

**INSTITUTIONAL CHANGE, INSTITUTIONAL ISOLATION AND BIODIVERSITY  
GOVERNANCE IN SOUTH AFRICA: A CASE STUDY OF THE TROUT INDUSTRY IN  
ALIEN AND INVASIVE SPECIES REGULATORY REFORMS**

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The world, in recent decades, has witnessed an incalculable surge in global “wicked” policy problems that have long-term, and most often irreversible, impacts, not least terrorism, climate change, biodiversity losses and desertification. Wicked problems are wicked because there is no single epistemological system that can adequately coordinate policy action for addressing them. Literature abounds with international case studies of opposition to national institutions that are designed to put into effect global and regional policies for resolving wicked problems. This raises questions about what constitutes reasonable institutions, how such institutions can be designed and why societies sometimes fail to develop such institutions despite the obvious need for them.

As a point of entry into these issues, the thesis adapted and extended the Northean (2007, 2012) macro meta-theoretic framework for studying the violence-development relationship, which focuses on the role of political and economic competition in the emergence of ‘right’ institutions that promote development, while containing violence. The Northean framework conceptualises two mutually exclusive social orders – the limited access order and the open access order – which provide the socio-cultural context for the evolution of specific institutions. The macro meta-theoretic framework was transformed into a micro meta-theoretic framework in such a way that the limited access order and the open access order co-existed in the evolution of specific institutions. This reconceptualisation built on Bromley’s (2004, 2006) two realms of public policy: the realm of reasons (legislative-judicial system) and the realm of rules (administrative system) as well as the feminist concept of epistemic violence, which broadened the concept of violence from being exclusively physical to including the sociocognitive. The feminist concept of epistemic oppression logically fitted into, and became a new sub-category of, Commons’ (1899, 1924, 1934) theories of sovereignty and negotiational psychology. The innovations showed that either of these realms can be a limited access order, while the other can be an open access order or both can be open access orders or both can be limited access orders.

The conceptual innovations were then used as an interpretive scheme in analysing the evolution of the South African invasive alien species regulatory reforms under the National

Environmental Management: Biodiversity Act of 2004, using a case study of the trout sector, which was the most opposed to the reforms. There was a general perception among socio-economic sectors that utilise invasive alien species that the regulatory reform processes for the governance of such species had institutionally isolated the sectors. Because of this perception, the regulatory reform process was contested, and implementation of the Fifth Chapter of the Act, which deals with the governance of invasive alien species, was delayed for nearly a decade. The thesis evaluated whether institutional isolation existed and how and why it came to be since it has implications for the reasonableness of emerging regulatory institutions, economic performance of sectors and efficient allocation of fiscal resources in institutional design processes. A mixed methods methodology was used, which included data analysis techniques such as semiosis, exploratory factor analysis, econometric estimation and document analysis. Policy documents, an online survey and key informant interviews comprised the data.

The findings suggested six dimensions of institutional change that a theory of institutional change might have to address: the origin and continuity of pecuniary institutions; self-reinforcing mechanisms of the limited access policymaking order; succession and disbandment of the limited access policymaking order; exclusivity of negotiations in institutional design; tiers of institutional isolation; and the role of administrative discontinuities. Findings suggested that institutional isolation existed in the regulatory process, manifesting in three forms: administrative isolation, epistemological isolation and sectoral isolation.

Administrative isolation was the most complex of the three in that it also involved a less obvious process of institutional isolation in the form of administrative redefinition of opportunity sets that were already legislatively redefined. The mechanisms of institutional isolation through which administrative isolation was sustained were administrative financing of research and careerism. The two mechanisms created a revolving door-type scenario through which invasion biologists supplied the administrative agency with candidates for senior (decision making) positions and the administrative agency, in turn, demanded specific types of knowledge over which the same epistemic community had a monopoly. The revolving door-type scenario was found to ideologically and physically entrench invasion biologists into the regulatory community. The consequence of the

entrenchment was institutional hegemony, which manifested itself through the mechanism of epistemic violence insofar as the invasion biologists became the epistemic arbiters about what kinds of ideas and institutions really mattered in the governance of invasive alien species.

Econometric estimates suggested that the extent to which an emerging institution is perceived to be reasonable by regulated sectors depends on the extent to which the institution is designed in a participatory and inclusive manner (that is, using integrative knowledge systems), the extent to which the designers used credible evidence and contextualised international evidence as well as the extent to which the emergent biodiversity governance institution was anthropocentric. However, findings suggested that the South African regulatory reform process fell short on all these four dimensions of reasonable institutions, which is characteristic of institutional design process shaped by hegemonic social imaginaries, resulting in institutional isolation.

Emerging from the findings are several theoretical insights. Bush's (1987) concept of institutional spaces under the Veblenian Dichotomy was extended, the result of which was identification of two stable institutional equilibria – one ceremonial and another instrumental. The ceremonial equilibrium was a typical limited access policymaking order and was responsible for the historical and present emergence of regressive institutions. Findings also suggested that the entrenched invasion biologists ceremonially encapsulated the knowledge fund that had been accumulated since the 1980s, which could have facilitated the consensual design of regulatory institutions for invasive alien species without protracted controversy. Findings suggested that a limited access policymaking order could only be disbanded by the intervention of an external sovereign agent (in this case the office of the state president) since the administrative agency, and the epistemic community that advised it, adopted the solutions that were empirically tested and proposed in the 1980s only after the intervention of the external sovereign agent. The instrumental equilibrium repealed the contested prisoner's dilemma that was characteristic of the policy process and turned it into an assurance policy game by facilitating the identification of common interests. This finding logically links the study to a recent theoretical development in institutional theory – Ordonomics – which focuses on the causality between ideas and institutions.

The findings imply that it is possible to design reasonable institutions as long as integrative (transdisciplinary) knowledge systems, including the non-scientific knowledge of the resource users, are incorporated. Integrative knowledge systems facilitate semantic innovations, which create social DNA, but epistemic violence destroys social DNA. They also imply that reliance on unidisciplinary knowledge systems in institutional design induces a large and inefficient transaction cost burden of public policy on the fiscus and private agents alike because of the inevitability of controversy, especially for wicked policy problems.

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I declare that all references are accurately recorded and that, unless otherwise stated, all work herein is my own. I certify that this thesis has not been submitted for a degree at any other university. However, the following articles, based on this research, have appeared in part or in full:

MARIRE, JUNIOURS., 2015. The Political Economy of South African Trout Fisheries. *Journal of Economic Issues*, **49** (1), pp.47-70.

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To Letwin, Ephraim, Oshea, Nun and Naomi

### **1.0. Introduction**

Humanity through knowledge has become, as it were, “clueless” of how to solve environmental, political, economic and social problems of global dimensions, which through knowledge it first created. The oxymoron of a sustained increase in problems and an increase in epistemic communities, which implies a significant increase in knowledge, is a puzzling phenomenon. The Club of Rome describes the oxymoron as an “era of scientific and technological advancement [that] has brought us unparalleled knowledge and power, [yet] we are witnessing the sudden emergence of a “world problematique”” (Botkin *et al.* 2014, p.1). Max-Neef (2005, p.5) defines problematiques as “problems of global and long term impact” and whose “adverse trends are steadily strengthening” (Botkin *et al.* 2014, p.1). In their seminal paper, Rittel and Webber (1973, p.155) describe the problematiques as “wicked problems”, which are untameable policy problems simply because there are divergent social theories, belief systems and value systems that cannot satisfactorily coordinate resolution processes. Yet, “science has developed to deal with “tame” problems” (Rittel and Webber 1973, p.155) or as King (1993, p.106) puts it: “the great forte of science” for centuries has been the resolution of tame problems.

The Club of Rome states that increases in knowledge mean increases in power. The question is power for what - power to destroy or power to take corrective action? If the latter, how is the power used to address the problems? Whose knowledge and, therefore, whose power matters? As far as problematiques are concerned “none of them can be adequately tackled from the sphere of specific individual disciplines” (Max-Neef 2005, p.5). However, Max-Neef (2005, p.6) observes another problematique – “consolidation of academic prestige” – which leads to compartmentalisation of society’s knowledge fund and is the fundamental cause of the “cluelessness”, as it were, on how best to address the problematiques. Epistemic power is a major problematique. Max-Neef’s (2005) observation suggests that integrative knowledge systems will provide a long term solution to global/national policy problematiques. The integrative knowledge systems, as the Club of Rome puts it, must take into account the

*“human element”* and never “relegate their impact on human beings to secondary importance” (Botkin *et al.* 2014, p.4, emphasis in original).

Adopting the Sustainable Development Goals (SDGs), the United Nations General Assembly (2015) also emphasised that the 17 goals “are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.” The economic and the social dimensions deal with the human element, while the environmental dimension deals with the planet. The essence of the SDGs is to create sustainability in all “areas of critical importance for humanity and the planet” (UN General Assembly 2015). The UN General Assembly (2015) believes that the human element can only be adequately addressed if “the participation of all countries, all stakeholders and all people” is engendered. Participatory governance at all levels matters in sustainability. In fact, the SDGs make clear the fact that a “people-centred” agenda is critical in protecting both the environment and the people.

Environmental policy in all its dimensions, that include biodiversity policy and climate change policy, is a cross-cutting issue. It has been plagued by the problematic phenomenon not only as nature adversely feeds back in response to human-induced changes, but also because compartmentalisation of knowledge has increasingly hindered consensual solutions quite often. The problem also lies in another contended issue – “the society–nature problematic” (Castree and Braun 2001, p.2). In many countries and global processes in general, policies for redressing environmental problematiques are often framed as natural science processes (Bromley 2012, Degnbol *et al.* 2006, Haas 1992, Han 2015, Jentoft 2006, Norgaard 2007, Ostrom 2014a, Ostrom and Cox 2010). Castree and Braun (2001) argue that the conventional practice of viewing nature as “nonsocial... can lead not only to confusion but also the perpetuation of power and inequality in the wider world.” Castree and Braun (2001, p.5) axiomatise that “nature has never been simply ‘natural’... Rather, it is intrinsically social, in different ways, at different levels, and with a multitude of serious implications.” Similarly, Bromley (2012, p.19) emphasises that nature is a “social construction” and “shared mental objectification” of those who experience its effects. From a pragmatist’s point of view, people know nature by its effects on them because “[o]ur idea of anything is our idea of its sensible effects” (Peirce 1878, p.293).

To the extent that society's knowledge fund is compartmentalised and the sensible effects of nature differ from person to person, from group to group and from one epistemic community to another, it evidently follows that environmental policy deals with some of the wickedest problematiques globally and nationally. Such is the case with management of alien and invasive species. Selge *et al.* (2011, p.3089) points out that despite indisputable ecological impacts of alien species, "public opposition to the removal of non-native species has repeatedly delayed interventions, sometimes to the point where eradication has become impossible." One of the reasons for opposition, as Selge *et al.* (2011) argues, is that invasion ecologists have been playing multiple roles of classifying species, prescribing management actions and, to some extent, implementing the self-generated policy prescriptions usually with ineffective involvement of other key stakeholders.

Insofar as unidisciplinary approaches to management of alien and invasive species have been predominant, Han (2015, p.811) has characterised them as "[a]uthoritarian environmentalism". Authoritarian environmentalism simply means "exclusive groups of scientists and technocrats, dominate the policy process" (Han 2015, p.811). Bromley (1985, p.789) characterises authoritarian environmentalism as the "the myth of management". The myth of management is the mistaken believe that policymakers are omniscient and their teams of experts command all the requisite knowledge to address the policy problem. However, the problem arises when the teams of experts are drawn from the same discipline; they simply cannot have all the knowledge required to solve the problematique (Max-Neef 2005).

In policymaking, the problem is no longer limited to having rules to influence desirable behaviour, but also extends to "rules for changing rules" (Bromley 1985, p.789). That is, who has access to the policy arena to participate in defining how the process of institutional change must take place. Whose knowledge has to define the process of change? Unidisciplinary approaches to problematiques usually create "incongruent institutional structures (rules)" (Bromley 1985, p.790) insofar as such rules serve the interests of the group controlling the policy arena. Lack of harmonisation with rules in other realms creates conflicting opportunity sets.

Generally, in developing nations, there is an unguarded and innocent zeal to transplant environmental governance systems from advanced societies without contextualising them to

the stage of development of the adopting societies, which often leads to opposition by the general public. Bromley (1985) emphasises that this copy and paste mode of governance underpins the myth of management and is characterised by enactment of legislation and policies that unreasonably prohibit access to, and utilisation of, environmental resources. Bromley (1985, p.790), however, believes that such governance practices provide “perverse incentives at the local level where it suddenly becomes an act of honor to defy stupid institutional arrangements, and a necessity for survival as well.” Veblen (1914, p.25) calls stupid institutional arrangements “imbecile institutions” and Louis Junker, in the foreword to Clarence E Ayres’ book on the *Theory of Economic Progress*, calls them “zombie institutions” (Ayres 1996, not paged). An important argument is that sustainable development has to be contextualised by “taking into account different national realities, capacities and levels of development and respecting national policies and priorities” (UN General Assembly 2015).

Gore (2000) discusses the inevitable struggle that policymakers face between normative developmental nationalism and methodological internationalism versus normative developmental internationalism and methodological nationalism. The normative framework concerns itself with how a nation evaluates what it finds in the best interest of its national development, and it has to use a global explanatory framework, the results of which are contextualised to the normative developmental nationalism outcomes. The methodological/explanatory framework concerns how development policies are diagnosed whether national factors should be used or global factors in this interpretive analysis. The copy and paste approach to environmental governance relies on normative developmental internationalism (global norms determine how institutions must be adjusted) and methodological nationalism. The tendency in this case is the design of acontextual institutions.

Concepts such as authoritarian environmentalism, the myth of management, nonsocial conception of nature and compartmentalisation of society’s knowledge fund sit at the core of a phenomenon that can be conceptualised as institutional isolation. Simply put, institutional isolation is marginalisation of persons, groups or sectors from a policy process that they have constitutionally defensible rights to be part of. Legally, it might be taken as absence of administrative due process of law (Commons 2009, Mashaw 1980; 1981). Even when a person, group or sector takes part in the process, the participation might be ineffective for the reason that their input is not being valued by those charged with the responsibility for making

decisions (Code 2008, Dotson 2011, Medina 2011, Walsh 2004). Béné and Neiland's (2006) characterisation of inequitable natural resource governance processes closely describes the phenomenon of institutional isolation. To them, equity in governance processes is a multidimensional concept that consists of participatory equity; equitable access to the natural resource; equitable distribution of transaction costs of policy adjustment; and equitable distribution of economic benefits from a resource. The absence of this equity implies institutional isolation.

The problem of sectoral marginalisation and how it affects sectoral development and contribution to local economies has been examined in the context of rural agriculture in developing countries (Bromley 2008b; Bromley 2008c). The analysis has been extended to studies of isolation of marine capture fisheries in some developing countries in terms of sector exclusion from the development policy agenda (Libecap 2009, Thorpe *et al.* 2005).

Since institutions are legal and non-legal rule systems that define fields of civil, political and economic liberty for individuals or groups in their interaction (Bromley 2008a, Hodgson 1998a, North 1990, Ostrom and Ostrom 2014), institutional isolation might also imply existence of regressive institutional arrangements or absence of facilitative institutions. Thus, sectoral institutional isolation is a multidimensional concept and a macro level problem that manifests in sectoral exclusion from the development policy agenda of a country, in weak regulation and policing and in the absence of, or uneven enforcement of, policies and authoritarian environmentalism among other dimensions (Bromley 2008b, Degnbol *et al.* 2006, Han 2015). The present study evaluates the evolution of a perceived phenomenon of institutional isolation in the evolution of biodiversity governance institutions in South Africa.

### **1.1. Knowledge, power and policy change**

Arguing that economics must be a science of social provisioning, which makes it a processual science, Dugger (1996a, p.33) emphasised that the process of economic change “opens up new struggles between the underdogs and topdogs.” The argument is that economic analysis inevitably is a study of conflict rather than harmony (Commons 1924b). The conflict is always between the more powerful and the less powerful. Commons (1931, p.648) also characterises policy processes as simultaneously exhibiting “conflict, dependence and order”. The process of economic change, as reflected in changing policies, is a process of redistributing economic

advantages and redefining the structure and nature of social provisioning (Bromley 2004a; 2008a, Commons 2009).

What makes a topdog a topdog? And what makes an underdog an underdog? Institutional economics from all its facets conventionally locates power in property, politics and moral systems such as religion (Ayres 1996, Commons 2009, Dugger 1996b, Rutherford 2011, Valentinov 2009). The topdogs often are the economically powerful, the socially powerful, the politically powerful and the spiritually powerful (Bush 2009, Hayden 2003, Ramstad 1991, Veblen [1899] 2005). Such systems tend to arrange society in a means-ends continuum, with the rest of society organised as means to the attainment of the ends of powerful interests. Dugger (1980) and Hickerson (1982) characterise such a means-ends arrangement as a manifestation of institutional hegemony. Others have observed the role of corporatocracy, which is a type of institutional hegemony, in shaping the evolution of socio-economic and environmental policies (Bolduc 2009, Hayden 2003; 2011, Norgaard 2007, Valentinov 2015, Waller Jr 1987). Corporatocracy is a manifestation of power through the institution of property and the legal power of liberty, which can be civil, political, or economic (Commons 1942, Parsons and Commons 1942). Institutional isolation is likely to be prevalent in societies characterised by political, economic and social inequalities insofar as “processes of change more often lead to cumulative inequalities and outright domination” (Dugger 1996a, p.33).

While knowledge is considered a critical input into policy change (Hayden 2006, Mayhew 1981, Rutherford 2011), the relationship between knowledge and power in the determination of the rate, extent and nature of institutional change remains an underexplored institutional issue. The Veblenian Dichotomy, which is discussed in Chapter Two, does theorise the role of diversion of knowledge from problem resolution by those who hold the power to “manipulate the nature and the flow of information” (Dugger 1996a, p.34). Within the Veblenian Dichotomy, knowledge that generically advances the human life process is instrumental, but powerful interests constrain the application of such knowledge to social problems if it adversely alters their benefit streams in the status quo arrangement (Ayres 1996, Bush 1987; 1989, Veblen [1899] 2005). In fact, all knowledge from the arts and sciences is conceptualised as instrumental in the Veblenian Dichotomy, but belief systems, cultural systems, myths, customs, traditions, superstitions and legends are usually assumed to be inhibitive to progressive social change (Bush 1987, Hayden 1982; 2006, Rutherford 2011).

Recent work in Ordonomics, which investigates the relationship between knowledge and institutions, has just begun to demonstrate how resistance to the application of knowledge to humanity's common problematics can be eliminated or minimised (Hielscher *et al.* 2012, Petrick and Pies 2007, Valentinov 2015). When North (1990), within a choice theoretic framework, gave careful thought to the causal links between knowledge, ideology and institutions, it left him with an unresolved puzzle, which Ayres (1996), so to say, addressed before Douglass C North discovered it. However, institutionalists have not explored any further some of Clarence E Ayres' postulations about the knowledge-ideology-institutions nexus. Thus, this is a fertile area for studying the process of institutional change. The thesis situates itself within this framework of institutional theory which continues to expand, especially as knowledge becomes epistemically differentiated and epistemic integration in policy processes increasingly is becoming elusive (Max-Neef 2005).

## **1.2. Overview of South African biodiversity policy challenges**

South Africa today is battling with the control and eradication of alien and invasive species whose presence can mostly be attributed to the short-sighted actions of nature lovers who "scoured the earth for new species and advocated liberal introduction laws" (Simberloff 2007, p.882). Generally, the search for variety in nature resulted in influential individuals "exhorting lovers of nature to 'beautify the countryside' and offering seeds of alien plants for the purpose" (Smout 2003, p.12). Some species were introduced with all good intentions such as for controlling soil erosion, for forestry, for agriculture, for ornamental purposes, for food and for trade, but they gradually became some of the worst invasives (De Moor and Bruton 1988, Macdonald and Jarman 1985, Richardson 2011, Van Wilgen and Impson 2011).

Wynberg (2002, p.236) summarised evolving threats to biodiversity in the 1990s in South Africa stating that

"16.5% of terrestrial habitats had been transformed for crop forestry, industry and human settlements. 50% of wetlands has been transformed for crop cultivation, forestry, industry and human settlements. 10% of terrestrial habitats has been degraded through over-use and poor management. 8% of terrestrial and riparian habitats is heavily infested by alien vegetation... [Similarly], 15% of plant species, 14%

of bird species, 24% of reptile species, 18% of amphibian species, 37% of mammal species [and] 22% of butterfly species [were threatened].”

To address the evolving ecocide, South Africa initiated a nationally government-funded programme in 1995 called the Working for Water programme, which is described as “the world’s most comprehensive initiative to clear invading alien plants” (Van Wilgen *et al.* 2012, p.8). Estimates also indicate that a value of approximately USD 650 million in potential ecosystem goods and services is lost every year due to invasion by alien plants (Van Wilgen *et al.* 2012). Without management and control measures, the value of ecosystem goods and services lost would have been approximately USD 4.2 billion per year (Van Wilgen *et al.* 2012). One of the greatest threats of invasive plants that the South African society is presently experiencing is water insecurity (Moran *et al.* 2013, Richardson 2011, Richardson and Van Wilgen 2004). Beyond immediate effects on physical water scarcity, alien plants have also destroyed ecological capital and productivity of water and land resources (Macdonald 2004, Richardson and Van Wilgen 2004, Van Wilgen *et al.* 2011).

While, until recently, aquatic ecosystems have not received systematic scientific assessment relative to their terrestrial counterpart, studies have illustrated the extinction of amphibians, insects, indigenous fishes as well as trophic cascades of significant proportions due to invasion by alien fish species (Ellender and Weyl 2014, Karssing *et al.* 2012, Rivers-Moore *et al.* 2013, Shelton 2013, Shelton *et al.* 2014). Monetary evaluation of the loss in ecosystem goods and services attributable to alien fishes has not yet been carried out, but socio-economic contribution of trout has been analysed on a localised scale (Du Preez and Hosking 2011, Du Preez and Lee 2010a; 2010b, Gatogang 2009, Nicholson and Snowball 2014).

Figure 1-1 illustrates the economic burden imposed by invasive plant management on the South Africa government. The amount of land cleared of invasive plants steadily increased and stabilised at an average of 140 000 hectares per year, but follow-up clearance stood at an average of 377 000 hectares per year. On average, South Africa has been spending USD 56 000 per hectare per year to clear alien and invasive species. What is evident from Figure 1-1 is that cleared land requires significant monitoring (follow-up clearance) expenditures or it gets re-invaded quickly as some new invasive species that were waiting for an opportunity to emerge

germinate, while old ones re-colonise the land. The burden is ever increasing at an increasing rate.

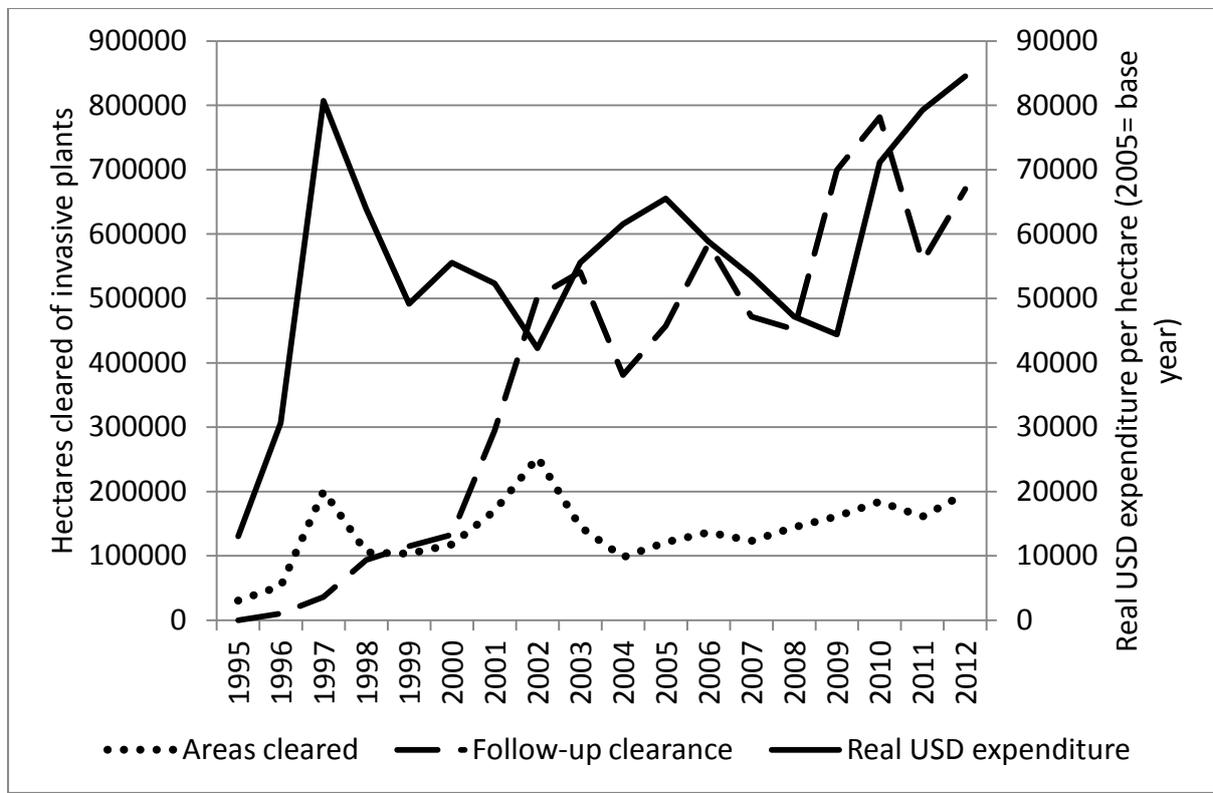


Figure 1-1: Invasive species burden in South Africa

Source: Christos Marias (2013) Affidavit for Department of Environmental Affairs

Estimates of total hectrage invaded and under threat from effects of invasion in South Africa range between 10 million and 20 million hectares (Richardson 2011, Richardson and Van Wilgen 2004, Van Wilgen *et al.* 2001, Van Wilgen *et al.* 2004). Invaded land was expected to double in a short space of time (Van Wilgen *et al.* 2004). One cannot avoid concluding that the loss of biodiversity in South Africa is a national problematique with global dimensions. But, why does management of alien and invasive species face opposition? It is puzzling that with such indisputable evidence of the damage to ecological capital some social groups oppose proposed institutional arrangements for addressing the problem of invasives.

The Department of Environmental Affairs (DEA) has for the past decade attempted to develop regulations for alien and invasive species without success. Since the process began in 2004, the DEA only successfully promulgated the regulations towards the end of 2014. One of the sectors that withstood the regulatory reform process was the trout sector. The thesis used the trout

sector as a case study to illuminate discussions on the theory of institutional change and on whether there was institutional isolation or not.

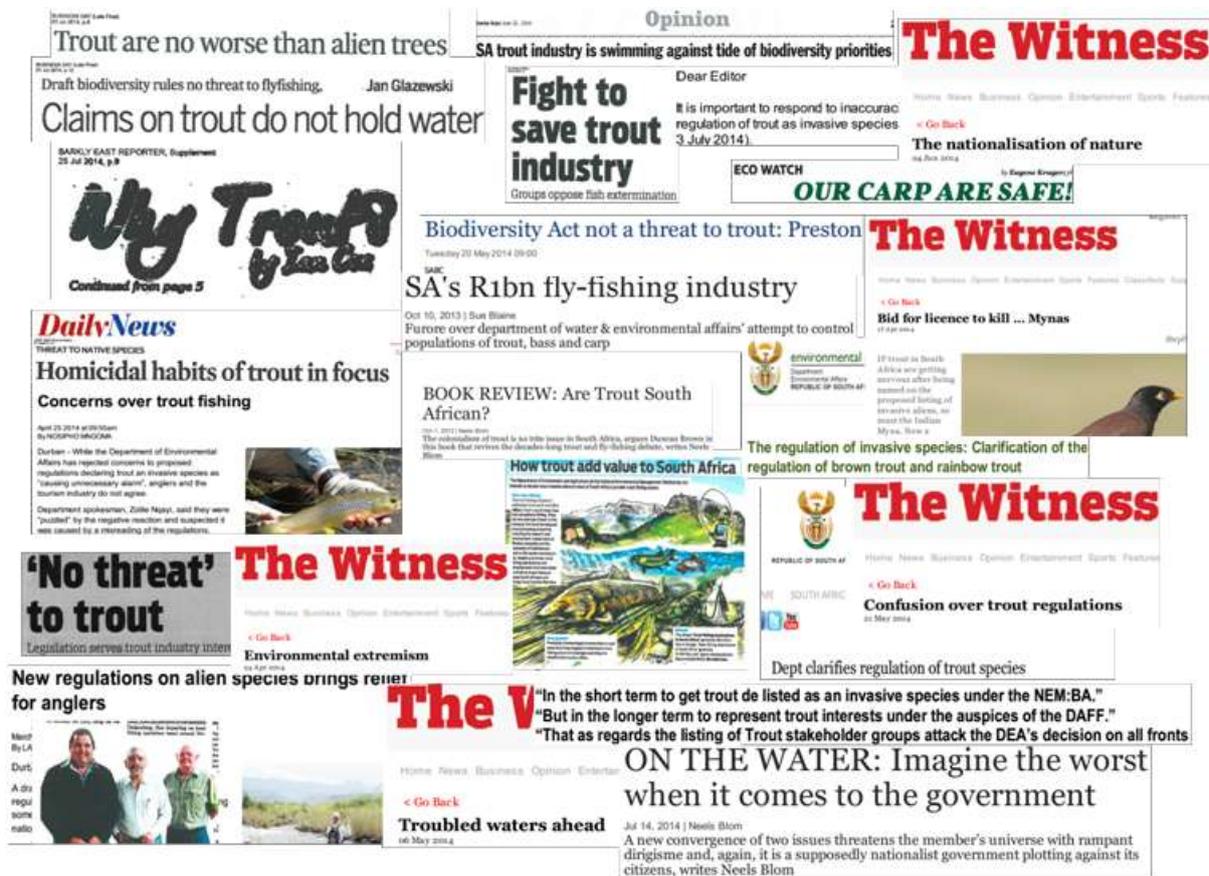


Figure 1-2: Some media themes on regulation of trout between October 2013 and August 2014

Source: Author’s compilation from various media

Figure 1-2 illustrates some of the headlines that frequented the media between 2013 and 2014. The trout sector, the DEA, invasion biologists or other parties such as journalists were addressing the controversy over the regulation of trout. Headlines such as the “nationalisation of nature”; “environmental extremism”; “fight to save trout industry”; “South African trout industry swimming against tide of biodiversity priorities”; and “no threat to trout industry” illustrate several dimensions of the problem. This was a battle between anthropocentric (people-centred) and biocentric/ecocentric (conservation-centred) interests.

### 1.3. Goals of the Research

The overall objective of the study was to evaluate the process of institutional change in the governance of biodiversity and in particular, economically useful alien and invasive species

in South Africa. Specifically, the thesis set out to [1] examine, using a case study of trout, the nature and cause of hitherto perceived institutional isolation and its potential economic effects on sectors utilising alien and invasive species; [2] evaluate the role of institutional entrepreneurship in the trout sector in trying to mitigate the effects of hitherto perceived institutional isolation; and [3] examine the governance and management preferences of the sectors utilising alien and invasive species, using the case study of the trout sector. Ultimately, it is hoped that a critique and contribution to the theory of institutional change, using the trout regulatory reform controversies, will be made. These goals can be reduced into the abductive hypotheses framework presented in Figure 1-3.

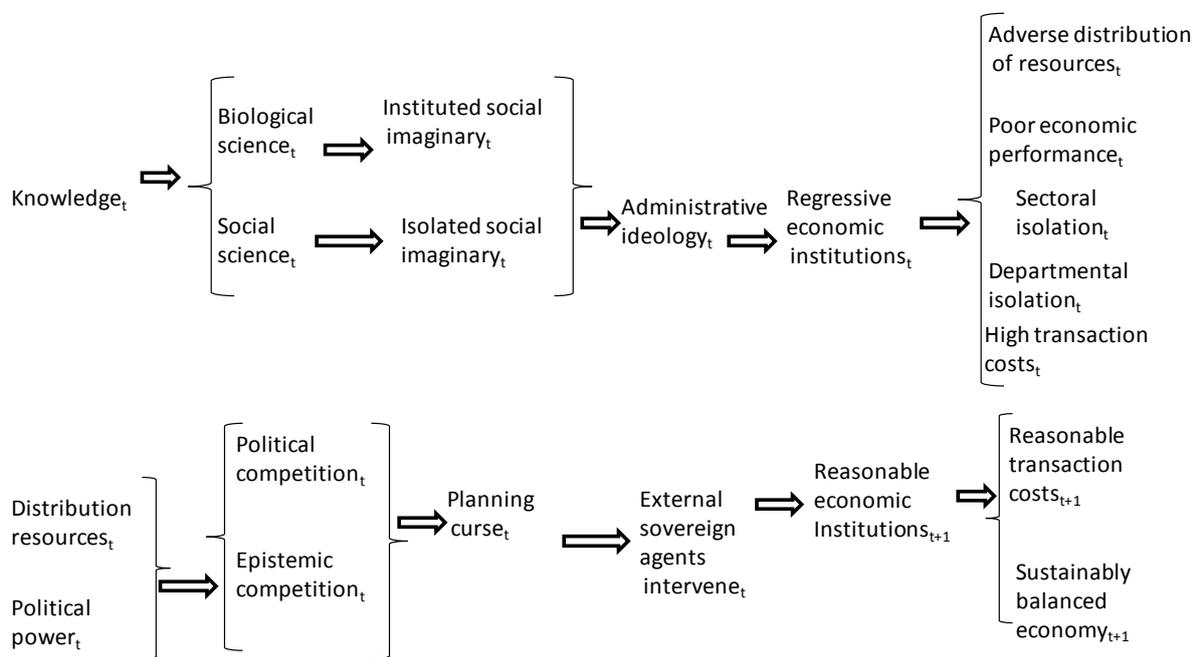


Figure 1-3: Study hypotheses

The goals of the research can be framed in an agency-structure relationship in which knowledge systems are the base institutional structure that underpins epistemic and functional differentiation in policy design processes at a time  $t$ . This differentiation implies existence of dominant epistemological systems (instituted social imaginaries) in policy design and marginalised epistemological systems at time  $t$ . Essentially, this epistemic exclusion has implications about the nature of emergent economic institutions and the redistribution of economic and political advantages that follow. This epistemic differentiation creates and underpins a particular administrative ideology (governance culture) in the governmental agency that is influenced by a particular scientific persuasion at

a time  $t$ . It is hypothesised that the administrative ideology influences the nature of economic (including environmental) institutions that emerge at a time  $t$  and the consequences of such institutions are hypothesised to include institutional isolation and other associated effects like high transaction cost burden of the emergent regulatory regime. Dissatisfied with the consequences of regressive economic institutions at time  $t$ , depending on the economic resources and political power possessed by the participants (insiders and outsiders) in the policy process, political and epistemic competition unleash dynamic forces that generate repeated planning cycles that fail to resolve the problem. These repeated planning cycles are hypothesised to be planning curses and their role is to invite parliamentary and judicial scrutiny into the policy implementation process, which dissipates the impoverishing Nash institutional transitional equilibria leading to reasonable economic institutions and the social desired economic and environmental outcomes at time  $t+1$ .

Based on the framework of hypotheses, several questions can be invoked to guide the falsification process. Why was the process of regulating trout controversial? Did institutional isolation exist in the first place? Why did it exist? What forms, if it existed, did it assume? By what mechanisms was it sustained, if it existed? Who were the key players and what power did they possess in the entire reform process? What arguments did the rival social groups use and how did those arguments shape the evolution of biodiversity legislative and regulatory reform processes in South Africa? By what criteria did the Department of Environmental Affairs weigh the competing arguments against each other in the process of choosing the most reasonable ones that became national legislation and regulations? The thesis is concerned with offering an explanation of the dynamics of institutional change in the evolving South African biodiversity problematique.

To answer these questions, a mixed methods research methodology was utilised. The qualitative component, which was the major aspect of the thesis, employed methods such as semiosis, document analysis and interview analysis. Generally, an abductive epistemological framework, with a nuanced combination with inductive analysis, was used. The objective was to reduce the qualitative data into a set of conclusions about institutional change. The quantitative component provided a deductive framework of confirming and testing, using online survey data for the trout industry, some of the emerging postulates in

the qualitative component. However, the quantitative and qualitative components were not carried out in a strictly sequential manner.

#### **1.4. Synopsis of subsequent thesis chapters**

The thesis is organised into nine chapters. Chapter 2 reviews the theory of institutional change from the Original Institutional Economics (OIE) perspective. The chapter is divided into the OIE of Thorstein B Veblen's tradition and the OIE of John R Commons' tradition. Chapter 3 reviews the New Institutional Economics (NIE) critique to the OIE. However, Douglass C North's tradition is the main focus of the review. A working integrated institutionalist framework that incorporates Douglass C North's social orders into the Veblenian Dichotomy, while making the social orders an ontological framework for John R Commons' negotiational psychology in an evolutionary framework is also presented in Chapter 3.

Chapter 4 sets forth the research methodology and specific methods used in each subsequent chapter. Each of the subsequent chapters – 5 through 8 – is a results chapter approaching the research problem from a different angle so as to pin down the real issues behind the intensity of the regulatory reform controversy and the nature of institutional isolation.

Chapter 5 uses economic theory to review the National Environmental Management: Biodiversity Act (NEM:BA) of 2004. The chapter presents institutional dissonance between the NEM:BA and the National Environmental Management Act (NEMA) of 1998 as well as between the NEM:BA and the Republic of South Africa Constitution of 1996. Chapter 6 gives a retrospective evaluation of how the institutional dissonance came to be and why the NEM:BA developed into the controversial law that it became during the past decade.

Chapters 7 and 8 discuss institutional change using the case study of the trout sector. Chapter 7 econometrically evaluates perceptions of the trout industry regarding the reasonableness of the last draft of alien and invasive species regulations that was published in February 2014 by the DEA. An online survey of the trout sector provided the data for this analysis. Chapter 8 presents semiotic analysis of the entire regulatory reform process from 2004-2014. This analysis is important for one reason: it reveals important dynamics that interview data, quantitative analysis and submissions made by the trout sector to the DEA

could not reveal. The chapter gives a grand overview that highlights major signposts that illuminate interview data analysis and quantitative analysis. Chapter 9 presents discussions of the thesis' findings in light of broader literature from policy sciences that include institutional economics and concludes the thesis with recommendations and suggestions for future research.

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### Old institutionalism on institutional change, knowledge and power

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*“If a man keeps cherishing his old knowledge so as continually to be acquiring new, he may be a teacher of others.”*

*The Life and Teachings of Confucius (Legge 1909, p.124)*

#### **2.0. Introduction**

This chapter reviews Original Institutional theory of institutions and institutional change. It first discusses the theory of institutions as postulated by all institutionalist schools, not least the Veblenian School, the Commonsian School and New Institutional Economics. While there are still differences in how institutions are conceptualised, there is a general tendency towards convergence of thought. After a brief discussion of institutions, the chapter proceeds to review theories of change of the two Original Institutional schools – the Veblenian and the Commonsian.

#### **2.1. Institutions**

The term institution has been variously defined, but three strands of definitions can be found in the literature based on whether the analysis is focusing on emergence, persistence or behavioural outcomes of an institutional system (Mäki, Gustafsson and Knudsen 1993). Mäki et al. (1993, p.12) emphasise that “no completely satisfactory definition of the concept of institution is available in social science literature”. North (1991, p.97) emphasises that institutions “humanly devised constraints that structure political, economic and social interaction”. Hodgson (2007b, p.96) also emphasises that “Institutions are systems of established and embedded social rules that structure social interactions”. For purposes of this thesis, it is sufficient to characterise an institution as consisting of structural and relational patterns functionally correlated by a value system in human interactions in social processes (Bromley 2006, Bush 1987). Bush (1987, p.1076) characterises society as consisting of “a set of institutional systems,” with an institutional system comprising “a set of institutions”, and an institution being defined as a “set of socially prescribed patterns of correlated behaviour.” North (1990) differentiates an institution from an organisation,

rendering organisations to be players and institutions to be rules of the game played. Since an organisation is a nexus of institutions, legal and social power relationships and values, it is an institutional system. Hodgson (2007b) believes that organisations are special institutions and are subsets of institutions. North's (1990) distinction is somewhat restrictive. Linarelli (2010, p.83) similarly asserts that "[o]rganizations are Institutions" and Ménard and Shirley (2008, p.283) also conceptualise an organisation as a "nexus of contracts", and contracts are institutions. At best, an organisation is a structural arrangement of institutional roles (Dugger 1980). The Original Institutional Economics (OIE) does not differentiate an institution from an organisation because the former is a habitual rule of relational action, while the latter provides a framework for structuring the relations (Bush 1983; 2009, Hamilton 1919).

The emphasis on social prescription in the broader definition of an institution, at once, reveals that institutions are "collective action in restraint, liberation, and expansion of individual action" (Bromley 2008a, p.229). The point is that an institution performs multiple functions simultaneously. It creates rights (capacities) and duties; it creates liberties and exposures; it creates immunity and liability (Commons 1924b, Hohfeld 1913; 1917). An institution defines what individuals can/cannot, must/must not or may/may not do (Bromley 2007; 2008a; 2009, Commons 1924b; 1931; 1934; 2009, Hiedanpää and Bromley 2012). Thus, an institution defines the opportunity set or "realms of choice (fields of action) for individuals" (Bromley 2008a, p.229). By performing these functions, institutions stabilise expectations in human interactions and facilitate order (Galiani and Sened 2014, North 1990) or as Hodgson (2007b, p.108) puts it, "institutions lead to regularities of behaviour [and] concordant habits are laid down among the population, leading to congruent purposes and beliefs."

Insofar as an institution prescribes behaviour, it requires an authority system (sovereignty) that enforces the prescriptions and proscriptions (Bromley 2008a, Commons 1899a; 1899b; 1899c, Dawson 1998, Dugger 1996b, Hodgson 2007b). Society and therefore, an institution, predate and postdate an individual (Albert and Ramstad 1998, Hodgson 2003a). Commons (2009, p.74) emphasised that "individuals... are always... members of a concern in which they come and go, citizens of an institution that lived before them and will live after them." There is a bidirectional causal relationship between individual agency and an institution.

Hodgson (2007b, p.108) also succinctly argued that “any single individual is born into a pre-existing institutional world, which confronts him or her with its rules and norms.”

Since all individuals are born into a societal context that has complex institutions such as laws, norms, legends, language, property, power, reciprocities, conventions, taboos, mores, ceremonies, beliefs, religion and traditions, they are instituted agents (Commons 2009, Hayden 2006, Veblen 1914). They have “institutionalized minds” (Commons 2009, p.638) because “they are embedded in existing customs and rules” (Bazzoli 2000, p.9). The institutionalised minds enable people to comply with the prescribed and proscribed patterns of behaviour willingly (Bush 2009, Hodgson 2007b).

## **2.2. Institutions and value systems**

According to Bush (2009) and (Hayden 2006), values are standards of judgment. Society derives values from culture and knowledge systems such as science, beliefs, religion and legends. Bush (1987, p.1076) points out that by defining an institution as a “set” it implies that elements within an institution are functionally interrelated. Original institutionalists insist that the value system has the task of correlating agent behaviour in institutions (Bush 1983; 1987; 2009, Hayden 2006; 2009).

The value system, however, is dualistic in that it comprises ceremonial values and instrumental values. Ceremonial values are invidious and discriminatory on grounds such as propertied/non-propertied, male/female, rich/poor, race or some such grounds (Bush 1983, Hickerson 1987). Since ceremonial values have their ground in invidiousness, they favour particular classes of society and, thus, the favoured classes have every interest in perpetuating the status quo (Ayres 1996, Bush 2009).

Tool (1994) and Veblen (1914; [1899] 2005) draw attention to the fact that instrumental values orient society towards the continuation of the human life process and culture; to the fullness of human development; and to the greatest possible provision of the material necessities of life. Instrumental values are alternatively defined as technological values, where technology is broadly defined as tools, skills and scientific (tacit and communicable) knowledge (Ayres 1996, Elsner 2012, Hayden 2006, Mayhew 1981). It follows, therefore, that ceremonial and instrumental value systems are dialectical (Bush 1983; 1987, Hayden 1982; 2006; 2009). Two behavioural systems are similarly evident: ceremonial behaviours

and instrumental behaviors. Ayres (1996) and Bush (2009) describe ceremonial behaviours and values as regressive, but the instrumental behaviours and values as progressive. The former are past-binding, but the latter are progressive (Hayden 2006).

The foregoing characterisation of an institution, value systems and behavioural systems is an elaboration of the Veblenian Dichotomy, which, as Tool (1977) emphasised, explains instituted processes as consisting of ceremonial systems and instrumental (technological) systems. Veblen (1914, p.25) observed the prevalence of ceremonial institutions in his day, which continue in various shades today, and described them as “imbecile institutions” or “zombie institutions” as Louis Junker put it in the foreword to Clarence E Ayres’ book on the *Theory of Economic Progress* (Ayres 1996, not paged). To Thorstein B Veblen, such institutions were inhibitive to social progress and, therefore, irrational in the broader scheme of things (Rutherford 2011, Veblen 1914, Veblen [1899] 2005). Instrumental systems were facilitative of the continuation of the human life process in its fullness. The Veblenian Dichotomy constitutes a central construct in OIE theoretical development in the Veblenian tradition. Parallel, but complementary to the Veblenian tradition, is John R Commons’ institutional economics, which focused on collective action and legal-economic analysis of the capitalist economy.

Therefore, the OIE views instituted processes as consisting of value systems, institutional systems and social interactions within a defined institutional structure. The value system is the lubricant of the institutional structure. A breakdown in the value system, leads to dysfunctional institutions and, consequently, undesirable results. Bush (2009) argues that ceremonial systems use a valuation criterion of ceremonial adequacy to decide the feasibility or non-feasibility of a proposed institutional adjustment. They rely on the logic of sufficient reason (purpose/final cause) (Bush 1987, Hickerson 1987). In this class of systems, Veblen (1914) placed the judiciary’s common-law method of developing law as a ceremonial system because it works on the basis of sufficient reason and authority to authenticate received legal principles. Because of this classification system, the tendency in the Veblenian tradition is to treat institutions as ceremonial (Ayres 1996, Bush 1983, Hayden 1982; 2006, Rutherford 2011) even though some institutions play an instrumental role (Brinkman and Brinkman 2006, Rutherford 2011). Brinkman and Brinkman (2006, p.1022) emphasise that

“the Veblenian Dichotomy does not infer that *all* institutions served ceremonial functions” (italics in original).

The instrumental system, on the contrary, utilises instrumental efficiency as a valuation criterion under the logic of “efficient cause” (Bush 1987, p.1080, Veblen 1914, p.292). Efficient cause focuses on objective and non-teleological causal explanation. The OIE postulates that society is ever in search of instrumentally efficient ways to promote the continuity of life (Hayden 2006). Instrumental behaviour necessitates technological innovation, broadly defined as growth of society’s knowledge fund (Bush 1987). Every new piece of knowledge, tool or material is a combination and recombination of existing tools, materials and knowledge to produce new instrumentalities and new instituted processes (Ayres 1996). Evidently, at the core of the OIE is the process of the growth of knowledge in the arts and sciences, which underpins instrumental systems. It is the heart of a democratic system (Hayden 2006). The Deweyan view is that the instrumental process is a technological growth process, which is a knowledge growth process by democratic participation (Dewey [1930] 2001, Dewey and Bentley 1960).

### **2.3. Original Institutionalist theory of institutional change**

This school of thought has its foundations in William James’ evolutionary psychology of habits and instincts, in the pragmatism of John Dewey and Charles Sanders Peirce and Darwinian evolutionism (Hodgson 2003b). The basic tenet of this brand of pragmatism is that truth is known by its effects or consequences (Peirce 1905). Hayden (2006, p.21) identified three pillars of pragmatism as “(1) the transactional approach to science, (2) a problem orientation, and (3) judging by consequences.” Thus, pragmatism is an epistemological program (theory of truth), an evaluative approach and a practically-oriented philosophy (Bromley 2008d, Commons 2009). A transactional approach emphasises the role of trans-subjective and intersubjective knowledge generation processes in policy processes and interdependencies between institutional systems and the ecological system.

Tool (1977) synthesised an emerging theory of institutional change from the works of Thorstein B Veblen, John Dewey, Clarence E Ayres and Fagg J Foster. From the synthesis, he first tendered an Original Institutional Economic (OIE) theory of value that acts as a guiding compass in studying the rationale for, and choices of, institutional adjustments. Of the two

traditions, the Veblenian (“intellectual descendants” of Thorstein B Veblen) and the Commonsian (“intellectual descendants” of John R Commons) (Ramstad 1989, p.770), the latter is the lesser-studied (Ramstad 1995) in terms of theoretical advances such as have been attained in the Veblenian tradition. Ramstad (1989), however, believes that the Commonsian reasonable value and the Veblenian instrumental value are substitutes because they espouse different philosophical frameworks. John R Commons sought to improve capitalism, while Thorstein B Veblen wanted it destroyed (Ramstad 1989). The Commonsian approach was a legal-economic analysis of the evolution of institutions of capitalism so as to create a theory of reasonable value and reasonable capitalism (Commons 1924b).

#### **2.4. Veblenian theory of institutional change**

The genesis of this school is Thorstein B Veblen’s 1898 essay, *Why is Economics not an Evolutionary Science?*, which Rutherford (1998, p.464) describes as “a manifesto for an evolutionary economics, a methodological outline only.” Thorstein B Veblen’s envisaged theory of institutional change “was one of new technology changing economic conditions, and new economic conditions leading to new ways of thinking and to new institutions through a (non-intentional) process of ‘habituation’” (Rutherford 1998, p.463). The Darwinism of his theory lies in the role of non-intentionality of instinctual and habitual ways of thought, where habit is a seat of mental potential and capacity (Hodgson 2003b, Rutherford 1998). This generalises institutional change as a “purely causal processes of variation and natural selection... analogous to Darwin’s in the general sense of being free from teleology” (Rutherford 1998, p.465).

Ayres’ (1996) integration of the Veblenian Dichotomy with John Dewey’s instrumental theory of knowledge creation (value creation) provided the foundation for a comprehensive synthesis of a later theory of purposeful institutional change. Several scholars in the Veblenian tradition attribute to Clarence E Ayres the role of an integrative fountainhead for the modern theory of purposeful institutional change in that tradition (Bush 1983; 1987, Hayden 1982, Hickerson 1987, Mayhew 1981, Rutherford 1996; 2011, Tool 1977). Through his integrative analysis, Ayres (1996) demonstrated that the technological process was the fundamental driver of the process of institutional change as it disrupted the ceremonial

system leading to behavior-value-institution disjunction. The disjunction set in motion deliberate efforts to adjust the institutional system in line with the technological innovation.

Foster (1981c), however, was the one who synthesised the Veblenian-Deweyan-Ayresian emerging thought into a nascent but coherent theory of purposeful institutional change. His starting premise was that economics was a problem-solving science (Foster 1981c). From the start, the OIE was concerned with economic and social problems that were hindering the attainment of full human development, and this view runs through any recent or old OIE work that one reads (Bush 2009, Commons 1931; 2009, Rutherford 1996, Veblen 1898a; 1898b; 1898c; 1914; [1899] 2005, Witte 1954). Witte (1954, p.132) described his mentor's approach as "Commons' philosophy of economics in action." Commons (1924b, p.viii) described his institutional theory as "practical applications of a theory of Reasonable Value to current problems". Thus, the OIE was conceived as an applied economics paradigm which also had commitments to theoretical economics (Hodgson 1998b; 2003a; 2003b, Myrdal 1978, Ramstad 1989, Rutherford 1996, Witte 1954). Rutherford (2011, p.345-346) also states that progenitors of original institutionalism had "faith in the power of empirical scientific investigation to provide solutions to social and economic problems."

#### **2.4.1. The economic problem defined**

Foster (1981c) defines a problem as the difference between 'what ought to be' and 'what is'. This conceptualisation makes positive and normative aspects of institutional adjustment inseparable (Ayres 1996, Dewey 1939, Hill 1978, Ramstad 1989). 'What is' alone cannot define a problem and 'what ought to be' alone cannot define a problem. Foster (1981c, p.924) postulated that the "disrapport among human activities that are supposed to be correlated in continuance of the productive process" is a real economic problem. Foster (1981b, p.899) also asserted that a problem existed whenever "existing patterns of human relations prevent full application of the existing state of the arts." Relevant solutions to economic problems take the form of "institutional adjustment" (Foster 1981c, p.927) to "restore acceptable institutional integration" (Foster 1981c, p.924). The roles of valuation, purposeful action and choice are central in this conceptualisation.

This conceptualisation of a problem achieved two things. First, it dislodged the "Cartesian dualisms" (Bush 2009, p.295) – the subjective/objective dichotomy and positive/normative

dichotomy among other dichotomies – and made “inquiry into the nature of institutions and the processes of institutional change ... inherently normative” (Bush 1987, p.1078). Foster (1981c) locates value in knowledge (the technological/ instrumental process), which is at odds with the Neoclassical Paradigm and the New Institutional Economics paradigm, which locate value in price (Mokyr 2014, North 1990; 1992; 1993, North and Thomas 1970, Robbins [1945] 2007).

The state of society’s knowledge fund defines the technological frontier. Every society, inevitably, lives below its technological (knowledge) frontier because ceremonial interests expropriate and withhold part of the knowledge fund from instrumental application to societal problems insofar as the new knowledge challenges ceremonial interests (Bolduc 2009, Bush 1983; 1987; 2009, Waller Jr 1987). Others have attributed the persistent inability of nations to live on their knowledge frontier to the problem of a cultural lag (Brinkman and Brinkman 2006, Glade 1952, Mueller 1938). It is, therefore, obvious that there is always a gap between what is and what ought to be, which marks the relevance of economics and makes purposeful institutional change continuous (evolutionary by artificial selection).

#### **2.4.2. Theory of social valuation**

The second effect of Fagg J Foster’s conceptualisation of a problem was that it made institutional change a *problem-driven process* rather than an incentive/price-driven process. Original institutional economics utilises pragmatism as its philosophical foundation and problem resolution is the thrust of pragmatism as the philosophy of science, the theory of truth and the theory of human action (Bromley 2006; 2008a; 2008d, Price 2013, Rorty 1982; 1998). To solve problems is to adjust institutions, but it requires social valuation. It has been variously argued that economists cannot evaluate the existing problematic institutional arrangement that society wants to change using elements of that problematic institutional arrangement as evaluative criteria (Bromley 2007; 2008a, Hiedanpää and Bromley 2014, Norgaard 2010, Norgaard and Bode 1998). Insofar as institutions, such as the price system, are functions of property and liberty (Bromley 2006, Commons 1942, Foster 1981b, Veblen 1914), which are integral components of the existing problematic institutional arrangement just as preferences and tastes are, price-based and willingness to pay-based economic valuations often sanctify the status quo (Bromley 2007, Dawson 1994; 1998, Dugger 1980,

Foster 1981b, Hayden 2003). Foster (1981b, p.899) concluded that “Prices are significant, but they cannot tell society what it ought to do.”

Since what ought to be is located in the outwardly expanding stochastic knowledge/technology frontier and in particular, in the idle part of the accumulated fund of knowledge, institutional change becomes a *deliberative process* to decide which parts of the knowledge fund have relevance to the problem. The evaluation processes require criteria (Hayden 1995; 2006). Briefly, Fagg J Foster’s contribution was to demonstrate that purposeful institutional change was an application of the theory of value to problems and that the theory of value was a particular application of a theory of technology (knowledge).

Although Fagg J Foster synthesised the Veblenian-Deweyan-Ayresian thought and hinted on the significance of the theory of value in guiding the purposeful adjustment of institutions to solve economic problems, he did not provide a comprehensive theory of social value (Foster 1981a; 1981b) just as his predecessors had not done. Tool (1977; 1983) developed the neoinstitutionalist theory of value that is consistent with the instrumental theory of knowledge and democracy.<sup>1</sup> It was Tool’s belief that “the intelligible core” of the OIE theory of value was the Veblenian-Deweyan-Ayresian-Foster synthesis (Tool 1977, p.824). In advancing the social theory of value, Tool (1977, p.824) maintained that “Reason and evidence” were indispensable pillars of the theory of value. He believed that value was a product of an instituted reasoning process grounded in evidence of and about the problematic situation. Other scholars have also drawn attention to the role of deliberative policymaking processes in social valuation (Hayden 2003, Norgaard 2007, Waller Jr and Robertson 1991).

Tool (1977) concluded that democracy was the core of the instrumental theory of valuation. Since the purpose of institutional change was to enhance the continuity and full development of the human life process through the greatest possible use of the knowledge fund in the productive process, generation of policies that achieved broader progressive

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<sup>1</sup> The term neoinstitutional economics has become a confusing term because New Institutional Economists also claim it. “The term “neoinstitutionalism” was coined by Marc R. Tool in his doctoral dissertation in 1953...” (Bush 2009, 294), but “The phrase, “the new institutional economics,” was coined by Oliver Williamson” (Coase 1998, 72) in 1975 more than two decades after Marc R Tool’s use of the term. As a result, to distinguish the two antagonistic paradigms, the neoinstitutionalists of Marc R Tool are now called “Original Institutional Economists (OIE)” (Bush 2009, 294).

changes inevitably called for democratic enquiry processes (Dewey [1930] 2001, Hayden 2003; 2006; 2009). The technological process is the engine of institutional change (Ayres 1996, Dewey [1930] 2001, Foster 1981c), and any social process that enhances technological accumulation is instrumental. Tool's (1977, p.841) efforts led him to conclude that the criterion of social value is "the continuity and instrumental effectiveness of recreating community non-invidiously" through the instrumentally efficient use of knowledge. This criterion is about "what is valuable and worth promoting" (Ramstad 1989, p.764).

Ramstad (1989, p.766), however, objects to Tool's social value principle because he believes that it is attempting to introduce new orthodoxy in institutional economics "thereby putatively providing an objective and transcultural orientation to the problem of identifying an appropriate value criterion." He holds that the Commonsian school is premised on a different theory of value using the logic of sufficient reason rather than efficient cause. However, by singling out reason and evidence as constitutive components of social value, Tool (1977), in fact, agrees with the logic of sufficient reason.

Dewey's (1939) instrumental logic stipulates that means and ends are inseparable and that they are stochastic. In his view, societies democratically assess both the means and the ends, which are in constant flux in an evolving social system (Bromley 2008a, Bush 2009, Dewey 1939). Dewey's logic, therefore, is a means-consequence-means-consequence continuum. The consequences (ends-in-view as opposed to absolute ends) of the previous instrumental valuation iteration become the means in the next instrumental valuation iteration.

#### **2.4.3. Dynamic mechanisms hindering and propelling institutional change**

Bush (1983; 1987) gave a major restatement of a mature theory of institutional change in which he illustrated that within an institutional structure – ceremonial or instrumental – the value system correlated agent behaviour. In this work, Bush dynamised the Veblenian-Deweyan-Ayresian-Foster synthesis by illustrating the forces that hinder or propel institutional change in addition to the technological process. The major point Bush (1983; 1987; 2009) introduced was that institutional change was inherently a change in the value system. A change in institutions not accompanied by a change in the value system would ultimately fail. Table 2-1 illustrates the dynamic processes.

Table 2-1: Types of ceremonial encapsulation

	<b>Instrumental feasibility</b>	<b>Instrumental non-feasibility</b>
<b>Ceremonial feasibility</b>	Ceremonial encapsulation and/ or instrumental embodiment	Lysenkoan effects
<b>Ceremonial non-feasibility</b>	Lost instrumental efficiency	Empty set

*Source: Bush (1987) Theory of Institutional Change*

Inasmuch as society consists of ceremonial systems (behaviours and values) and instrumental systems (behaviours and values) and inasmuch as ceremonial systems are past-binding, Bush introduced the concept ceremonial encapsulation (Table 2-1). Ceremonial encapsulation occurs whenever the ceremonial system dominates the instrumental/technological system such that ceremonial forces expropriate and withhold part of society’s fund of knowledge from being applied to problem resolution. Since ceremonial systems use the logic of sufficient reason to authenticate institutional change, a proposed adjustment has to satisfy the valuation criterion of ceremonial adequacy (Bush 1987; 2009), otherwise no adjustment takes place.

In the worst case, Bush (1987) demonstrated that ceremonial systems can completely dominate instrumental systems leading to a regressive outcome through a ceremonial encapsulation mechanism that he termed Lysenkoan effects (Table 2-1). Although Lysenkoism results in institutional adjustment guided by ceremonial interests, it is more of a future-bound phenomenon in its *earlier phases*. Once it has matured and has *appropriated sovereign power*, it becomes past binding. Lysenkoism is driven by political and ideological interests of the powerful groups, whose ideological systems constitute dominant epistemological systems. The other dynamic that Bush discussed in Table 2-1 is progressive institutional change (or rendered closely, instrumental embodiment). Within this dynamic, technological forces rupture ceremonial systems so that wider societal transformation takes place and the instrumental value system dislodges the ceremonial value systems. Usually, the advent of democracy marks such momentous rupturing of ceremonial systems by instrumental systems (Dewey [1930] 2001, Elsner 2012, Hayden 2006).

The extent to which the ceremonial system dominates the instrumental system is called ceremonial dominance, which Bush (1983; 1987; 2009) measures by an index – the index of

ceremonial dominance. The index is the ratio of ceremonial values to instrumental values. If the ratio significantly exceeds one, the institutional structure is ceremonially dominated. In such a case, the Lysenkoan effects become prevalent and no technological change occurs because spurious knowledge is void of any instrumental content. Tool (1994, p.410) called the Lysenkoan process of change “path independent” change. If the index is slightly below unity, the outcome observed would be ceremonial encapsulation. In this case, some technological innovation takes place but the value system largely remains unaltered. Tool (1994) associated this species of ceremonial encapsulation with the phenomenon of institutional path dependence – that is, one that is deeply culturally embedded.

Instrumental embodiment occurs if the index is significantly less than one (Bush 1983; 1987; 2009). The index can never be zero because of the inevitable coexistence of ceremonial and instrumental systems in any society; they only differ in degree of prevalence. This dynamic force is one of progressive institutional change. Bush (1987, p.1103) asserts that “the growth of knowledge is both the cause and consequence of progressive institutional change.” Progressive institutional change follows a change in the value structure, which in turn follows an increase in knowledge (technological innovation). Tool (1994, p.410) called this process “path-determinant” change, and the instrumental theory of value considers this process of institutional change the most desirable.

These three mechanisms are stages in a single process of institutional change. Lysenkoan ceremonial encapsulation occurs first, especially in societies that are endemically ceremonially dominated by non-cultural ceremonial systems such as propaganda and scientific ideologies. Lost instrumental efficiency occurs second as ceremonial systems withstand change in favour of the status quo. Finally, the occurrence of ceremonial encapsulation or instrumental embodiment depends on the relative dominance of each system (ceremonial or instrumental) in matters of feasibility of the proposed change or the change suggested by new knowledge (Table 2-1).

#### **2.4.4. Evaluating institutional change**

Although Paul D Bush managed to demonstrate that when the index of ceremonial dominance exceeded one, institutional change was likely going to be regressive, the problem is that ceremonial values and behaviours and instrumental values and behaviours are difficult to separate and measure. Criteria that are more definitive would make it

possible to evaluate the character of institutional change unambiguously. Extending his previous work on the social value principle, which also lacked definitive criteria, Tool (1994) derived criteria for evaluating the regressiveness or progressiveness of institutional change.

Five criteria that characterise progressive institutional change are the democratic test; the instrumental efficiency test; the growth of knowledge test; the minimal needs test and the environmental continuity test. Instrumental theory of value demands that policy change be a democratically responsive process. The maxim in this case is that “those who receive the incidence of the policy... [must be] able to find and employ means to change such policy” (Tool 1994, p.414). He believed that interested and affected parties must retain control over the policy (Tool 1990). Deliberative institutional change results in “equitable solutions,” (Norgaard 2007, p.375).

The instrumental efficiency test evaluates the extent to which institutional change allows technological processes that enhances the economic progress of society (Tool (1994). Hodgson (2004b, p.8) characterises “socio-economic evolution... [as] concerned with human welfare and well-being” and that is the essence of instrumental efficiency. Institutional change is instrumentally efficient to the extent that it is non-discriminatory change. Instrumental efficiency assesses the extent to which the new institution is pragmatic and not advancing a particular ideology (Tool 1990).

Since democracy is the only political institutional arrangement consistent with instrumental theory of valuation (Bush 2009, Dewey [1930] 2001, Hayden 2006), institutional change is to be evaluated on its contribution to participatory knowledge production. The process of institutional change itself is a hypotheses testing process, which must yield valuable lessons for future processes of social change. Deliberative economics, as Norgaard (2007) named it (and it could be added, deliberative science and policymaking), is an indispensable component of valuable knowledge generation. The result would be robust policies. Democratic institutional change results in “deliberative learning processes” (Norgaard 2007, p.376).

Forasmuch as institutional change redistributes economic advantages and access to necessities of life (Bromley 1997, Dawson 1994), progressive change must satisfy the minimum livelihood needs of those to be affected by it (Wisman 2011). Lastly, institutional

change qualified as progressive if it facilitated environmental continuity. This test build on Veblen's (1914) instinct of parental bent, which concerned itself with intergenerational equity or sustainability. A process of change that facilitated destructive utilisation of the environment would be regressive. Although Tool (1994) did not provide weights for the criteria, it is inferable that the weight of each criterion depends on the circumstance under investigation. An evaluation of environmental policy change, for example, would grant the greatest weight to the environmental continuity test. One would expect the policy to give adequate protection to biodiversity without losing tempered anthropocentrism.

Tool (1994) also developed criteria for identifying regressive institutional change: possession of power test, status quo preservation test, invidious defence test and pecuniary gains test. At the heart of the possession of power test is the question of whether authoritative agents of the state justify their actions to the recipients of government policies and regulations. A system characterised by the "practice of resource management by proclamation" (Bromley 1985, p.790) or "the old-style [of] *ruling-down*" (Hiedanpää and Bromley 2011, p.100, emphasis in original), in which reason-giving is lacking, characterises regressive change (Brandom 1995; 1997, Hayden 2006, Price 2013). The decisions that fail to pass judicial scrutiny, scientific scrutiny, economic scrutiny and democratic scrutiny, would be regressive.

The status quo preservation test manifests whenever the ceremonial system overpowers the technological system based on arguments about property rights, some ceremonies or other existing institutional arrangements that are creating the problem to be corrected (Bromley 2007; 2009). This test assesses the extent to which self-serving interests prevail against the "public good" (Norgaard 2007, p.376). As it appears, the invidious defence test is the antithesis of the instrumental efficiency test. It is a defence along discriminatory lines, for example, to maintain apartheid system privileges in a post-apartheid constitutional dispensation.

Lastly, the pecuniary gains test evaluates the extent to which the Veblenian pecuniary culture, such as arguments about profits and other private economic gains, are used as justification against institutional change (Hayden 2003, Norgaard 2007). One can use Bush's (1983; 1987; 2009) index of ceremonial dominance to assess the degree of pecuniary

dominance as a ratio of pecuniary values to sustainability values (Mora and Valentinov 2012, Valentinov 2015).

With these definitive criteria for evaluating institutional change in place, Tool (1994) added the environmental continuity principle to the three principles of institutional change that Foster (1981c) earlier developed. The first principle of institutional adjustment is the principle of technological determination, which requires a problem to suggest its own solution as opposed to a one-size-fits-all approach (Foster 1981c). The second principle is that of recognised interdependences, which postulates that institutional change is to produce instrumentally efficient correlations of human interactions and activities in the post-adjustment period (Foster 1981c). This principle recognises that society is a complex network of interrelated instituted activities and processes that mutually depend on each other. Adjusting one necessarily affects the rest. The third principle is the principle of minimal dislocation (Foster 1981c), which requires a favourable sequencing of institutional change to guarantee a reasonable minimum livelihood for those to be affected by the change – that is, avoiding “shock therapy” (Tool 1994, p.406).

Up to Foster, the principles had not taken into account the Veblenian instinct of parental bent, which was to be an arbiter in deciding sustainability issues in institutional adjustment. Swaney (1987) argued for an original institutionalist theory of environmental economics in which he replaced Tool’s (1994) environmental continuity principle with an all-encompassing coevolutionary principle. The coevolutionary principle postulates that the social system and the ecological system evolve together, but often the co-evolution is non-harmonious (Swaney 1987). A policy change is progressive if it puts the social system and the ecological system on a sustainable co-evolutionary path (Gual and Norgaard 2010, Kallis and Norgaard 2010, Norgaard 1984; 1988, Swaney 1986, Valentinov 2015). This made the OIE paradigm a socio-ecologically balanced scientific research programme. Thus, the framework for explaining and evaluating purposeful institutional change is a “broad framework in terms of a set of meta-theoretic and methodological guidelines” (Hodgson 1998a, p.174).

#### **2.4.5. Summary**

The OIE theory of institutional change of the Veblenian tradition is premised on the pragmatist view of economics as a problem solving science. Since it is a problem solving science, human purpose plays a central role in shaping institutional change. The presence of purpose implies that social valuation is inescapable. Rather than leave the role of valuation to the markets, the OIE theory of change requires an active application of knowledge to decide what it is society finds best to do given its technological constraints. While purpose defines the OIE theory, in effect, at any one time there are in co-existence ceremonial purposes and instrumental purposes. This makes institutional change a dialectical process whose final outcome is a function of the relative dominance of instrumental purposes over ceremonial purpose or the converse. The OIE theory makes explicit the mechanisms by which progressive institutional change can be hindered or sustained: ceremonial encapsulation leading to path dependence; Lysenkoan effects leading to path independent change; and instrumental embodiment leading to path determinant change.

The most important point is that institutional change can be evaluated using progressive criteria: the democratic test; the instrumental efficiency test; the growth of knowledge test; the minimal needs test; and the environmental continuity test. Regressive change can be evaluated on four criteria: the pecuniary gains test; the invidious defence test; the possession of power test; and the status quo defence test. The overall adjustment process has to be guided by four principles: the coevolutionary principle; the minimal dislocation principle; the principle of technological determination; and the principle of recognised interdependences. The application of these criteria and principles is a normative exercise.

#### **2.5. Commonsian theory of institutional change**

Like Thorstein B Veblen, John R Commons worked out his theory of institutional economics within a climate of epistemological revolution introduced by the Darwinian Theory of Evolution, which required explanations in terms of a pure cumulative causal process that was goalless (Commons 2009). Natural selection is a purposeless continuous process of cause and effect in which environmental conditions (selection criteria) determine which species survive depending on their adaptive capabilities (Hodgson and Knudsen 2006a). Unlike Thorstein B Veblen, who embraced Charles Darwin's natural selection mechanism in explaining institutional change, John R Commons was resolute that social phenomena were

guided by human purpose, hence institutional change was a purpose-driven process (Bazzoli 2000, Commons 1924b; 2009, Cordes 2006; 2007). Bazzoli (2000, p.1) supports Commons' view arguing that the "specificity of evolution in the area of social phenomena" makes artificial selection a key metaphor in social theory. The argument is that the "new Darwinian idea of continuous change and its abandonment of a foreordained goal" made it a "blind causal process" which was not directly applicable to social phenomena (Bazzoli 2000, p.4).

### **2.5.1. Transaction**

Commons' (2009, p.683) point of departure in the search for ways to improve the theory of economics and make capitalism reasonable was that economic theory made incomplete explanations of change because it sought causation of the present human activity in history. Rather, the future causes the present, hence the future (purpose) rather than the past (reflection) causes institutional change. The future is a body of expectations or "created imaginings" that participants possess as Bromley (2004b, p.81) puts it. Since they possess disparate expectations, they inevitably have to employ a psychology of negotiation with others in order to realise their expected future (Bromley 2004b; 2006).

Negotiational psychology is characterised by the reciprocals: persuasions or coercions; commands and obedience; as well as arguments and pleadings (Bromley 2006, Commons 1931, Hiedanpää and Bromley 2012, Ramstad 1996). As is apparent, negotiational psychology is a manifestation of legally sanctioned power relationships between legal superiors and legal inferiors (commands and obedience); between legal equals (persuasions or coercions); and between a collective legal superior and an individual/collective legal inferior (arguments and pleadings) (Albert and Ramstad 1997; 1998, Kaufman 2007, Ramstad 1996, Valentinov 2009).

In the Commonsian School, a transaction is "the smallest unit" of analysis (Commons 1931, p.652) and a transaction is an exchange of various kinds of rights (Commons 2009, Rutherford 1996). It is in the transaction that the three ideas of negotiational psychology, expectations about the future, and the causal influence of the future on the present, have meaning. Commons (1924b, p.121) defines a transaction as a relational process that has "both the economic dimensions of opportunity and power and the legal dimensions of reciprocal rights [and] duties", which is regulated by the working rules. The definition unites

economics, law and ethics (Commons 1924a, Hodgson 2003b, Samuels 1972a). Inherent in this definition is the concept of property, which he defines as the “power of scarcity” (Commons 1942, p.370) or the power to withhold (Commons 1934; 1942; 2009, Dawson 1998, Parsons and Commons 1942). Inherent also in the definition is the concept of liberty, which he defines as “bargaining power” (Commons 1942, p.370). Working rules are institutions, and since the working rules correlate human behaviour, to one party they ascribe rights and to another they impose duty; to one party they create capacity and to another exposure among other correlative aspects (Commons 1924b; 1931, Dawson 1994, Hohfeld 1913; 1917).

Three dynamic social forces – conflict, mutuality and order – always characterise a transaction (Commons 2009). Since parties to a transaction necessarily have opposing interests and since the parties may/may not be legal equals, there is a possibility of exploitation and abuse leading to void and voidable transactions (Dawson 1994; 1998, Ramstad 2001). Yet, the parties depend on each other (mutuality) to consummate a transaction. Commons (2009, p.654) argues that the choice each participant makes in a transaction is a triadic act of “a performance, an avoidance, and a forbearance”. A performance is the application of “power over nature or others” (Commons 2009, p.654), while avoidance is a volitional choice not to act in particular ways - for example a choice not to enslave, exploit or cheat a weaker party in a transaction. Forbearance is the choice not to exert full power on others in a transaction. Commons (2009, p.654) argues that “It is from forbearance that the doctrine of reasonableness arises.”

The social problems emerging from the transaction process bring a third superior collective authority, such as a court, into the transaction arena to create order out of the conflict (Bromley 2008a, Hiedanpää and Bromley 2011). This order, Dawson (1994, p.36) argues, is the “legal power structure – a structure that was typically the source of conflict and reworked out in policy process.” The order usually takes the form of a court ruling, an injunction, a directive or some such intervention, which becomes a *new* institution that shall bind all future transactors who find themselves in a similar predicament. Therefore, “order refers to the reproduction of working rules” (Bazzoli 2000, p.14). The three social forces imply the presence of multiple parties to a transaction, some directly interested in the outcome, while some enforce existing working rules and *create new* working rules.

The Commonsian school distinguishes amongst three categories of transactions. First, bargaining transactions transpire between legal equals when exchanging property rights in the market employing the negotiational psychology of persuasion or coercion (Biddle 1990, Ramstad 1996, Valentinov 2009). Persuasion necessarily implies that the parties to the transaction have liberty (Commons 1942). Commons (1942) emphasises that coercion is the use of economic force by legally withholding a resource from a party that does not own the resource, but wants to own or use it. Second, managerial transactions produce wealth for a society and employ the negotiational psychology of command and obedience since they take place between an individual legal superior and an individual legal inferior (Kaufman 2007).

Thirdly, rationing (administrative) transactions transpire between a collective legal superior and an individual/collective legal inferior when the superior apportions the burdens and benefits of the society's wealth-creation process to inferiors using the negotiational psychology of argumentation and pleading (Albert and Ramstad 1998, Ramstad 1989; 1996). Bromley (2004b) specifies rationing transactions as taking place in policymaking contexts, in court proceedings where judges and lawyers argue and plead out facts and in parliamentary debates among others. Commons (2009) also discusses a special class of transactions, which he calls strategic transactions, which arise because there might be a limiting factor, such as a regulatory vacuum, or overregulation, against which organised lobby groups might advocate or protest leading to institutional change.

### **2.5.2. Principles of institutional change**

In the Commonsian framework, it is not just the three social forces (conflict, dependence and order) that drive the process of institutional change, but also five fundamental principles that configure conflict, dependence and order in every transaction. Commons (1924b; 2009) identifies the five principles as the principle of scarcity; the principle of sovereignty; the principle of efficiency; the principle of futurity; and the principle of working rules. Commons (2009, p.94) defines a principle as the "*similarity of actions*" (italics in original). Thus, a principle involves a flow of time. Commons (2009, p.94) emphasises that "because a principle involves the sequence of time it is a *similarity of cause, effect or purpose*" (italics in original). For example, the principle of scarcity in a maize market for household consumption might be a cause of activity (importation of maize), or an effect of

an activity (diversion of maize to bio-fuel production) or a purpose intended by an actor (commercial farmers' union withholding maize supplies to influence price).

Commons (2009) defines the principle of scarcity as the similarity of bargaining transactions in all their variety within an exchange context. The principle of efficiency is the similarity of managerial transactions in all their variety in a going plant (Commons 2009). The principle of working rules (institutions, customs) is "collective action in restraint, liberation and expansion of individual action" (Bromley 2008a, p.229). Commons (2009, p.737) defines custom as the "the binding force" of the collective will over the individual will. Ramstad (1986) points out that it is the principle of working rules that identifies Commons with other institutionalists. The principle of sovereignty is the repetitive use of the sanction of physical force by a superior in a variety of rationing transactions as he/she apportions the benefits and burdens of the going concern upon subordinates (Commons 2009, Ramstad 1996). Commons (2009, p.738) defines the principle of futurity as the likeness of a variety of repetitive transactions and their valuations performed in real time "with reference to future events as expected hindrances, aids, or consequences."

Economic theory, as Commons (2009) argues, rests on the interactive dynamics of the five-part principles with each other and with the whole of which they are parts. Thus, Commons (2009, p.738) postulates that the five principles are parts of a whole that he calls the "principle of Willingness". As a concept, willingness is "the complex attributes of human beings" (Commons 2009, p.738). Cordes (2006, p.533) describes the complex human attributes as "cognitive processes" such as imagination, creativity, social learning, dispositions, instincts, habits, beliefs, attitudes, hypotheses formation, emotions, passion, reason and intellect among others. However, as a principle, willingness is the variability of repetitive actions and transactions of volitional agents "within the limiting and complementary interdependence of the principles of scarcity, efficiency, working rules, sovereignty and futurity" (Commons 2009, p.738).

The five principles can figuratively be thought of as five dimensions of the human will and "a change in one dimension changes all the others" thereby changing the "whole transaction" and the "whole of willingness" (Commons 2009, p.738). For example, the scarcity of clean (relatively non-polluted) rivers reduces efficient supply of clean water, which in turn alters

expectations about future water security (futuraity), which in turn might cause the government authorities to intervene (sovereignty) with directives or regulations to control discharge of pollutants into rivers (that is, *new* working rules or institutions). This chain of changes transfigures the transaction and the willingness of social agents to wait or act. Thus, institutional change can be triggered by changes in any one of the dimensions of willingness. In the following subsections discussion is limited to the principle of futurity and the principle of sovereignty because of the centrality of these principles in the thesis. The other three principles automatically enter the discussion since they are holistically interdependent with the two.

#### ***a. Principle of futurity***

This principle forms the cornerstone of the Commonsian school because causation runs from the future to the present (Bromley 2004b; 2012, Dawson 1994). Commons (2009, p.84) argues that his institutional economics is a “science of Futurity”. He draws attention to the fact that a cursory review of human affairs demonstrates that from pre-scientific to scientific activities to religious activities “the principle of Futurity dominates human activity” (Commons 2009, p.84). Dawson (1994, p.40) emphasises that social agents make “decisions while moving into the void of time”. Because the future is uncertain, Dawson (1994, p.33-34) emphasises that the void of time indicates that “uncertainty... gives rise to our feeling of fear, doubt, and hope”. Within a transaction context, individuals not only formulate expectations about the behaviour of other parties to the transaction as the working rules require of them, but also formulate expectations about the future in general.

Commons (2009, p.742) reiterates that his theory of institutional change is an “economic theory of willingness” and “of the unfinished but attainable future”. It is in the willingness that social agents are ever hopeful and creating/planning a series of futures that when reconciled constitutes the grand future/plan of that society, which may/may not be attained. Bromley (2004b; 2006; 2008a; 2010) has tendered a comprehensive discussion of the principle of futurity in public policy, which in essence is the process of institutional change. He argues that when a problem in human society emerges, it comes as a “*surprise*” (Bromley 2004b, p.80, italics in original). Since it is a surprise, it defies the existing truth claims about such problematic situations and its first effects on the minds of the people are “individualized impressions” (Bromley 2012, p.17).

The surprise forces individuals to carry out an investigation into that surprise using their impressions as data and the result would be “*expressions*” (Bromley 2004b, p.80, italics in original), which also are data for the next stage. Expressions constitute the created reality about the existing problematic situation that individuals begin to habitually tell themselves and others about as well as begin to live on that new truth as a scaffold (Bromley 2004b, Hiedanpää and Bromley 2002). On the basis of the expressions, the individuals begin to imagine the future and how their created future would play out as the problem unfolds. It is the created imaginings, or “*history-to-come*” (Dawson 1994, p.34), that put volitional beings to action. Cordes (2006, p.537, emphasis added) reiterates that evolved Homo sapiens have “the cognitive capabilities that allow them to *anticipate* and avoid selection effects.” Thus, when an individual enters the bargaining transaction context, he/she negotiates from the perspective of the created future with the view to realise that future if it is favourable or to avert it if it is expected to be adverse.

At a societal level, there are several millions of such impressions, expressions and created imaginings. The collective authority has the responsibility of processing these various imaginings and expressions. A process of reconciliation of the “*multitude of contending expressions*” (Bromley 2008a, p.227, italics in original) and imaginings leads to an “emergent consensus” of the collective authority (Bromley 2004b, p.93). The process of reconciliation is a rationing transaction premised on the psychology of argumentation and pleading in the “*realm of reasons*” such as legislatures and courts (Hiedanpää and Bromley 2011, p.106, italics in original). The emergent consensus, after passing through democratic valuation, becomes the grand consensual expression of what the current situation is and the grand consensual created imagining (future) a society beholds for the time being.

The grand consensus is a “valuable belief” (Bromley 2008d, p.8) upon which action unfolds in the “*realm of rules*” or administrative realm (Hiedanpää and Bromley 2011, p.106, emphasis in original), which is the phase of implementation of the valuable belief. This is a strategic transaction because “individuals use their intelligence to find a creative response to the new situation in order to adapt to, and to control, their environment” (Bazzoli 2000, p.8). Institutional innovation arises from strategic transactions driven by the desire to break out of limiting factors that the imagined future brings to light (Cordes 2006; 2007). Cordes

(2006, p.534) emphasises that the fundamental driving force of institutional change is “human cognition, wants, and creativity... [that] motivate the search for novelty.”

On the basis of the grand future, *new rules, new policies, new laws, new regulations or new directives and new court rulings* – that is, *new working rules*, which constitute institutional change – are passed (Bazzoli 2000, Bromley 2006, Cordes 2007). From the same consensual emergent future, new scarcities and new conflicts emerge. Thus, the principles of futurity and scarcity together with the principle of working rules interact to create new transactional settings thereby altering human *willingness* to act or wait.

Daniel W Bromley’s account reasonably predicts the emergence of global institutions of environmental governance such as the Convention on Biological Diversity and the Kyoto Protocol, among others. They all started as created imaginings of a group of activist-scientists who told a story about the next great extinction, ozone depletion, climatic catastrophes and ocean fisheries crises. These powerful imaginings moved the global community of political leaders to action in order to create international covenants (Corell and Betsill 2001, Haas 1989; 1992, Lund 2013, Max-Neef 2005, Nelson 2010, Peterson 1992, Phillips 2003, Porritt 2007). Thus, the future (created imaginings) causes the present (institutional change).

#### ***b. Principle of sovereignty***

Sovereignty is both a structural agent (the state) and a process by which the state extracts the sanction of physical violence from private hands and centralises it within itself (Commons 1899a; 1899b; 1924b; 2009). The bureaucratic hierarchy becomes the locus of sovereign power. As such, Commons (2009, p.684) argues that sovereignty “is the changing process of authorizing, prohibiting and regulating the use of physical force in human affairs.” It is by the acts of sanctioning, prescribing and proscribing that sovereignty creates order when deciding transactional conflicts. Order necessarily implies stability of expectations (principle of futurity) attained through *new working rules*.

The principle of sovereignty, as Bazzoli (2000, p.9) points out, is John R Commons’ “conception of the source of social order, a conception that perhaps dissociates him most from mainstream theory.” Because conflict is ubiquitous, inherent and inevitable in transactions, a theory of institutional change has to explain how order emerges. Bazzoli

(2000, p.9) argues that the Commonsian view “rejects the classical view that spontaneous order [emerges] via the invisible hand” since “order implies that a coercive structure of rules” is established and enforced by a collective authority. However, other evolutionary social scientists maintain that self-reinforcing spontaneous orders are also ubiquitous (Aldrich *et al.* 2008, Hodgson 2003a; 2003b, Langlois and Hodgson 1992).

Dugger (1996b, p.427) argues that sovereignty builds “on some form of power”. He discusses three sources of power which are three forms of sovereignty. The most basic form of sovereignty is that of the state, which has monopoly over physical violence. The second form of sovereignty is the power of property, which is the power of scarcity or the power to withhold (Commons 1942, Dawson 1998, Valentinov 2009) – the monopoly over economic violence or the sanction of poverty (Commons 1924b). Thus, property owners are able to participate in sovereignty. The third form of sovereignty is that exercised by “religious, moral, and cultural concerns, based on the power of opinion” (Dugger 1996b, p.428). It is evident that the multiplicities of types of sovereignty simultaneously work out their effects in a transaction. Dugger (1996b, p.427) also maintained that sovereignty is “multiple and relative.” Thus, anyone with some form of power can participate in sovereignty.

There are, however, covert forms of power, which Bernays (1928, p.9) describes as the shrewd schemes of controlling the “organized habits and opinions of the masses... [and that] those who manipulate this unseen mechanism of society constitute an invisible government which is the true ruling power....” He argues that the “invisible governors” govern through “their ability to supply needed ideas and by their key position in the social structure” (Bernays 1928, p.9). It follows, therefore, that there is also a possibility of including a fourth form of sovereignty – that of scientific communities – which is based on the sanction of scientific opinion or sanction of ignorance, which can be conceptualised as the power to silence other groups because their claims are regarded as non-authoritative or non-scientific. This power works invisibly by creating a climate of ideas that shapes the ideologies and habitual assumptions of those legitimately vested with the sovereign powers to make public decisions (*new institutions*) (Ayres 1996).

Dugger (1980) also observes tacit knowledge as a source of power derived from repetitive performance of institutional roles. He identifies four mechanisms by which power reveals

itself. Firstly, he postulates a mechanism of subreption in which corporatocracy manipulates all institutions of society so that they become means to the ends of corporations. Norgaard (2007, p.376) observes “a disconcerting mix of theocracy, corporatocracy, and crony capitalism” as anti-deliberation elements in biodiversity policy reforms.

Secondly, Dugger (1980) also postulates the mechanism of emulation by which one institution becomes revered such that all other institutions emulate it. Thirdly, he observes contamination as another mechanism by which power manifests itself in the case where one institution assumes the motives of another, which naturally are never its motives. He uses an example of a religious institution modelling itself after the corporate world and measuring its attainments by the size of its real estate and financial power.

Lastly, Dugger (1980) identifies the mechanism of mystification, which comes to the fore when the artefacts, products or some elements of an institution are granted ceremonial power. An example he gives is the mystical power given to prices in economic valuation processes so as to decide *new* policies, yet corporations make prices using their power of scarcity. It has been argued that the mystification of corporate prices allows corporations to invisibly take over government policy (principles of sovereignty and working rules) because results of economic valuation, in the main, favour the status quo (Bromley 2007, Hayden 2003). Dawson (1994, p.38) similarly argues that “leaving resolution [of policy problems] in the hands of “the market” amounted to legitimating exercise of power as structured by the existing set of legal rights.”

Taken together, the four mechanism of institutional hegemony are the ways by which sovereignty can be captured and employed to advance the ends of the powerful people and groups in a social and policy context. While they manifest in daily lives, there is reason to suspect them to play out to the fullest effect when policymakers plan institutional change. This is because institutional change redistributes economic advantages and burdens (Biddle 1990, Bromley 2001, Dawson 1994, Ramstad 1989).

### **2.5.3. Reasonable value as a theory of institutional change**

The triadic forces of conflict, mutuality and order imply that the process of institutional change is a problem of identifying reasonable value (Commons 2009). Since Commons’ theory of change was developed within the context of transactions, collective authority

plays a central role in the evolution of *new* institutions as it decides conflicts to bring order. Hodgson (2003a; 2004) has criticised the Original Institutionalists for some methodologically collectivists theoretical formulations such as the Veblenian Dichotomy whereby cultural and technological determinism seem to determine all social change and individual agency is undermined as collectivism is made to explain every aspect of institutional change. It would appear as though Commons' theory instantiates methodological collectivism.

The theory of reasonable value, however, identifies the initial purposeful emergence of institutions as unorganised custom, say, in the form of industrial norms and standards or codes of practice (Hiedanpää and Bromley 2012). Here, unorganised custom does not imply the absence of purpose in design, but rather the absence of harmonisation and standardisation of the customs and practices so that they can be equitably enforced by a central authority. In deciding conflicts, courts create order by what can be characterised as a process of codifying, formalising, sanctifying and canonising the best practice out of current multiple alternative practices that constitute the already existing unorganised customs (Bromley 2006, Hiedanpää and Bromley 2011; 2012).

In essence, the process by which *new formal* institutions emerge (created by collective authority) is a secondary process that utilises as data, already existing *informal* institutions (created by individual agency) to accumulate common law precedent (Bazzoli 2000, Bromley 2008a, Hiedanpää and Bromley 2012). Cordes (2006, p.533) emphasises that the institutions comprising spontaneous orders "may subsequently be subject to deliberate considerations." While Hodgson (1998a; 2003a; 2003b; 2004; 2007) takes issue with OIE for being methodological collectivists, the critique seems to be harsh because the Commonsian theory uses a co-evolutionary methodology for studying institutional change, which Bazzoli (2000, p.14) calls a "methodological middle way between individualism and holism." She describes the methodological middle way as "a theory of cumulative causation between individual action (individual causation) and collective action (institutional causation)" (Bazzoli 2000, p.6).

The negotiational psychology leading to the selection of the best practice is that of argumentation and pleadings – the "game of giving and asking for reasons" (Price 2013, p.31). Rationing transactions play a central role in driving institutional change. Bromley

(2006) emphasises that the logic of sufficient reason (purpose/final cause) guides the choice of the best custom out of rival customs. It is by this process that common law evolves over time thereby redefining the legal foundations of the economy; redefining opportunity sets; redefining rights and permissions as well as reapportioning benefits and burdens of the going concern (Bromley 2007; 2008a, Ramstad 1991).

Commons (2009, p.681), thus, defines “reasonable values as reasonable transactions, reasonable practices, and social utility, equivalent to public purpose.” The Commonsian theory locates value in social practices, norms and customs because that which is valuable is that which the collective authority finds sufficient reasons to canonise, hence the notion of reasonableness. Interestingly, the Commonsian theory defines social utility as the public purpose, which, certainly, is not an aggregation of individual utility functions to obtain the social utility function that then defines social welfare. To Commons, social utility is the “Due Process of Law” (Commons 2009, p.681). His argument is that when procedural/administrative law is adhered to in making public decisions (enforcing or *changing* institutions) a reasonable democratic citizen derives satisfaction out of that process. Social utility is about human dignity and human dignity is the upholding of an individual’s democratic rights (Mashaw 1980; 1981).

Scholars have discussed the seeming inconsequentiality of Commons’ theory of reasonable value observing that it fails to yield determinate results to guide policymakers and social agents (Dawson 1994, Ramstad 1995). The question is how reasonable is reasonable value? Commons (2009, p.682) stated that “Man is not a rational being... he is a being of stupidity, passion, and ignorance ... Hence Reasonable Value contains a large amount of stupidity, passion, and mistake.” This assertion not only refutes the neoclassical assumption of rational economic agent, but also suggests that stupidity, passion and ignorance act as mental filters that mediate meanings and imagination in decision-making processes. But, what makes stupidity, passion and ignorance? It would seem as though ideologies, dogmas, beliefs, habits, superstitions, traditions, fear and hope shape people’s cognitive structures (Ayres 1996, Galiani and Sened 2014, Mokyr 2014, North 1990), possibly leading to unreasonable expectations.

Bromley (2008d, p.4), nonetheless, argues that the supremacy of reasonable valuation is that “the purpose of reason is to defeat indeterminacy... Indeterminacy is the reason we reason. Indeterminacy explains reasoning.” Policy scientists have severally demonstrated that policy problems are wicked and messy, with few being tameable (King 1993, Rittel and Webber 1973). Usually, there is no single social theory to coordinate social agents in attempting to resolve the problems, thus there are non-convergent knowledge, ideological and belief systems about the problems, especially wicked ones (King 1993, Rittel and Webber 1973). A key feature of wicked problems, and perhaps, messes, is that they are *indeterminate*, hence deterministic solutions, while desirable for reasons of certitude to policymakers and scientists, do not help much in resolving such problems (Balint *et al.* 2011, Hartmann 2012, King 1993, Ritchey 2011, Rittel and Webber 1973). Thus, reasonable value is required to defeat indeterminacy.

While messes can be solved by paying meticulous attention to the details of the puzzle, wicked problems cannot be resolved; they can only be managed (Balint *et al.* 2011). Managing in this case implies consensus building, hence the need for reasonable valuation (Commons 1942, Norgaard 2007). To Commons (2009, p.743), the reasonable value theory solution concept is that “It is not “what I think” ought to be, but what “we think” ought to be and can be attained, as a going concern.” The emphasis is on the collective will and not the individual will in resolving complex problems, hence rationing transactions are significant as sources of institutional change.

While scholars such as Ramstad (1989) maintain that the instrumental value theory has no common ground with reasonable value theory because Commons rejected the Veblenian Dichotomy, factors that make up for the stupidity, passion and ignorance arise from what the Veblenian Dichotomy calls ceremonial systems. Commons (2009, p.697) himself maintains that in rationing transactional context, one has to know who sits “on the Supreme Court bench than to know what the law is. The Constitution is not what it says it is – it is what the Court says it is.” The judges’ habitual assumptions, ideologies, beliefs and preferences matter in the outcome called reasonable value, which thus includes a large measure of mistake, stupidity and passion (Dawson 1994). However, the negotiational psychology of argumentation and pleading guarantees reasonable value because it is out of

the practice of giving and asking for reasons that robustness in decisions arises and Commons (2009, p.681) maintains that the *resultant* working rules are “for the time being”.

Commons’ (2009) argument that the composition of the judges on the Supreme Court bench determines the outcome, considered temporally, also suggests that constitutions need re-interpretation because the conditions and interests that existed at the time they were first drafted and the present conditions and interests might be quite different (Beard [1935] 2012). As the process of social change takes place “new concepts of rights and reasonable practices” also emerge (Commons 2009, p.682). Courts decide conflicts “by the judicial process of weighing practices, customs, precedents, statutes, and constitutions in the light of changing conditions and conflicting habitual assumptions” (Commons’ 2009, p.690). He argues that the weighing process is an “experimental process of “exclusion and inclusion”” (Commons 2009, p.691). Exclusion eliminates from the meaning of a legal concept aspects that historically were attributed to the concept, while inclusion brings into the ambit of a legal concept meanings that were historically thought not to be part of it.

In manifestation here, thus, is a purposeful Darwinian process of *creating* completely *new* institutions (varieties) out of the old, profoundly *changing* the old ones (mutation) or letting old institutions become extinct. Similarly, Commons (2009, p.683) argues that when deciding conflicts between contesting parties, the court by a “process of due evaluating” assigns “due weight” to each testimony and its decision is the “final word, for the time being, on Reasonable Value”. Thus, the process of weighing and balancing ensures reasonableness and context-relevance of the decision. The decision is a reasonable rule to live by for the time being, but will be changed as conditions or new and different conflicts arise.

The reasonable value method offers “tentative and not absolute” truth (Copeland 1936, p.335), which is a “workable consensus” (Commons 2009, p.743). Reasonable value is “the consensual idealism” of the participants in a transaction context such as a court proceeding or a legislative debate (Commons 2009, p.743). It is the collective, inter-subjective and trans-subjective process of constructing reality that makes reasonable value a possibility and courts do that all the time (Bromley 2006, Dawson 1994, Gonce 1971, Hiedanpää and Bromley 2011, Max-Neef 2005). Max-Neef (2005, p.11) states that there exist “different

levels of perception of reality and of multi-dimensional realities”, hence the need for consensual idealism.

Hodgson (2003b, p.557), however, argues that the reasonable value theory has faulty interpretations of the concept of habit, taking it to mean repetitive behaviour and “mental sensations” rather than constitutive mental capacity as intended by the psychology of habits and instincts. He also argues that Commons enthroned reason, belief and human will in place of habit and instinct thereby departing from the theoretical foundations laid down by Veblen (Hodgson 2003b). Hodgson (2003b) also points out that Commons failed to establish the causality between custom and habit; the causality between habit and reason/thought; the causality between the human will and habit; as well as the causality amongst instinct, habit and belief. As such, Hodgson (2003b) maintains that Commons transmuted pragmatist concepts and evolutionary psychology concepts.

Hodgson (2003b, p.570) extends his critique of Commons’ theory for failing to recognise “that artificial selection was no more than a special case of “natural selection” and not an alternative to it”. Hodgson’s co-author, Knudsen (2002, p.444), however, emphasises that “neo-Darwinian explanation applies *only* to such economic selection processes that involve replication” (emphasis added). Since social systems fail the “heritability” test because it is proving impossible for scholars “to identify anything akin to a ‘social DNA’” (Cordes 2006, p.535), natural selection, as it were, becomes the special case rather than the general case insofar as it applies “only” to cases where the genetic inheritance law applies. Ostrom (2014b) tried to single out rules as genotypes because she believed rules have instructions encoded in them, but this only serves to illustrate the problem insofar as norms, taboos, habits, beliefs, superstitions, customs, conventions and many such institutions also carry encoded instructions. Thus, there is an identification problem when it comes to determining which institutions serve as genotypes (carriers of social DNA).

It is interesting that even the progenitor of evolutionary economics, Veblen (1898b, p.188), adjured economists to explain how the

“[economic man] achieved his emancipation from the law of natural selection.... [H]e is now able, without jeopardy to the life of the species, to play fast and loose with the spiritual basis of its survival... By selective necessity he is endowed with a

proclivity for purposeful action. He is possessed of a discriminating sense of purpose...”

Veblen seems to give pre-eminence to environmental selection of the initial set of socio-economic institutions, and then surrenders subsequent selection processes to human purpose “in the more advanced stages of human cultural and technological evolution” (Rutherford 1998, p.466). The argument is that as economic development progresses, artificial selection becomes predominant, although purpose is to be explained in terms of the “instincts [that] provide a set of original, or basic, goals of action” (Rutherford 1998, p.467).

The natural selection argument is capable of explaining “origins of these cognitive dispositions”, but falls short in explaining continuity of socio-economic evolution (Cordes 2006, p.536). Cordes (2006, p.536) points out that the rate of socio-economic evolution becomes “a qualitatively different kind and much faster pace of evolutionary change” in subsequent phases of cultural growth because of cognitive learning process and “accretion of knowledge during cultural evolution.” Perhaps, the unnatural and fast rate of evolutionary change experienced in subsequent periods suggests the role of Commons’ principle of willingness, which determines humanity’s willingness to act or wait. Ultimately, human intentionality cannot be ruled out (Bazzoli 2000). Perhaps, in developing his science of futurity, Commons had seen the relative emancipation of humanity from the law of natural selection, hence his insistence on a volitional explanation of institutional change.

#### **2.5.4. Conclusion**

Although John R Commons’s theory of institutional change is too complex to be reviewed in as a short a section as this owing to his holism, which connects every concept to every other concept, the review has demonstrated that at the core of the Commonsian theory of institutional change are the concepts of a problem and human purpose. The review of the Veblenian theory of institutional change also identified the centrality of the problem and human purpose. A problem emanates from transactional conflicts that necessitate the collective authority (sovereignty) to step in and enforce the existing working rules or *modify* them as need arises. The process of modifying the rules is a process of codifying and

canonising already existing customs that private agents developed in their social practices, which is an endogenous process of institutional innovation.

The review noted that Commons' theory, therefore, qualifies for a co-evolutionary methodology of studying institutional change since the individual agency plays a significant role in supplying the collective agency with data (informal institutions) for canonisation into the formal legal foundations of the democratic economy. The review established that the Commonsian theory of institutional change – the Reasonable Value theory – works on the logic of sufficient reason (purposeful/final cause explanation) and requires the building up of a grand consensus about what the future imagined by the society looks like, on the basis of which collective volitional action unfolds in the form of institutional change. The logic of sufficient reason is itself a process of experimental reasoning by which weighing and redefinition of legal concepts *create new* institutions much in the same way the Darwinian processes of speciation and mutation, and in addition hybridisation, operate.

Although the Veblenian theory of institutional change operates on the logic of efficient cause (objective explanation) there is some reason to infer, in effect, that the Veblenian school operates on both the logic of efficient cause and sufficient reason. This follows from the centrality of reason and evidence in instrumental valuation. The knowledge frontier defines all that the society knows and can potentially exploit to enhance the human life process, yet so far it might be failing to utilise the knowledge because ceremonial forces encapsulated it. Thus, the knowledge frontier is the future that could be attained and it determines the choice of the institutional adjustment path. However, the role of culture and habitual assumptions also makes the past a causative agent in light of the reality of institutional path dependence.

The Veblenian School and the Commonsian School seem to differ in their social value theory. The Veblenian School has a predetermined social value principle, which requires institutional change to satisfy the condition that it is non-discriminatory and facilitates the improvement of the human life process, while facilitating the fullest possible instrumental use of knowledge to that end. In the Commonsian theory, values emerge in the course of deliberation through the negotiational psychology of argumentation and pleading. Practices that obtain sufficient reasons constitute what society finds best to do for the time being.

Nonetheless, it can be argued that the Veblenian social value principle is merely a goal to which society aspires and to which actual values that emerge from deliberative process ought to conform. In that sense, the two value principles converge. Despite this difference, the two schools do not use price theory to measure value in deciding institutional change.

A fundamental difference between the two schools is that the Veblenian school singles out technological evolution as the driving force of institutional change, while the Commonsian school considers conflicts and conflict resolution to be the primary source of institutional change by the common law process. While the Veblenian school takes institutions as sources of inertia, the Commonsian school takes institutional rigidity as pre-requisite for social order. However, both the Veblenian and Commonsian theories are theories of cumulative and circular causation process.

Chapter 3 provides a review of the New Institutional Economics (NIE) paradigm, with a particular focus on the Douglass C North's theory of change insofar as he has pioneered and continued to focus on the role of ideology and knowledge in economic change processes. After reviewing the NIE's critique to the OIE, an integrated institutionalist framework for evaluating institutional change is presented.

### **new institutionalism Theories of institutional change with critiques from the original institutionalism**

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*“Acquire new knowledge whilst thinking over the old.”*

*The Sayings of Confucius (Cranmer-Byng and Kapadia 1910, p.94)*

*Is there anything of which one can say,  
“Look! This is something new”?  
It was here already, long ago;  
it was here before our time.*

*Ecclesiastes 1 verse 10, Today’s New International Version, 2005*

#### **3.1. New Institutional Economics theory of institutional change**

The New Institutional Economics (NIE) has its foundations in the works of Ronald H Coase, particularly his work on property rights theory, contract theory, and alternative institutional arrangements of production as well as transaction costs (Coase 1937; 1960; 1992, Galiani and Sened 2014). Mäki, Gustafsson and Knudsen (1993, p.11), however believe that “[Carl] Menger has perhaps more claim to be the patron saint of the new institutional economics”. Hodgson (2004b, p.5) also believes that “Carl Menger’s (1871) theory of the evolution of ‘organic’ or undesigned institutions” was foundational to the NIE although none of the luminaries of the NIE – Williamson, Coase, North and Ostrom – ever made the claim that Menger influenced them or that they were building on Menger. For example, North (1992, p.4; 1994, p.360) emphasises, in no uncertain terms, that “It was Ronald Coase (1960) who made the crucial connection between institutions, transaction costs, and neoclassical theory.” Again, “Coase [1937] and [1960] gave birth to the transaction costs approach to the study of institutions by studying the firm” (North 1994, p.610). This view is an inference made by Hodgson and his co-authors. The NIE is a diverse research programme that has at least three major sub-schools of thought: the micro-institutional (governance) economics

school led by Ronald H Coase and Oliver E Williamson, the macro-institutional economics led by Douglass C North and the integrative school led by Elinor Ostrom that puts together theoretical insights from the first two schools and apply them to micro-level natural resource governance case studies (Galiani and Sened 2014, Ménard and Shirley 2011; 2014). There is also a strand of literature led by Acemoglu, Johnson and Robinson who evaluate the impact of political and economic institutions on economic development, but with a greater emphasis on colonial institutions (see for example, Acemoglu and Robinson 2006; 2012, Acemoglu, Johnson and Robinson 2001).

One of the defining features in this diverse body of research is its underpinning methodological individualism, which implies that the individual agency ultimately explains the emergence and subsequent change in institutions (Galiani and Sened 2014, Hodgson 1989; 1998a, North 1990; 1992; 1993). Methodological individualism has the major problem that it presupposes that it attempts to explain all social change and structural reconfigurations based on human intentionality, planning and goals (Hodgson 2004b). The confusion in methodological individualism is that it fosters ambiguity about whether “individual interactions or social structures” are constituent properties of the individual (Hodgson 2004b, p.17). If interactions and structures are not part of the individual they methodological individualism is inoperable. The sum of this debate is that

“Much of the confusion in the debate over methodological individualism stems from whether methodological individualism means explanations (a) in terms of individuals alone, or (b) in terms of individuals plus individual interactions or social structures” (Hodgson 2004b, p.17).

The idea expressed in (a) is more controversial than the one in (b). However, the fact that the notion included in (b) is more acceptable implies that methodological individualism becomes “methodological structuralism” and then “it is misleading to give the individual exclusive representation in the label” (Hodgson 2004b, p.17). Three general problems confound methodological individualism. Firstly, too much explanatory burden is placed on the individual and the properties of social structures are inductively derived from the individual. Secondly, it is admitted that social structures shape the individual and methodological individualism is broadened a little bit to make it flexible. Lastly, the version of methodological individualism typical of the NIE uses agentive interactions in an

“institution-free ‘state of nature’” to explain emergence of social structures (Hodgson 2004b, p.19).

At the core of the NIE paradigm, North (1990, p.5) asserts, is the goal of unifying social research by “[i]ntegrating individual choices with the constraints institutions impose on choice sets.” To accomplish this goal, the NIE relaxes three neoclassical assumptions: namely, “costless exchange, perfect information and unlimited cognitive ability” (North 1993, p.36). The emergence of networks of organisations specialising in information production and marketing attests to the costliness of information (Landini 2013, Stiglitz 1986). Exchanging property rights is costly and information processing is imperfect (hence, bounded rationality) because of the mental filters such as culture, ideologies, beliefs, cognitive biases and taboos, among others, that mediate meanings (Galiani and Sened 2014, Ménard and Shirley 2011, North 1990; 1992; 1993; 1994; 2008, Williamson 2000).

The NIE, as the adjective “New” suggests, emerged as a successor (or better still, rival) research programme to the OIE. The progenitor of the NIE, Coase (1984, p.230), described the OIE as “anti-theoretical, particularly where classical economic theory was concerned”, which evidently implies that the NIE emerged to provide a “neoclassical theory of institutions” (Wallis 2014, p.33) or “the neoclassical interpretation of institutions” (Wallis 2014, p.47). Similarly, referring to progenitors of American institutional economics, North (1992, p.3) argued: “They did not, however, give us theory.” The search for a theory of institutions for the NIE began on this premise. These claims, however, seem untrue given the theory reviewed above. Perhaps, Hodgson’s (2004b) view that the NIE suffers from a major problem of neglecting the history of economic thought attests to this observation.

### **3.1.1. The NIE-Northeastern theory of institutional change**

The section reviews North’s theory of institutional change. It is North (1990) who gave a comprehensive macro theory of institutional change and for that reason (in addition to the present thesis’ focus on national policy change) the discussion here reviews Douglass C North’s theory of institutional change. He occupied himself with the explanation of the “formation, mutation and decay of organizational forms” (Wallis 2014, p.32). The section identifies the sources of evolutionary dynamics in North’s theory.

### ***a. Changes in relative prices***

The emergence of the firm as an alternative to the market is an instance of a process of institutional change. To the NIE organisations are governance structures and not institutions, and are meant to minimise transaction costs (Williamson 1979; 1992; 2000). Coase (1937; 1960) argued that the firm emerged to minimise transaction costs, which he conceptualised as the cost of using the price system. North (1990) defines a transaction cost as the cost of establishing, maintaining, policing, enforcing and exchanging property rights.

The starting premise for North (1990, p.3) is that “[i]nstitutional change shapes the way societies evolve through time and hence is the key to understanding historical change.” To remedy the presumably defective foundations of the OIE, North (1992, p.5) proposed a new philosophical foundation for institutional analysis stating that

“this *new* institutional approach fit[s] in with neo-classical theory... [in that it] begins with the scarcity hence competition postulate; views economics as a theory of choice subject to constraints; *employs price theory as an essential part of the analysis of institutions; and sees changes in relative prices as a major force inducing change in institutions*” (emphasis added).

Since the goal of the NIE was not to “overturn or replace neo-classical theory” (North 1992, p.3), the neoclassical choice theoretic framework, predicated on the concept of scarcity and competition, remains a pillar of the NIE. As scarcity conditions change, relative prices change. The incentives signalled by the relative prices influence economic agents to engage in institutional entrepreneurship using their political and economic power to have institutions changed so as to facilitate exploitation of the emerging opportunities (Alston *et al.* 1996, North 1990, Galiani and Sened 2014). For example, Wallis (2014, p.34) argues that institutions change “because of short-run variations in relative prices that create, at some point in time, the incentives to restructure human organizations.” Forasmuch as scarcity gives rise to opportunity cost, price theory is central to the Northern theory of institutional change, hence the hypotheses, “fundamental changes in relative prices are the most important source of [institutional] change... and the only other source of such change is a change in tastes” (North 1990, p.84). It follows, therefore, that institutions are

'commodities' whose demand is a function of tastes and relative prices, adjusted for transaction costs.

While acknowledging that there is a knowledge gap about what changes tastes, North (1990, p.84) maintains that relative prices influence tastes since "fundamental changes in relative prices over time will alter the behavioral pattern of people and their rationalization of what constitutes standards of behavior." His argument is that prices reveal to the human agency the values that matter in any circumstance. In this case, it can be argued that prices generate values which are standards of judging appropriate behaviour. Ultimately, changes in relative prices explain institutional change directly and also indirectly through changes in taste. Relative prices signal incentives for organisation and individuals to maximise returns within existing institutional parameters or to invest in changing the current institutional arrangement (Mokyr 2014, North 1994; 2008, North and Thomas 1970). The change in relative prices is the selection criterion among competing institutional arrangements since the relative prices subject to the cost structure reveal the magnitude of the net payoffs of operating under different institutional arrangements – the status quo or some other new alternative.

In evolutionary terms, transaction costs are another selection criterion that determines institutions that can maintain their identity (survive/persist) despite being inefficient because high magnitudes of transaction costs reduce the likelihood of changing such institutions (Galiani and Sened 2014, Ménard and Shirley 2008; 2011, North 1990). In this case, the Darwinian selection mechanism (transaction costs) is strengthened by the Northian postulation that "rational individual behavior is consistent with institutional choices that retard, rather than promote" social and economic progress (Wallis 2014, p.35). Transaction costs, in effect, are another category of relative prices, the price paid to facilitate exchange of rights. Transaction costs can drive institutional change by inducing the human agency deliberately to change institutions to reduce them, but transaction costs can also inhibit institutional change when they are so large that the net payoff of changing the institution becomes negative (North *et al.* 2007; 2012, Galiani and Sened 2014, Ménard 2011). Galiani and Sened (2014) argue that the human agency has more accurate knowledge of the past than the future; hence, the tendency is to choose institutions that strengthen the status quo for reasons of certitude.

Insofar as scarcity entails opportunity cost to human choices, constrained optimisation, with institutions as additional constraints to the standard neoclassical constraints, is critical in the Northean model and, indeed, the NIE paradigm. Yet, price theory also explains institutions (North 1990; 1993, Galiani and Sened 2014). Thus, institutions are *endogenous* constraints in the choice theoretic framework. North (1990, p.5) argues that “[d]efining institutions as the constraints that human beings impose on themselves makes the definition complementary to the choice theoretic approach of neoclassical economic theory.” Within this choice theoretic framework, institutional change is a price- or incentive-driven process.

Bromley (2008a, p.221) takes issue with the endogenisation of institutions and institutional change to the “reigning doctrine of neoclassical economics” predicated on rational choice theory. The endogenisation of institutions implies that they can no longer be “explained by the structure within which they are embedded” (Bromley 2008a, p.222) – some factors exogenous to the price model have to explain institutional change. However, Mokyr (2014, p.152) maintains that the Northean view of “thinking of institutions as analogous to budget constraints (which are set by relative prices) is quite helpful.”

Wallis (2014, p.40), however, explained the role of power in driving institutional change stating that the “dynamics of social interactions political, economic, religious, military, and educational determine which changes are rejected, which are sustained, and which changes persist, ultimately having a large impact.” The role of relative power in institutional change seems to be the key point so much that Wallis (2014) makes it the decisive factor as opposed to ascribing institutional change to fundamental changes in relative prices. Ostrom (2014b, p.19) finds a consistent pattern in her micro-level studies in irrigation systems and forestry that *conflict* over scarcity of a resource “stimulate[s] changes to the use of rules”, thus making institutional change a problem-driven process. There is an interesting parallel between her meta-theoretic analysis and the Commonsian theory’s insistence that conflict drives institutional change and that the principle of scarcity plays a significant role in triggering changes in other dimensions of willingness to act or wait.

#### ***b. Informal institutions as a normalising and stabilising power***

North (1990) argues that institutional change and stability of emerging institutions depends on a complex network of informal rules such as norms, traditions, beliefs and customs. The

informal institutions have normalising power that necessitates the building of trust and a sense of community amongst interacting agents. North (1990) suggests that beliefs emerge from habitual practices in the past that have evolved over time with the society. Since beliefs are past-binding, Wallis (2014) argues that they often lead to regressive institutional change. Not only do beliefs normalise behaviour, but also they can potentially lock society in inefficient institutional arrangements.

While North (1990, p.83) argues that informal rules have stabilising power and “tenacious survival ability”, he also postulates that, over time, changes in relative prices eventually erodes norms leading to their non-enforcement or replacement with other norms. Similarly, “a custom or tradition may be gradually eroded and replaced with another,” as relative prices change (North 1990, p.86). The continuity and survival of institutions depends on customs and habits (the gene pool) (Hodgson 2007b, Hodgson and Knudsen 2006a; 2006b). Literature suggests that habits, values and customs are some of the most difficult institutions to change and some of them, in some cases, might be transcendental (Bush 2009, Hayden 1995; 2006). Perhaps, North’s point illustrates the limitations of making relative prices a major explanatory factor of institutional change. Supposing that short run changes in relative prices can change norms, customs, beliefs, values and traditions seems unrealistic. It makes institutional change and formal institutions continuously unstable as the foundational informal institutions that must be the sources of stability are fluctuating with prices.

### ***c. Investment in knowledge***

Organizations are purposeful agents that have the objective of maximizing wealth for their creators (North 1990). In order to accomplish this goal, they have to acquire knowledge both through learning-by-doing (tacit knowledge) and also by external acquisition of communicable knowledge. North (1990, p.74) casts the acquisition and generation of knowledge in a choice theoretic framework within which different “kinds of knowledge, skills, and learning that the members of an organization will acquire ... reflect the payoff—the incentives—imbedded in the institutional constraints.” The returns to knowledge determine the demand for particular types of knowledge which, in turn, drives technological innovation.

While knowledge produces technology, it also produces ideology. Ideology, in turn, shapes the demand for knowledge. Thus, North (1990) argues for bidirectional causality between ideology (which he defines as perceptions) and knowledge. Ménard (2011, p.8), broadly, defines ideology as “customs and beliefs”. Ideology provides the mental cognitive models by which organisations and individuals assess the extent to which the “structure of rules of the system is fair and just [which would] reduce costs”, but “their perception that the system is unjust raises the costs of contracting,” (North 1990, p.76). The Northean view is that ideology is a mental stage or shared ideational structure that constitutes the social fabric made up of norms, canons of conduct, beliefs, customs and language among others (Galiani and Sened 2014). They determine the choice set at a basic level.

Through their maximising behavior, organisations set in motion the process of institutional change by marginally adjusting “informal constraints” (North 1990, p.78), by creating a technology-organisation-institution interactive dynamic, and by increased demand and investment in different kinds of knowledge. The technology-organisation-institution interactive dynamic produces adaptive efficiency (Galiani and Sened 2014, North 1994; 2008). Institutions and cultural factors adjust gradually in favourable ways, which North calls adaptive efficiency. The accumulation of knowledge implies that there “are always groups and individuals who have an incentive to change the rules,” (Wallis 2014, p.42). Institutional change, therefore, is continuous even though it might be unnoticeable until it reaches a saturation threshold. The alternative dynamic is that the maladjustment of institutions and the culture lag can lead to adaptive inefficiency (Brinkman and Brinkman 2006, Mueller 1938).

The interesting dynamic that North (1990, p.79) reveals is that organisations deliberately “devote resources to changing the institutional constraints” and expected net payoffs determine the size of investment in knowledge that would transform the institutional structure. The changing of a limiting factor (institutional constraints) is equivalent to what Commons (2009) calls a strategic transaction. North (1990) demonstrates that in the history of nations, using their economic and political power, and guided by the net pay-offs of changing the current institutional arrangement, organisations with strong institutional entrepreneurial power use the polity to achieve their goals. In this case, organisational hegemony determines the institutional adjustment path for the overall society.

The extent to which the networks of organisations with sufficient power collaborate in lobbying for certain changes to the current institutional set up determines the likelihood and rapidity of institutional change. The converse is that the networks of organisations might as well withstand institutional change if the net payoff of operating under the existing institutional arrangement exceeds the net payoff of operating under the proposed institutional arrangement. North (1990) argues that the existence of huge payoffs provides a sufficient condition for the creation of special purpose vehicles (lobbying organisations) to achieve the envisaged economic gains of institutional change. North (1990, p.86) believes that, by lowering transaction costs of political participation, democracy facilitates wider sharing of true and spurious knowledge, thus making “ideas, dogmas, fads, and ideologies *important sources of institutional change*” (emphasis added).

The emerging point is that institutional change easily arises out of ceremonial knowledge, much in the same character as Lysenkoan effects (Bush 1987). North (1990, p.86) believes that there is an investigable and testable bidirectional causal link between “changes in relative prices, [and] the ideas and ideologies that form people's perceptions” with the possibility of illustrating how the two and their interactive dynamic influences institutional change. He, thus, makes the point that there is a market for ideas and ideologies in which changes in their relative prices determine which ideas and ideologies sell to policymakers for implementation as new institutions. Once the new institutions are in place, they, in turn, affect the relative prices in other markets other than the market for ideas and ideologies.

#### ***d. Oxymoron of two social orders***

Institutional change entails evolution of political and economic institutions that may further or retard societal progress. North *et al.* (2012) argue that the pandemic of armed violence has hindered economic development in developing countries. Violence is prevalent because there is no one, including the governments, with monopoly over violence (sovereignty) (North *et al.* 2007; 2012). To promote development, developing countries have to resolve both latent and open violence. As North *et al.* (2012, p.2) argue, the medium-term solution is to establish a social order called a limited access order (LAO) that deters “the use of violence by creating incentives for powerful individuals to coordinate rather than fight.”

The LAO creates economic rents for the violent elite groups, which incentivise them to cooperate and refrain from violence. The benefit of the LAO is that “rents make people’s behavior more predictable” (North *et al.* 2012, p.6). As long as the rent sharing framework between and within groups is fair, the LAO is stable and violence would not erupt. Although the outcome would not be efficient, it would free some development potential. North *et al.* (2012, p.9) conclude that in the LAO there are extensive constraints on socio-political participation through formation of organisations that would claim shares of existing rents. Such constraints necessarily mean that “Local monopolies and restrictions on economic entry hinder competitive markets and long-term economic growth.”

The logic of the LAO requires depriving the non-coalition members of the right to organise and grow politically and economically. The LAO simply is a dominant coalition’s monopoly over economic and political violence (sovereignty). Raising political transaction costs of challenging the LAO arrangement creates long-run stability and viability of the LAO, but it locks the society, sometimes for decades, into an impoverishing Nash equilibrium. The LAO stops violence, but does not address the fundamental cause of the violence, thus the violence remains latent. North *et al.* (2007; 2012) give examples of many developing countries, such as Afghanistan, Democratic Republic of Congo and Haiti, which are LAOs. The LAOs vary in degree of stability: some LAOs are fragile, some basic and some mature.

Once a LAO becomes mature, the dominant coalition finds the net payoff of transitioning to an open access order (OAO) higher than maintaining the status quo. North *et al.* (2007, p.6) define an OAO as a political institutional arrangement “where access to economic, political, and social organizations, including the freedom to form them, is open to all individuals who qualify as citizens in the society.” The LAO dominant coalition will begin to grant economic and political rights to the general citizenship with the result that there will be an increase in organisations, which introduces a competition dynamic in the political and economic spheres.

North *et al.* (2007, p.17), thus, postulate that “political competition is necessary to maintain open access in the economy, and economic competition is necessary to maintain open access in the polity.” Bidirectional causality between political competition and economic competition begins to set the society on a sustainable development path. The society now is

fully democratised. Examples of OAOs that North *et al.* (2012) give include Western European nations, the USA, Canada and Japan. The central problem leading to the LAO/OAO hypotheses is one of who must/must not participate in the monopoly over economic and political violence (sovereignty). In the Northean explanation, the LAO and the OAO are mutually exclusive.

The thesis argues that there is a possibility of extending the LAO and the OAO such that they co-exist in a single social process. To make possible the coexistence of the OAO and the LAO, the two realms of public policy proposed by Hiedanpää and Bromley (2011, p.106, emphasis in original): the “*realm of reasons*”, which deals with the legislative/judiciary rationing transactions, and “*realm of rules*”, which deals with administrative rationing transactions (implementation processes) can be used. As discussed under the Commonsian theory of institutional change, reasonable valuation generates valuable beliefs, which find expression in national legislation, constitutions and judicial precedent. The administrative level implements the valuable beliefs through the design of rules that operationalise the legislation, the precedent and the constitutional provisions. Thus, the two realms are theoretically separate, but they do not necessarily have to be the same policymaking order simultaneously. One can be a LAO, while another can be an OAO or both can be LAOs or both can be OAOs. Each configuration has different implications on how institutional change evolves.

It is also proposed here that the LAO/OAO can be generalised to consider various forms of violence in society – the bloodless and the bloody. One such covert form of violence occurs in policymaking and implementation processes. It can be argued that this form of violence is at the level of ideology, ideas, knowledge and beliefs – which can be characterised as the sanction of ignorance or sanction of scientific opinion. In his theoretical treatment of the causal linkages between relative prices, ideology and institutions, North (1990, p.85-86) arrived at a puzzle, which he constructed as follows:

“institutions, by reducing the price we pay for our convictions, make *ideas, dogmas, fads, and ideologies* important sources of institutional change. In turn, improved understanding of institutional change requires greater understanding than we now possess of *just what makes ideas and ideologies catch hold*. Therefore, we are still at

something of a loss to define, in very precise terms, the interplay between *changes in relative prices, the ideas and ideologies that form people's perceptions*, and the roles that the two play in inducing changes in institutions” (emphasis added).

The puzzle is that ceremonial knowledge (dogmas, ideologies, fads) drive institutional change despite being manifestly ceremonial. Mokyr (2014, p.151) argues that the Northean view is that beliefs and ideologies are mental stages that “allow us to stand on and do things together” ideationally in defining the opportunity sets in the realm of volitional action.

Ayres (1996, not paged) described ideology as the “power to move communities of [people] to action.” He also argued that ideology has such power because it is transcendental – it is beyond scientific enquiry. Ayres’ (1996) distinction of ideas from ideology, perhaps, addresses North’s puzzle. Ideas, Ayres (1996) distinguished, were manifest by their problem solving power. To Ayres, therefore, ideas were instrumental, while ideologies were ceremonial. Ayres (1996, not paged) describes the relationship between ideologies, ideas and power thus,

“Since, as we know, social scientists live in climates of opinion, there seems to be no basis for a distinction between their *theories* and the *group ideologies* which they so suspiciously resemble. Thus ... the ideas of [all sciences] prevail only through the *agency of organized communities*, and finally through the triumph of that leadership over others in the *struggle for coercive power*, a struggle in which *force* supplements and qualifies “*ideas*”” (emphasis added).

The solutions to Douglass C North’s puzzle are all linked in a nuanced fashion here. Theories are equated to ideas, but group ideologies are equated to force (sovereignty), the power that moves people into action. Ayres clearly argues that epistemic communities struggle to have sovereign authority (coercive power) over the policy space. Thus, ideologies catch hold because they have a spiritual dimension that is dogmatic in nature. Ideology acts as a legitimising framework for ideas of that epistemic community. Ideas triumph because the ideology buttressing them is hegemonic.

Since policy problems might manifest violent clashes of ideologies, ideas and belief systems, the thesis proposes that the concept of violence as armed conflict used by North *et al.*

(2007; 2012) can be broadened to include other covert forms of non-armed violence. Feminist literature provides a useful way of broadening the conception of violence from the physical/armed dimension to the epistemological dimension. Epistemological violence, as feminist literature suggests, occurs whenever there are multiple epistemological systems, one of which is the dominant epistemological system, which also marginalises others (Code 2008, Dotson 2008; 2014). An epistemological system is a typical instantiation of an “instituted social imaginary” (Code 2008, p.34), characterised by an entrenched value system, belief system, traditions, myths, ideologies and theories, which define the epistemic culture that defines how social agents construct knowledge and influence the social structure and, thus, institutional change. Similarly, Denzau and North (1994, p.3) postulate that “people act in part upon the basis of myths, dogmas, ideologies and ‘half-baked’ theories”. Thus, “Ideas matter” in institutional change process (Denzau, North 1994, p.3), but the real issue is whose ideas matter.

The instituted social imaginary comprises the actual “implicit but effective systems of images, meanings, metaphors, and interlocking explanations – expectations woven through a social-political order” (Code 2008, p.34). The social imaginary is equivalent to what the Northean socio-cognitive framework for institutional analysis conceptualises as “shared framework of mental models that groups of individuals possess” (Denzau and North 1994, p.4), which constitute the interpretive concepts or schemata by which they understand their socio-economic environment. Thus, mental models are socio-cognitive constructs - images, meanings, metaphors, and interlocking explanations – that provide the bases for interpretation of the institutional environment by social agents. It is evident that the multiplicity of social groups in an institutional context implies the multiplicity of perceptual frameworks that constitute different social imaginaries (von Staden and Bruce 2015).

The tendency of the dominant group’s epistemological system to displace and marginalise other epistemological systems amounts to epistemic violence. Code (2008, p.32) characterises epistemic violence as the “intransigent politics of unknowing”, which entails that the dominant group is not open to alternative interpretations of the reality and experiences of the community. Dotson (2011, p.236) also characterises epistemic violence as the “practices of silencing of marginalized groups.” Thus, epistemic violence has dimensions of intention/or lack thereof to receive and reciprocate a testimony as well as

“pernicious ignorance”, which Dotson (2011, p.238) defines as “[r]eliable ignorance ... that is consistent or follows from a predictable epistemic gap in cognitive resources.” This cognitive gap precisely follows from scientism.

Table 3-1: Limited Access Order and Open Access Order in policymaking and regulatory processes

		Legislative sphere – realm of reasons		
		Limited access order	Transitional phase	Open access order
Administrative sphere/Implementation sphere – realm of rules	Limited access order	Deterministic institutional change problems; absolute epistemic violence; Environmental governance by ruling down; no consultation	Deterministic institutional change problems; high levels of epistemic violence; high risk of relapse to LAO-LAO; completely ineffective consultation	Wicked institutional change problems; high levels of epistemic violence; judicial interventions may mitigate epistemic quieting if litigation transaction costs are low
	Transitional phase	Deterministic institutional change problems; moderate to high levels of epistemic violence; unstable transition and high risk of relapse to LAO-LAO; completely ineffective consultation	Deterministic institutional change problems; moderate to high epistemic violence. Consultative processes are mere formalities; some risk of relapse to LAO-LAO, but with judicial intervention OAO-OAO possible to	Potentially reasonable institutional change; moderate epistemic violence; judicial interventions increase the odds of transitioning to regulatory open access order; consultative process becoming effective after considerable struggle.
	Open access order	Messy institutional change problems; Administrative agency is disabled by legal instrument despite effective consultation	Messy institutional change problems; Administrative agency may be disabled by legal instrument despite effective consultation	Competitive process, instrumental and reasonable institutional change; low and non-reducible epistemic violence; very effective consultation, justification and reason-giving are high

Source: Author’s synthesis

Conceptually, epistemic violence takes two forms: testimonial quieting and hermeneutic injustice (Code 2008, Dotson 2008; 2011; 2014). In testimonial quieting, the audience

refuses to accept the knowledge claims of a testifying group because they do not hold the group to be an epistemically qualified one to make such claims. Thus, the epistemically quieted social groups are marginalised from contributing towards knowledge production because they are denied the status of epistemic arbiters. Epistemic quieting violates a cardinal test of progressive institutional change – the growth of knowledge test or Deweyan democratic knowledge production systems (Hayden 2006, Tool 1994). Hermeneutical injustice is the locus of asymmetrical power relationships in ideational processes and knowledge production systems insofar as the dominated epistemic groups, as Dotson (2011, p.236) argues, are damaged so that their “ability to speak and be heard” is severely curtailed. Their experiences are interpreted for them by the dominant group or epistemic arbiters. This damaging is what Ayres (1996) described as the triumph of the leadership of one epistemic community over others by coercive power (sovereignty).

In policymaking processes, testimonial quieting and hermeneutical injustice might be dominant manifestations of epistemic violence. This conception of violence facilitates the adoption of the LAO/OAO hypotheses to policy processes such that they can be used to explain how purposeful institutional change can become a vicious circle. The LAO/OAO framework can easily provide an ontological framework for studying why some negotiational psychologies are predominant in policy processes and others are not. Negotiational psychology, as is apparent, contains epistemic violence as a sub-category.

Table 3-1 illustrates the interaction of LAO/OAO in policy processes. The rents in the case of epistemic violence in public policy processes need not necessarily be monetary. In the case of biodiversity conservation, for example, the rents might be in the form of scientific satisfaction derived from existence value of certain classes of species. The rents can be political satisfaction/pride that the claims of a particular epistemic community constitute the truth that is guiding society’s institutional adjustment path. However, the rents can also be pecuniary to the extent that dominant epistemologies provide a sustained flow of consultancy contractual relationships and research funding as well as expanded employment opportunity sets open to members of dominant epistemic communities. However, for economic sectors and epistemic communities that have an anthropocentric inclination, the rents can take the form of economic benefits of unfettered utilisation of biodiversity and even alien species that might pose a threat to biodiversity.

Table 3-1 illustrates the evolution of regressive and progressive institutional change processes. In a constitutional democracy, most probably, the requirement is that policies and laws have to be developed democratically. It might, of necessity, also be a requirement that policies and laws be implemented democratically. The first scenario of a LAO-LAO consists of legislatures and bureaucrats engaging in “the neo-colonial practice of ruling down on others” and imposing their will on the polity (Bromley 2012, p.18). They are the sovereigns and their will is law and policy and this is the problem of determinism because it fails the test of public reasoning. The process of institutional adjustment is deterministic because government, by whatever means, would crush any form of resistance (absolute testimonial quieting and hermeneutic injustice), which is equivalent to raising political transaction costs of influencing policy change. Usually, government knows what it wants to achieve and seeks the advice of social and natural scientists selectively to sanctify its own ideas (Bromley 2007). The legislative and administrative functions are not distinctly separated and they share the same political and institutional will.

The second case, in Table 3-1, exists whenever the realm of reasons is a limited access order, but the realm of rules is an open access order (LAO-OAO). The legislative and administrative wills are distinctly separate. The legislative body’s will is the law and policy, but how the legislative intent has to be implemented is left to democratic processes. The problem that emerges in this case is one of interpretive battles about what the sovereign will in that law or policy means (Bazzoli 2000, Dreyfus and Ingram 1976, Liroff 1972, Wichelman 1976). Bazzoli (2000, p.15) argues that “public purpose is fallible, ambiguous and changing: it is contingent upon which social groups can influence or control the *common understanding* of what is reasonable” (emphasis added). The common understanding, in this case, is the instituted social imaginary, which really is common in the sense of it being the dominant group’s collective mental model. Epistemic violence is likely to vary from being moderate to being high. Groups fight as they negotiate institutional spaces to entrench themselves in the regulatory process so that the regulations will be favourable to their interests. Ideologies, dogmas and fads as well as propagandas are most likely to play an important role (Ayres 1996, Denzau and North 1994, North 1990).

The third case, in Table 3-1, pertains to the legislative process that is democratic, but the administrative process that is a limited access order (OAO-LAO). The legislative and

administrative wills are separate, but how implementation of the democratic will proceeds leads to a number of potential outcomes. Powerful groups can capture the administrative agency such that the law is implemented in a *particularistic* interpretive scheme, which may not necessarily be the democratic will in the law (Dreyfus and Ingram 1976, Wichelman 1976). Epistemic violence is likely to be high if not nearly absolute in this scenario. The political dispensation might be such that the transaction costs of litigation are low and the democratic community has adequate access to the judiciary (Cortner 1976, Wichelman 1976). Litigations against the implementation of the law in a displeasing way might unfold. The game of imposing the administrative will on the democratic community would be evident and whichever group succeeds in capturing the administrative agency becomes the new co-sovereign agent that sustains its sovereignty by the sanction of ignorance (epistemic violence).

If the political transaction costs of monitoring the administrative authorities are high, the principal-agent problem intensifies and the law ends up being implemented in a defective/uneven way. The implementation of the law/policy might also be unduly delayed and cycles of planning without coming to terms with the democratic will might ensue, hence institutional path dependence (Galiani and Sened 2014, North 1990, Tool 1994). The process of numerous prolonged planning cycles that siphon significant resources from the fiscus, but failing to solve the problem, is conceptualised here as the planning curse.

The last scenario, in Table 3-1, is a real open access order in which the democratic will reflected in the law or policy is also reflected in the implementation/regulatory strategy (OAO-OAO). The competition of ideas about how best to implement the law produces valuable solutions that facilitate progressive change. Reasonable regulations and rules are likely to emerge in this case. Science and democratic reason are united (Bromley 2012). The negotiation psychology of persuasion or coercion is most likely here.

The intermediate categories in Table 3-1 focus on transitional conditions that can assume any form, in the sense that a transitional arrangement is unstable. It can relapse to a limited access order or progress to an open access order. Political and litigation transaction costs play an important role in deciding the tendencies in the transitional phase.

The meta-theoretic framework provided in Table 3-1 implies that institutional change occurs in three levels, which Bartunek and Moch (1987, p.486) conceptualise as “first-order change”, “second-order change” and “third-order change”. First-order change is characterised by marginal adjustments to the social imaginary, which serve to reinforce the existing social imaginary, which, thus, leads to institutional path dependence. In terms of Table 3-1, first-order change can be conceptualised as the change in governance strategies such as designing new laws, new policies and new constitutions. It is merely an incremental change in the laws, constitutions and incremental changes to how the judiciary and administrative agencies socio-cognitively work. The governance culture remains largely unchanged.

Second-order change is a “conscious modification” of the social imaginary itself (Bartunek and Moch 1987, p.486), which is a type of a weak-form path determinant change. The social groups are changing their mental models, through stochastic belief updating processes (Bromley 2008d; 2012). In terms of Table 3-1, there is a modification of the governance norms. The way the realm of reasons and realm of rules operate is modified, for example, to facilitate participation in institutional design. The quality of participation may not be as holistic as the full sense of the word might imply. Second-order change is deeper than first-order change insofar as it not only focuses on changing the governance strategies, but also the governance norms.

Third-order change is a revolutionary epistemic change of the Kuhnian-type in the sense that the instituted social imaginary – the entire epistemological system: its myths, ideologies, traditions, values, customs, taboos, dogmas and spiritual proclivities – is changed (Bartunek and Moch 1987, Kuhn 1996). This is an example of strong-form path determinant change. Not only do social groups question the very socio-cognitive structures upon which their interpretation of reality stands, they are empowered to actually change the instituted social imaginary. In terms of Table 3-1, the democratic processes of political and socio-economic governance are truly democratic and epistemic violence is minimised to its non-reducible level. Multiple social imaginaries and instituted social imaginaries interact in a transdisciplinary fashion to enrich institutional design processes. Third-order change is the deepest form of institutional change because it goes beyond merely changing laws to actually transforming the entire governance culture itself – legislative and administrative

cultures alike. In most developing countries institutional change ends at the level of first-order change whereby governance strategies are copied from the developed world, but the accompanying governance culture is not copied (Bromley 1985).

Using Ordonomics, which is the study of the relationship between institutions and ideas, Hielscher *et al.* (2012) and Petrick and Pies (2007) also argued that ideational competition is an important pre-requisite for consensual idealism or finding win-win solutions to perplexing policy problems. The logic behind Ordonomics is to move away from thinking in terms of trade-offs to orthogonal transformation of wicked problems so that a policy game transitions from “collective self-damage” to collective gain (Hielscher *et al.* 2012, p.784). Orthogonal transformation converts a non-cooperative game into an assurance game such that consensual institutional arrangements are designed which satisfy the Veblenian cardinal value principle that “any economic fact must approve itself under the test of impersonal usefulness – usefulness as seen from the point of view of the generically human” (Veblen [1899] 2005, p.67).

### **3.1.2. Summary**

The Northean model of institutional change sheds light on some important dynamics in the process of institutional change, especially the role of knowledge, investment in knowledge and the social order within which institutional change is to take place. Although the Northean model ascribes pre-eminence to changes in relative prices in explaining institutional change, its own account suggests that it is power dynamics and the knowledge claims as well as ideologies of the participants that are determinative of the institutions that would emerge. The role of transaction costs in lobbying for institutional change or withstanding change is critical in determining the extent and quality of the adjustment process. Broadening the concept of violence beyond the traditional meaning helps adapt the LAO/OAO hypotheses to many applications such as analysing evolution of a policy over time.

### **3.2. Hodgsonian-Veblenian Social Darwinian Theory of institutional change**

Evolutionary economic thought has expanded rapidly (Nelson and Winter 1982, Hodgson 2002, Dopfer 2005). Hodgson has been advocating the revival of the Original Institutional Economics of Thorstein B Veblen since the 1980s. To Hodgson, the American Institutional paradigm had ideas that were too advanced and little appreciated in its day, especially the

works of Thorstein B Veblen (Hodgson 1998b). These works constitute raw materials for an advanced generalised Darwinian social theory of institutional change as Hodgson (2004b, p.xvii) emphasised: “I am also keen to point out the modern relevance of many of the old institutionalist ideas.” Hodgson (2004b, i) observed that the circumstantially supportive conditions in the form of the revival of pragmatism, revival of evolutionary psychology of instincts and habits as well as re-emergence of open systems Darwinian social modelling provided sufficient laboratory conditions for the rejuvenation of the original Veblenianism. Quite interesting, Hodgson implicated the decline in pragmatism, the displacement of psychology of instincts and habits with behaviourism psychology as well as the decline in social Darwinism for the decline of the OIE in the post-second world war era (Hodgson 1998a; 2003b; 2004b, 2007b). In addition to these three factors, Hodgson also demonstrated that the decline in OIE coincided with and, partly, was caused by the emergence of positivism in economic methodology coupled with the departure by American institutionalists from Darwinian foundations of institutional economics as set up by Veblen (Hodgson 2003a; 2003b; 2004b; 2007c).

The reconstruction of the Veblenian evolutionary economics faces two antagonistic forces. The first is that “many mainstream economists have resorted to the dismissive tactic of describing any broader version of their discipline, or any approach that is not based on individual utility maximization, as ‘not economics’” (Hodgson 2004b, p.4). The pluridisciplinarity of OIE broadened the scope of economics, which rendered some received neoclassical doctrines somehow inoperable (Hodgson 1998a; 2004b; 2006; 2007c, Witte 1954). The second, and has gained greater currency, is the claim that started with Coase (1984, p.230) that:

“The American institutionalists were not theoretical but anti-theoretical, particularly where classical economic theory was concerned. Without a theory they had nothing to pass on except a mass of descriptive material waiting for a theory, or a fire.”

Coase declared that the OIE’s intellectual material had no other fate but destruction or some other people to develop a theory out of the “dense mass of description... scrupulously accurate, but so wanting in a theoretical framework” (Posner 1993, p.74). It is the latter that Hodgson chose to explore. As to the claim of an anti-theoretical and atheoretical

institutionalism, Hodgson (2004b, p.3) argues that “Repeated so often by so many, this manifestly false allegation that the old institutionalism was ‘against theory’ has regrettably stuck.” It is a myth. Hodgson (2004b, p.4) further stated that dismissive tactics engendered by the Coasean claim raise suspicions, especially when the criticisms are advanced, “without ever once providing any evidence that they have carefully read or analysed its texts. An experienced historian of ideas would smell that proverbial rat.”

He has proven in various works that the OIE made major contributions both to micro and macro economic theory and he believes that the neglect of History of Economic Thought explains why the NIE holds on to the myth that is unsupported by a single quote of material from the OIE that shows they were anti-theoretical (Hodgson 1989; 1998a; 1999; 2004b).

### **3.2.1 Hodgsonian Critique to OIE and Revivalist agenda**

Hodgson takes issue with the post-second world war American Institutionalism for having abandoned the Veblenian foundations of evolutionary economics for some other adulterated version of Veblenianism. Hodgson (1998b, p.427) argues that the OIE “eventually took the road of cultural determinism ... [and] its evolutionism was severed from biology, and its socio-economic theory downplayed the role of individual agency.” It is from this thesis that he began a reconstruction of the evolutionary theory of institutional change, which, for simplicity of reference, is here named the Hodgsonian-Veblenian theory of institutional change.

Hodgson (2004b, p.xvi) has concerned himself with the development of a generalised Darwinian theory of social change that addresses “theoretical problems of agency, structure, emergence and social evolution.” He sees Veblen’s work on instincts and habits not only as the key to a complete Darwinian Social theory of evolutionary change (Hodgson 2007b, Rutherford 1996), but also as a solution to the longstanding and often neglected social science paradox of the causality between the individual and the institution (Hodgson 2003a). He broadly observes an epistemic dichotomy in this problem with neoclassicism and the NIE taking a methodological individualism framework in which institutions and institutional change are explained by acultural, ahistoric and acontextual individuals whose agency is driving institutional change (Albert and Ramstad 1997; 1998, Dugger 1979; 1996a, Hodgson 2009, Hodgson and Knudsen 2006c, Ramstad 1986).

To accomplish causal explanation the NIE requires a sweeping assumption that the initial condition was an “institution-free ‘state of nature’” (Hodgson 1998a, p.176). This is particularly a common assumption in Elinor Ostrom’s game theoretic work on the evolution of institutions in common pool resource governance (Ostrom 2014a, 2014b, Ostrom and Ostrom 2014). For example, she argues that “[i]f one wants to analyze changing rules, the initial situation before any rules are established is one where *there are no rules*” (Ostrom 2014b, p.15, emphasis added). The major problem with methodological individualism in explaining institutional change, Hodgson argues, is that it makes major unrealistic assumptions about given norms, given language, given culture, given tastes and preference and given habits among other givens. The individual is data, but the individual is never explained why he/she behaves the way he/she does in conformance to the institution (Hodgson 2009). The problem he identifies with the NIE explanations of institutional change is that of “infinite regress” (Hodgson 2004b, p.19) because neither the institution nor the individual ultimately has explanatory pre-eminence. The closure rules or stopping rules (Hiedanpää and Bromley 2012) have to be arbitrarily fixed by appealing to “Divine, spiritual, miraculous or uncaused causes” (Hodgson 2004b, p.8).

Douglass C North’s recent work, however, focuses on the role of culture and ideologies in institutional change (Galiani and Sened 2014), although methodological individualism remains a central tenet of the NIE. Von Staden and Bruce (2015, p.113) recently have pointed out the emerging convergence and complementarity between North’s “sociocognitive turn” and Veblenian research since the birth of institutionalism in the 1890s. They argue that North’s recent work on cognitive structures provides “an important ontological frame” (Von Staden and Bruce 2015, p.113) for deepening the Veblenian explanation of how beliefs, values, habits, preferences and interests are formed and their relation to institutional design. Similarly, in the present review it was shown that Northean social orders provide an ontological framework to Commons’ negotiational psychology since each social order entailed a different negotiational psychology and power structures.

On the other extreme is the post-second world war OIE, as Hodgson claims, which follows a methodological collectivism in explaining institutional change. In this framework, the institution explains all that the individual is. Methodological collectivism neglects the role of individual agency in changing institutions, while institutions are influencing and changing

the individual (Hodgson 1989; 1998a; 2004b, Hodgson and Knudsen 2006a). The process by which institutions reproduce themselves in individual agency by shaping motives, influencing and changing behaviour is what he calls “reconstitutive downward causation” (Hodgson 2004b, p.10). He, thus, concludes,

“Hence methodological collectivism may suggest versions of ‘structural determinism’, ‘cultural determinism’, ‘economic determinism’ and ‘technological determinism’. The versions that are close to methodological collectivism see individual thought or behaviour as being determined largely by structural, cultural or technological factors. In turn ‘structure’, ‘culture’, ‘economy’ or ‘technology’ are often seen as having a powerful logic and dynamic of their own,” (Hodgson 2004b, p.23).

The inclination to this extreme in the OIE, as Hodgson claims, implied that the individual played a passive or no role at all in institutional change. Hodgson (2003b) and Rutherford (2011) argued that the OIE had become cultural determinists and with the over-emphasis of Clarence E Ayres on technology, it could be argued that the OIE also became technological determinists. Rutherford (2011, p.335-336) supports this claim stating,

“Ayres takes these ideas [of Veblen on technology as a driver of economic progress and the current institutional system as inhibitive] and gives them a particular interpretation, identifying technology with instrumental ways of thinking and institutions with “ceremonialism”... He does not seem to fully recognize the necessary functions of institutions or that institutions can themselves be more or less instrumental.”

The danger here was Ayres’ use of a special case as a workhorse in advancing his integrative analysis of institutional change. While post-second world war institutionalism was about “the problem of “social control”” (Hodgson 2003b, p.570), to an extent, Ayres (1996) nearly took an anti-institutional view, while professing institutionalism. His student Fagg J Foster viewed institutions as instrumental, thus his insistence that problem resolution, in essence, always assumed the form of purposeful institutional adjustment (Foster 1981b; 1981c).

Ayres' model, despite the shortcomings Rutherford (2011) highlights, has become a foundational building block in advanced General Systems Analysis models of institutional change such as Hayden's Social Fabric Matrix (Fullwiler et al. 2009, Hayden 1982; 2006). While these claims by Hodgson and Rutherford seem to suggest extreme methodological collectivism, they have to be balanced with analytical advances in the OIE theory of institutional change that emphasised democratic participation in institutional change in the Deweyan instrumentalist tradition (Hayden 2003, Tool 1977; 1983; 1990; 1994, Waller Jr and Robertson 1991). For example, discussing the convulsive economic reconstruction programme in the post-collapse Soviet, which was designed by neoclassicists, Tool (1990, p.539) argued:

“we perceive democracy to mean that those who receive the incidence of policy must have and retain ultimate discretion over that policy – that is, that restraints and constraints are, in effect, self imposed through responsive and responsible political institutions and may be revised as the evolving consensus dictates.”

This view hardly fits into the methodological collectivism critique, but it fits into the purpose-driven evolutionary perspective with its reference to evolving consensus. In developing the theory of institutional change, Tool provided for the democratic test as a decisive test of progressiveness of a purposeful institutional adjustment processes and he censured ““shock therapy”” (Tool 1994, p.406). Defining the democratic test, Tool (1994, p.414) stated: “At issue is whether those who received the incidence of policy are themselves able to find and employ means to change such policy.” As is clear here, the emphasis is on democratic control, democratic consensus and discretionary power for individual agency to change institutions if they deem them undesirable.

Similarly, in the Commonsian School, institutional change is driven by problems arising out of individual transactions. The exercise of the individuals' political power (share in collective sovereignty) to set the government machinery in motion to enforce his/her will on others through the process of reasonable valuation results in institutions change (Commons 2009). Dawson (1994, p.36) emphasises that “the polity is inescapably involved in determining the distribution of injury” and benefits through creative ideas that shape the policy context and design of new institutions. This hardly fits methodological collectivism. The impulse for

change has its genesis in the individual or private entity and private customs that are due for judicial canonisation. Bazzoli (2000) showed that there was co-existence of individual causation and institutional causation in the Commonsian theory.

The instrumentalist theory of institutional change squarely builds on democracy because the Deweyan tradition focused on the importance of instituted processes of democratic participation to produce robust policy, policy change and scientific ideas that could deeply and positively influence society (Bromley 2004b; 2008a; 2012, Hayden 2006). Waller Jr and Robertson (1991) argued for a deliberative valuation economics in addressing issues of institutional change. In a deliberative framework, the individual agency is a considerable cause of institutional change through knowledge production and deliberation.

### **3.2.2. Hodgsonian-Veblenian theory of institutional change**

According to Hodgson (2003a, p.86), “Darwinism means causal explanation, where a cause is understood as necessarily involving transfers of matter or energy.” In explaining, institutional change, the social scientist is concerned with a “causal analysis of process” (Hodgson 2003a, p.87). Since Darwinism is a processual analysis of cumulative and, perhaps, circular causal sequence, a theory of institutional change must address three fundamental Darwinian principles: namely, “sustained variation”, “heredity or continuity” and “natural selection” (Hodgson 2003a, p.88).

#### ***a. Variation***

Social phenomena evolve and manifest in the emergence of diverse institutions such as language, laws, regulations, rules, norms, cultures, habits, traditions, mores, legends, superstitions and many other manifestations. Hodgson (2003a) asserts that a theory of institutional change, of necessity, has to explain the emergency of variety of institutions. Some of the institutional arrangements emerge spontaneously as though designed by an invisible hand, while others emerge by human purposeful design (Hodgson 2002; 2003a, Hodgson and Knudsen 2006c, Langlois and Hodgson 1992). As the non-human biological domain attains variety through speciation and mutation so also does the social domain. By speciation, institutions reproduce and multiply into different forms of institutions. The variety of biological life forms is a result of “genetic recombination and also rare mutations” (Hodgson and Knudsen 2006c, p.5). Although such mechanisms are prevalent in the non-human biotic domain, Hodgson and Knudsen (2006c, p.5) point out that there “are no

closely analogous mechanisms in the evolution of social institutions.” Thus, it remains an empirical question as to how institutions recombine and mutate to produce new varieties of institutions (Hodgson and Knudsen 2006c).

There is an indication, nonetheless, that this empirical question was attempted by Ayres (1996), notwithstanding the criticisms against him as a technological and cultural determinist (Hodgson 1989; 1998b; 2003a; 2004b, Rutherford 2011). Ayres (1996, not paged), here quoted at length, explained,

*“Technology advances by virtue of invention and discoveries being made by men, of course. But all inventions and discoveries result from the combining of hitherto separate tools, instruments, materials, and the like. These are capable of combination by virtue of their physical existence. The combining is of course performed by man, and especially by bright and restless men. But no one ever made a combination without there being something to combine. Furthermore, the more there is to combine in any given situation the more likely inventions and discoveries become unless the inveterate restless of human hands and brains is severely curbed”* (emphasis added).

At the core, Ayres’ argument is an evolutionary argument based on Darwinian concepts of variation and mutation and, in addition to them, hybridisation. To Ayres, technology is made up of tools, skills and knowledge, knowledge being the fundamental form of technology (Bush 1983, Hayden 1982, Mayhew 1981). Knowledge can be tacit (acquired through learning-by-doing) or explicit (communicable). This knowledge evolves over time by the mechanisms of combination and recombination of different types of knowledge that were before thought to be independent. Thus, new technological varieties emerge (by speciation and by hybridisation). The recombination, however, is an act of choice and purpose rather than an invisible hand operating in society.

Knowledge diversity is the source of sustained speciation and hybridisation of institutions, since, in Ayres’ framework, technology is the dynamic force driving institutional change (Ayres 1996, Bush 1983, Mayhew 1981, Hayden 2006, Valentinov 2015). The Veblenianism of Ayres’s argument can be traced to the Veblenian gene pool (habits and instincts). Of the many instincts Veblen discussed, he singled out the instinct of workmanship, the instinct of

parental bent and the instinct of intellectual idle curiosity as critical for the continuity of culture and the human life process (Veblen 1898c; 1914; 1919; [1899] 2005). Technological evolution builds on these instincts. In the Commonsian school, the same process of combination and recombination of existing common law precedent is responsible for the evolutionary growth of the formal institutions (Commons 2009).

In the revivalist project for Veblenian evolutionary economics the concept of habit is critical in explaining the evolution of institutions (Hodgson 2004b). Hodgson and Knudsen (2006a, p.488) have argued that “[h]abits and routines are persistent containers of encoded instructions for behaviour or thought,” hence making them the genes and DNA. The question is where do habits come from? Hodgson (2007c, p.332) answers: “Habits are formed through repeated thoughts or behaviors in a specific type of social setting.” The problem is that there remains something to be explained. For example, what causes thought?

The progenitor of pragmatism, Charles Sanders Peirce, explained habit as a function of belief which is a function of thought which is a function of doubt which is a function of surprises (Bromley 2008f, Peirce 1878). The nested function summarises Peircean theory of habit and truth formation. Society comprises multitudes of chaotic and orderly signs continuously flowing through it, and the signs that manage to catch the attention of human agents are surprises (Bromley 2008a). For example, biodiversity losses, climate change, new disease outbreaks, upsurge in inflation during a restrictive monetary and fiscal policy regime, upsurge in crime rates when the economy seems to be prospering and is growing inclusively are examples of surprises. Surprises are surprises because they contradict existing truth claims and beliefs about objects, processes and phenomena.

Surprise produces doubt in the mind of the sign observer. The doubt irritates the agent and forces him/her to search for new beliefs (Bromley 2008f, Psillos 2009). Thus doubt leads to the process of knowledge production (the technological evolutionary process) (Ayres 1996, Bush 2009). The produced knowledge is warrantable and it may/may not necessarily be accepted by all who investigate the surprise (Bromley 2004b; 2008f, Peirce 1878). However, if the community of investigators converge on a particular knowledge claim, it becomes the truth for the time being (warranted knowledge) and whatever that truth represents is the

reality for the time being (Bromley 2008a, Peirce 1878). The warranted knowledge claim produces belief in the community of investigators of the surprise. This belief becomes a habit by repeated usage, as Hodgson (2007c) stated, and the habit becomes a rule of action (which is an institution) (Hiedanpää and Bromley 2012). A habit itself becomes a custom if it is widely diffused and adopted by the broader community beyond the initial community of investigators of the surprise (Hayden 2006). Thus, a habit becomes part of a dominant epistemological system (instituted social imaginary) the moment it matures into custom.

The Peircean account of how habits arise shows the role of new knowledge in producing new beliefs, which become new habits. If this line of reasoning follows, then Ayres got it right insofar as he defined technological evolution as a process of the growth of knowledge in the arts and sciences as well as knowledge encoded in tools. The emergence of new technology by combination and recombination of existing knowledge, skills and tools is a response to surprises (changes/shocks) from the human environment. In a comparable line of reasoning, Hodgson and Knudsen (2006a, p.482) argue that “[n]ew variation is generated because replication is never perfect and because replication involves recombination of existing variants.” They, in part, attribute variety to “replication error” and this makes variation a matter of chance (probability) and fate (Hodgson and Knudsen 2006a, p.483). The Peircean account, of course, does not tell the entire story about habit formation because “[w]hile some habits may be learned only through conscious effort, most habit formation is probably unconscious” (Bush 1987, p.1077). Thus, the difference between Ayres and Hodgson and co-authors is respectively one between purpose and chance on the one hand, and reductionism and generality on the other.

### ***b. Selection***

For a theory of institutional change to be adequate, Hodgson (2003a) argues that it has to include the principle of selection. The point is why some institutions survive longer than others. Selection is a test of fitness. Veblen ([1899] 2005, p.126) maintained that the “evolution of social structure has been a process of natural selection of institutions.” In the Hodgsonian-Veblenian social theory, the units of selection hierarchically are institutions and habits/routines, but not individuals (Hodgson 2002; 2003a).

Broadly, Hodgson and Knudsen (2006a) identify two selection mechanisms: namely, subset selection and generative selection. Subset selection is non-dynamic in that it seeks to secure “continuity... by enduring identity among a subset of entities [/institutions]” (Hodgson and Knudsen 2006a, p.483). The process of subset selection maps the “anterior set” into a “posterior set” in such a way that identity is maintained although the posterior set will be smaller (Hodgson and Knudsen 2006a, p.478). In this case, the subset continues to be decimated overtime as it interacts with environmental factors (selection criteria) until that species of institutions become extinct or survive if it withstands the selection pressure.

Generative selection, on the other hand, creates variety of institutions through speciation and mutation (Hodgson 2003a; 2004a, Hodgson and Knudsen 2006a; 2006b). Unlike the subset selection process, with generative selection “continuity is secured by the transfer of information” through “imperfect replication and recombination” of the genes (Hodgson and Knudsen 2006a, p.483). Hence, subset selection is about preservation of the status quo, while generative selection is about producing new varieties by passing on genetic and adaptive information, which equivalently are the “adoption and diffusion of the innovations” in the social domain (Bush 1987, p.1105).

Hodgson and Knudsen (2006a, p.477), nonetheless, have demonstrated that “neither subset selection nor generative selection implies improvement... neither necessarily leads to efficiency... [But]... can lead to extremely rapid effects in a social population.” Similarly, Hodgson and Knudsen (2006c, p.5) emphasised that the “outcomes of a selection process are necessarily neither moral nor just... there is no requirement that outcomes of a selection process are necessarily optimal or improvements on their precursors.” Thus, the natural selection of institutions does not privilege favourable outcomes; it can also lead to imbecile or zombie institutions (Ayres 1996, Veblen 1914). Hodgson and Knudsen’s (2006c) explanation highlights several references to two systems of canons that Thorstein B Veblen continually flags out in his works.

In the *Theory of the Leisure Class*, for example, Veblen ([1899] 2005, p.241, p.257, p.260, p.265) discusses “canons of reputability”, “canons of honor”, “canons of anthropomorphic fitness and honorific worth”, and “canons of pecuniary merit” among others. He utilises these canons as standards of ceremonial adequacy by which the leisure class evaluates any

proposed institutional adjustment to decide its feasibility or non-feasibility, its benefits or harms to the class. These standards of judgment, Veblen (1914, p.25) argued, result in “the triumph of imbecile institutions over life and culture.” However, the nature of the standards by which such imbecile institutions gain ascendancy suggest that there is a power structure driving the unjust, non-moral, non-optimal or inefficient selection of surviving institutions. If this follows, then human intentionality (purpose), perhaps, is the most important arbiter in Darwinian selection of institutions. However, Hodgson and Knudsen (2006c, p.12) maintain that “Darwinism does not deny belief, choice, purposeful behavior or foresight: it simply asserts that they too are caused and worthy of explanation.” To Dugger (1980, p.897),

“[I]ndividuals acquire motives, goals, ideals, and means... [from] the institutional structure in which the individual is embedded. Institutional structure is the source of power, for individuals learn motives, goals, ideals, *and means* from their participation in society's institutions” (emphasis in original).

The key observation here is that power is an outcome of habitual exercises and routines that an individual performs to fulfil an institutional role within an institutional structure. The subtle point is that habitual practices generate tacit knowledge, which becomes the seat of power. If this argument follows, it implies that human purpose rather than an invisible hand of natural selection is responsible for regressive or progressive institutional change (Bazzoli 2000). The purpose of the leisure class, for example, is to protect their “social standing,” “social claims,” and “social assets” (Polanyi [1957] 2001, p.48), hence, the usage of invidious canons to evaluate feasibility of social change (Wisman 2011). Notwithstanding the perceived proximate role, human purpose seems inescapable in evolution of institutions.

On the other hand, Veblen also makes reference to canons favourable to the wider society as opposed to the powerful classes. He discusses, for example, “canons of workmanship”, “canons of reality” by which people objectify processes, “canons of curiosity” and “canons of economic reality” (Veblen 1914, p.88, p.179; 1919, p.8, p.148). He argues that institutions sometimes survive on instrumental grounds because they satisfy these canons of instrumental efficiency. Instrumental efficiency cannot be a goalless canon. Further, in contrast to Hodgson and Knudsen (2006c), this suggests that the morality or immorality and the optimality or non-optimality of institutions is not a matter of chance but choice. The

canons are purposefully put in place by people either through cumulative habitual practice or by declaration; it does not seem as though they happen by chance. Veblen ([1899] 2005, p.111) characterised the selection process:

“In whatever way usages and customs and methods of expenditure arise, they are all subject to the *selective action of this norm of reputability*; and the degree in which they conform to its requirements is a test of their fitness to survive in the competition with other similar usages and customs” (emphasis added).

Selection happens at the level of customs and usages. The key argument here is that survival of institutions depends on their adequacy in satisfying some standard of judgment (a value) such as the norm of reputability in consumption. In productive uses, the norm of instrumental efficiency would be the criteria of survival of institutions that govern production. However, the norms arise when a “tradition gains consistency, [and] the common sense of the community erects it into a canon of conduct” (Veblen [1899] 2005, p.12). In each aspect here, purpose is the cause.

While Hodgson differs with the post-second world war OIE on whether there is such a thing called the Veblenian Dichotomy, the explanation of subset selection fits OIE’s explanation of ceremonial systems. Ayres (1996, not paged) postulated that

“If the technological process is the locus of value, the continuous development of the technological arts and crafts and the accompanying recession of superstition and ceremonially invested status is progress.”

The point he raises here is that society has two systems of institutions that are dialectical. Ceremonial systems with their past-binding effect serve to retain and continue their identity just as subset selection does. Examples of such ceremonial systems would include myths, superstitions, legends, ideologies, beliefs, traditions and norms among others. Although some of these elements of the cultural fabric are necessary as bases for trust and mutual interaction, some of them are sources of resistance to institutional change (Hayden 2006, Rutherford 1996; 2011). Thus, the process of “recession” of ceremonial dominance is the equivalence of the decline towards extinction of a species under subset selection. From this viewpoint, Ayres (1996, not paged) argues that “culture exhibits another aspect which is

inhibitory to the technological process just as gravitation inhibits centrifugence.” Therefore, he concludes that “[f]or all who achieve economic development profound cultural change is inevitable” (Ayres 1996, not paged). The other dynamic in Clarence E Ayres’ explanation, which is the equivalence of generative selection, is “the continuous development of the technological arts and crafts”. Hence, as speciation of technology continues, ceremonial systems get disrupted leading to institutional speciation and diversity (Rutherford 1998).

Logically, the instinct of intellectual idle curiosity is the source of natural selection of institutions that survive since the purposeless acquisition and accumulation of knowledge for its own sake gradually passively creates new beliefs, which, with diffusion and adoption, at some stage become habitual mental models (Bush 1983; 2009, Hayden 2006). The other two instincts, that of workmanship and that of parental bent, have human purpose at their core which means they are sources of artificial selection using the logic of efficient cause (Veblen 1914; 1919) or sufficient reason (final cause) in the Commonsian sense (Bromley 2006, Commons 1924b). The result is that institutional change takes place through both natural and artificial selection (Bazzoli 2000, Cordes 2006; 2007, Rutherford 1998). Hodgson and Knudsen (2006c, p.15-16) admit that “Darwinism is insufficient, but ... it is also necessary at an abstract and highly general level.”

The insufficiency of Darwinism seems to arise from the Hodgsonian-Veblenian marginalisation of human purpose in social change because if both natural and artificial selection mechanisms are *equally* considered it will be a sufficient theory. Indeed, there are social phenomena that emerge in an unorganised fashion, while others display the mark of a human designer (Hodgson 2003b, Hodgson and Knudsen 2006c). Either case is ubiquitous in modern society. A broader framework, it seems, would be one that integrates Darwinian natural selection and artificial selection process in explaining institutional change.

### ***c. Heredity***

The issue of continuity of culture and the human life process dominates Veblenian institutional economics and as such the process of sustaining continuity requires the Darwinian principle of heredity (Hodgson 2002; 2003a, Hodgson and Knudsen 2006a; 2006b). Heredity explains why certain institutional forms and arrangements persist and

remain relatively stable (path dependence). The process of replication maps an original (source, parent) to a copy (offspring). Hodgson and Knudsen (2006a) and Ostrom (2014b) draw attention to the fact that the social domain consists of interactors (firms, churches, families, governments, villages and political parties among others) and replicators (habits, custom and routines all of which act as genes and DNA). The parent institutions directly and causally produce the offspring institutions, but all that is required is similarity of the copy to its original rather than perfect identity (Hodgson and Knudsen 2006a). Hodgson and Knudsen (2006b) argue that in the process of the production of the offspring, encoded information is passed from the parent institution to the offspring institution. The replicators are the genes (habits, beliefs, custom, traditions and routines).

To Hodgson and Knudsen (2006a), the strength of the connectedness between cultural settings and interactors/carriers of the replicators determines the degree of successful replication. Hodgson and Knudsen (2006c, p.5) also postulate,

“In biology these mechanisms often involve genes and DNA. In social evolution we may include the replication of habits, customs, rules and routines, all of which may carry solutions to adaptive problems... There must be some mechanism that ensures that some such solutions (embodied in habits, routines or whatever) endure and replicate; otherwise the continuing retention of useful knowledge would not be possible.”

In the NIE, Ostrom (2014b, p.12) has made a similar argument likening phenotypic structures (interactors) to the structure of the social game – the players, incentive structures, hierarchy – and the genotypic structures (replicators) to “the set of instructions encoded in DNA ... [which is] a rule configuration ... to produce the structure of relationships...” In this case the social rule is the DNA. Knudsen (2004) emphasises that a replicator at one social level might be an interactor at another level, thus he suggests the existence of a hierarchy of social DNAs (genotypic hierarchy) and a hierarchy of interactors (phenotypic hierarchy). However, Cordes (2006, p.535) argues that “[i]t has not been possible to identify anything akin to a ‘social DNA’.” Cordes (2007, p.277) has also critiqued the interactor-replicator (or phenotype-genotype) conception because in social evolution “systematic feedback between variation and selection” undermines theories of change that

rely on “identification of pheno- and genotypes in cultural evolution (or interactors and replicators in Hodgson’s terms).” The implication of this critique is that there is an identification problem because replicators and interactors are indistinguishable. The complexity here is that if a gene can become an organism and an organism a gene at different hierarchical levels then the two are clearly indistinguishable in the social domain (Cordes 2006; 2007).

Hodgson and Knudsen (2006a) and Knudsen (2004) outline four conditions necessary for effective replication. Firstly, since interactors are the carriers of replicators, the continued survival of interactors necessarily implies continued survival of replicators ingrained in them. Secondly, the replicators ingrained in an interactor interact with the outside interactors through the medium of the interactor, thus the result is shared organisation of components among interactors. In a sense, this condition suggests that interaction of organisations of all forms in the social domain involves diffusion, absorption and replication of habits, custom and routines. Thirdly, replicators that are not ingrained in an interactor are independent of the interactor. Lastly, the expected number of subsequent replicators depends on the characteristics of the interactor (Knudsen 2004). An organisation that least interacts with others cannot pass on its routines (replicators) to others and cannot receive routines (replicators) from others. Overall, Darwinian selection operates at the interactor level, which is to say at organisational level. It also happens at the replicator level, which is to say at the level of habits, customs, traditions and routines, which play the roles of social DNA. The Darwinian selection is hierarchical, but clearly there is an identification problem.

### **3.2.3. Comparative insights: Veblenian Dichotomy and Hodgsonian-Veblenian theory**

Given the contention by Hodgson that the post-second world war OIE abandoned the Darwinian foundations of Veblenian institutional economics, a sketchy comparative analysis follows. At the most fundamental level, firstly, the Veblenian Dichotomy (VD) uses the institution as an explanatory unit, while the Hodgsonian-Veblenian (HV) theory uses a co-evolutionary explanation. Thus, there is a degree of methodological collectivism in the VD as Bush (1987, p.1077) explained “socially relevant behavior is learned and is, for the most part, habitual” and “institutional change is discretionary precisely because all social prescriptions are the outcomes of conscious choices made at some point in the life history of the culture”. In the Commonsian tradition, it was shown that a co-evolutionary

methodology is evident in spite of the view that institutions are collective action in restraint, liberation and expansion of individual action (Albert and Ramstad 1998, Bazzoli 2000, Bromley 2008a, Commons 1931).

Secondly, the HV is a hierarchical model of institutional change in which the interactors (the social structures) and the replicators (habits, routines, traditions and customs) change by natural selection. Although the HV critiques the VD for reductionism, the VD is also a hierarchical model of institutional change. Institutional change takes place at the levels of the value system and the institution (structural levels) (Bush 1983; 1987). The VD postulates that “value is contextual and located within the existential realm of “knowing and doing” (Bush 2009, p.295).

Since values have to do with knowing and doing, they deal with the realm of norm and habit production. Thus, values are the replicators in the VD, while habits and routines are the replicators in HV. Besides correlating behaviours within and between institutions, Bush (2009, p.295) argues that values have the warranted ability to “relate means to consequences in the appraisal of human action” and they are “a form of knowledge.” Thus, values act as standards of judgment in human decision making because they genetically contain knowledge encoded into them from previous generations by a cumulative causal process. Value judgments themselves, as Bush (2009, p.301) argues, “are not subject to habituation, for they are the very stuff out of which changes in habits of thought and behavior are initiated.”

The important conclusion that emerges from the VD is that “institutional change must entail a change in the value structure of the institution” (Bush 1987, p.1078). The implication is that a change in the replicators (ceremonial values and instrumental values) means real institutional change has taken place. This is the Darwinian concept of mutation. The VD presumably gives an adequate explanation by virtue of isolating the ceremonial system as the source of inhibitive forces in institutional evolutionary process, which means the outcome may be that of a favourable generative selection (in the case of instrumental embodiment), that of adverse generative selection (in the case of Lysenkoan effects) or that of subset selection (in the case of prolonged ceremonial encapsulation). In effect, the Lysenkoan effects seem to be the equivalence of Hodgson and Knudsen’s (2006a, p.477)

characterisation that “subset selection and generative selection can lead to extremely rapid effects in a social population.” Similarly, what Hodgson and Knudsen (2006a, p.483) characterise as “replication error (mutation) and genetic recombination generates new variation” is what the VD calls weak form ceremonial encapsulation, which leads to an imperfect pass through of new knowledge to instrumental uses leading to some loss of instrumental efficiency.

In light of this view, the VD largely is Darwinian, but it is premised on artificial selection. Human purpose is a deciding factor in the VD, which it is not in the HV. The VH, therefore, does not have a theory of valuation since selection is left to chance and fate, thus the possibility of generating immoral and unjust results. The VD is premised on institutional adjustment as a problem solving process rather than change out of chance as the HV postulates. Even in the case of purposeful selection, the HV requires that it be traced to the cause of purpose, hence marginalising the need for a theory of social value (Bazzoli 2000). Yet, the cause of purpose is a problem (a surprise), which is what VD postulates.

In causing purpose, the problem does not select a response (institution), valuation guides the choice of an institution although the value criteria are evolutionary themselves (Cordes 2006). The prevalence of canons of different types, standards of conduct and norms as valuation criteria in all of Veblen’s works suggests an oxymoron in that he embraced natural selection, while at the same time advocating valuation, which is purposeful (Veblen 1898c; 1914; 1919; [1899] 2005). Either he meant the two forms of selection to go along side each other or he vaguely used the term natural selection to imply that human choices are natural selection processes in the course of cultural development. This reasoning follows from his clear indication that the fitness of new institutions depends on them passing the canons or norms, which are purposefully established, diffused and adopted standards of valuation. Commons (2009, p.661) seems to corroborate this argument in his critique to Thorstein B Veblen arguing, “Thus Veblen is compelled to introduce *purpose* into his instinct of workmanship, and thereby to change from Darwin’s “natural” selection to Darwin’s “artificial” selection.”

Since valuation is central to the Veblenian discourse and cumulative causal analysis of process is foundational and since “artificial selection” is no more than a special case of

“natural selection” (Hodgson 2003b, p.570), the HV necessarily claims the place of an overarching generalised theoretical programme of Veblen evolutionary economics. However, literature within the HV suggests that HV is not necessarily a general case in the social domain. For example, Knudsen (2002, p.444) asserts that “the neo-Darwinian explanation applies *only* to such economic selection processes that involve *replication*” (emphasis added). Cordes (2006; 2007) draws attention to the fact that the social domain fails the heritability test. The qualifier “only” suggests that there are cases the HV fails to explain.

Cordes (2006; 2007) has demonstrated at two levels that the HV is a partial theory because, while the original Darwinian framework comprises five-part hypotheses that together make a complete (holistic) exposition of evolution, the HV has focused on three (selection, variation and heredity) and excluded (descent and speciation). He also argues that the HV is capable of explaining origin, but fails to explain continuity of social evolution because the presence of social learning transforms the trajectory and rate of social evolution outside the normal Darwinian trajectory and rate of change (Cordes 2006, Cordes et al. 2008).

Lastly, there are similarities in the framing of some of the HV’s minimum conditions for selection and the VD’s principles of institutional adjustment. Firstly, VH’s principle of shared dependence of component replicators which postulates that the life of the replicators is dependent on the life of the interactors is related to the VD’s principle of minimal dislocation because a major dislocation would cause a disrapport that would extinguish replicators and interactors simultaneously. Secondly, the HV’s principle of shared organisation of components which postulates that mutual cross pollination of interactors (by habits, customs and routines – the pollens) takes place through the medium of interactors corresponds to the VD’s principle of recognised interdependences, which postulates that institutional adjustment must be of such a kind that it will favourably correlate the emerging pattern of activities and human relations within and between institutions in the post adjustment period.

Overall, the two Veblenian claimants are both hierarchical evolutionary models and only differ in terms of the principal replicator as well as the role of purpose and valuation on the one hand, and chance and fate on the other. The HV claims open system and non-

reductionist Darwinian Theory of institutional change, which the VD seems not to claim. However, natural selection in the VD follows the locus of the instinct of intellectual idle curiosity. The VD approaches institutional change from an applied perspective, while the HV is cast in a theoretical sense.

### **3.3. A working integrated institutionalist paradigm**

The section ties together the various pieces from the three institutionalist schools of thought to build an integrated explanatory framework for institutional change from the perspective of knowledge and power. The framework accommodates both methodological collectivism and methodological individualism, which is a co-evolutionary methodological framework. The Northean School demonstrated that social agents invest in knowledge as a function of net returns in order to build a strategy for lobbying for certain changes that they desire in the institutional structure. It also postulated bidirectional causality between knowledge and ideology, suggesting that ideology, fads and dogmas sometimes have a major influence on institutional change. This line of thought was conceptually refined with input from feminist literature that focuses on the role of instituted social imaginaries and epistemic violence.

Generalising the concept of violence from armed conflict to socio-cognitive violence facilitates generalisation of the limited access and open access order hypotheses to explain the role of knowledge- and ideology- based epistemic violence in shaping institutional change. Epistemic violence is a manifestation of power – monopoly over the sanction of ignorance. The sanction of ignorance implies that epistemic communities that have sovereign power can silence others, through the mechanisms of testimonial quieting and hermeneutic injustice, in institutional change processes.

To interrogate the transmission mechanisms of epistemic violence in shaping institutional change, John R Commons' principles of sovereignty, futurity and working rules as well as the negotiational psychology of command-obedience, argumentation-pleading and persuasion-coercion are relevant here. Since sovereignty is a process of monopolising economic and political violence (Commons 2009, Dawson 1998), and since the logics of LAO and OAO are about monopoly over violence, a special case of which is epistemic violence, the two schools coalesce into a useful lens for theorising institutional change. The LAO/OAO social orders

provide an ontological framework for John R Commons' negotiational psychology. Insofar as epistemic violence has the greatest claim on sovereignty when an epistemic community manages to partner with governmental agencies, and since government is a process characterised by the continuous flow of transactions between officials of the state and the citizens (Commons 1924b), the LAO/OAO contains the logic of negotiational psychology.

While in the Commonsian School, property is central to accessing sovereign power, the modified LAO/OAO suggests that knowledge and ideologies are potential sources of sovereign power especially considering the potential role of knowledge and ideology in John R Commons' negotiational psychology. Further, since a democratic setting lowers political transaction costs of expressing social agents' opinions (North 1990), liberty and property combine with epistemic violence in John R Commons' negotiational psychology to create a potentially wicked institutional adjustment problem. As Commons (1931, p.654) would argue, "It is from forbearance that the doctrine of reasonableness arises," but forbearance is the opposite of epistemic violence. Wickedness is the absence of reasonableness.

To the extent that property, liberty and epistemic violence can be used to advance narrow group interests or broader societal interests, the Veblenian Dichotomy enables classification of various power configurations and manifestations of sovereignty into ceremonial and instrumental categories. The relative prevalence of ceremonial motives over instrumental motives (or the converse) in the unfolding institutional change dynamics, helps evaluate the extent to which change is progressive or regressive, and to explain the nature of dynamic forces hindering or propelling progressive institutional change. The definition of a problem as the difference between 'what ought to be' and 'what is' ties all the three schools – the Northean, the Commonsian and the Veblenian – in the concept of purpose. Although the Northean view uses the price system for valuation, it also ascribes purpose to knowledge acquisition and generation.

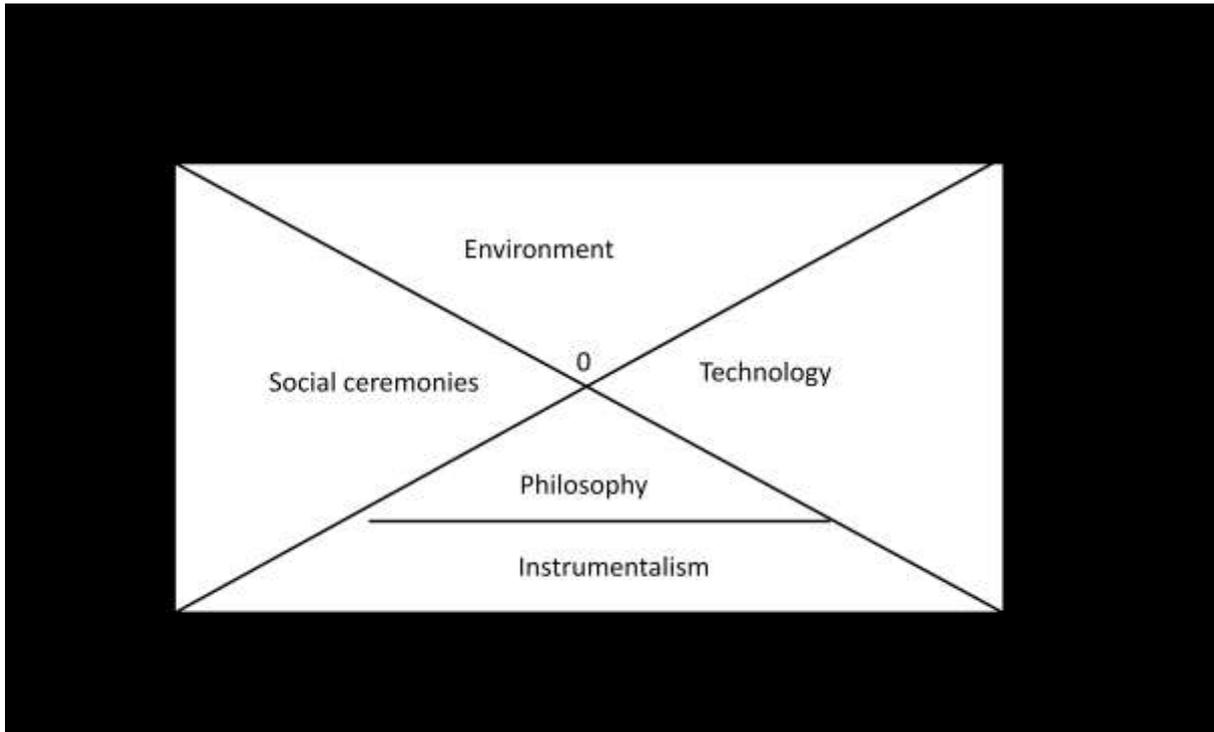


Figure 3-1: Institutional theory of social change

Source: F Gregory Hayden (1982, p.643): *The Institutional Paradigm*

Figure 3-1 illustrates Hayden’s (1982) synthesis of the institutional paradigm. Figure 3-2, which is a modification of Hayden’s (1982) framework, synthesises the potential interlinkages of the three schools in terms of the knowledge-ideology-power interactive dynamic in explaining institutional change. The two sides AB (ceremonial knowledge system) and CD (instrumental knowledge system) are antagonistic. Social ceremonies include institutions and values. They are past-binding. Under this category, property rights also belong in the event that they are used to justify a regressive outcome. For example, based on a property rights argument, a group might withstand an environmental policy that probably is democratically and socially desirable. However, property rights also incentivise desirable behaviour such as investing in sustainable land management practices (Armsworth *et al.* 2006, Kontoleon *et al.* 2007, Leal 2010, Swanson 1994). In that sense, they are instrumental institutions.

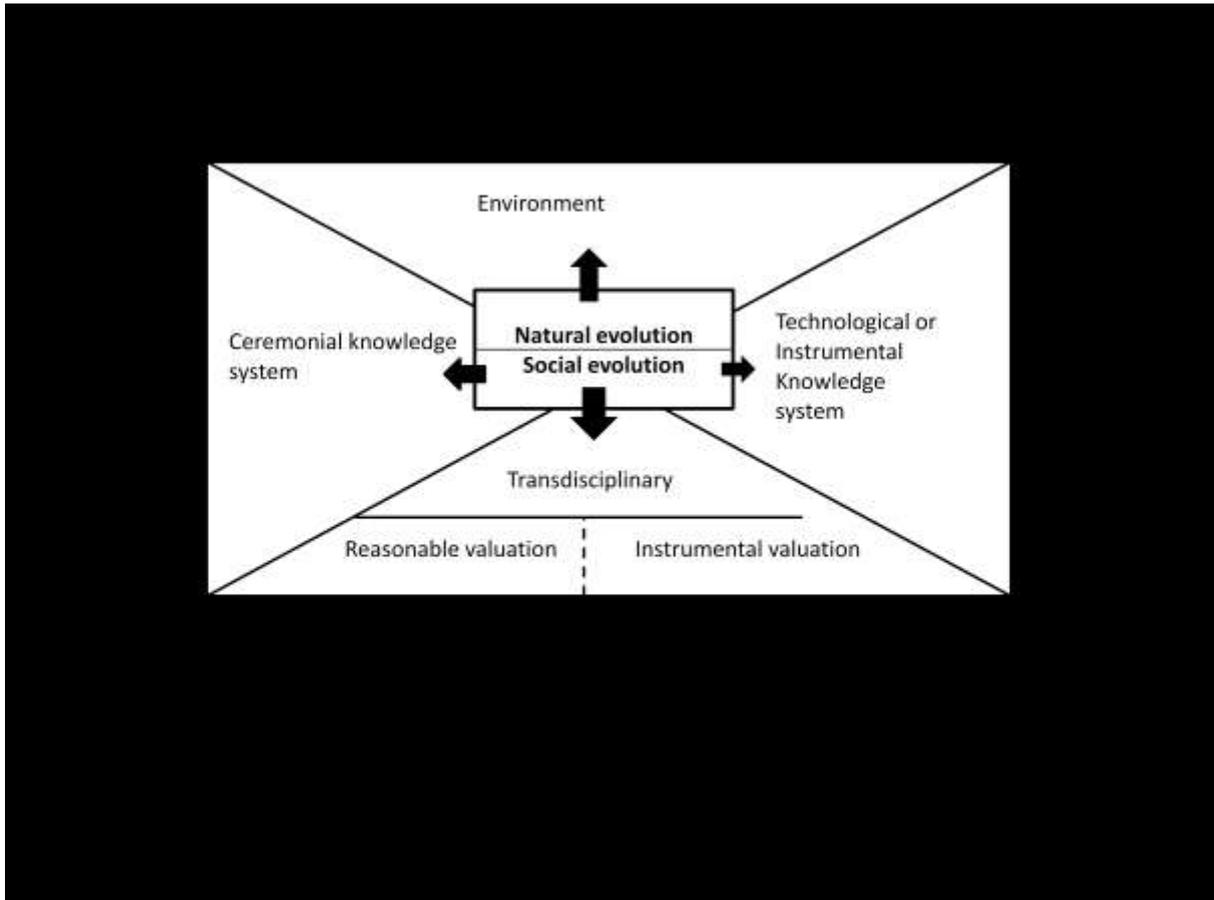


Figure 3-2: Framework for analysing knowledge and power

Source: Modified from F Gregory Hayden (1982): *The Institutionalist Paradigm*

There is a fundamental point of difference between Hayden’s framework (Figure 3-1) and the one depicted in Figure 3-2. To Hayden, given his utilisation of the Ayresian framework that takes institutions to be ceremonial and technology to be instrumental (Rutherford 2011), all institutions such as property rights, judicial precedent, government statutes and the constitution are ceremonial institutions. An attempt is made in Figure 3-2 to match every component of social ceremonies in Hayden’s framework with an instrumental aspect. Ceremonial values have instrumental values as their antithesis. Ceremonial beliefs have instrumental beliefs as their antithesis. Since values are a form of knowledge (Bush 2009), there is no reason why instrumental values cannot be classified under technology.

It is somewhat doubt-inducing that the Veblenian Dichotomy classifies the judiciary system as a ceremonial system on grounds that it is an authority system (Ayres 1996, Hayden 1982, Hickerson 1982; 1987, Mayhew 1981). Insofar as the basis for new technology is already

existing technology, which makes it a referential system, one wonders why the judiciary becomes ceremonial if the basis of common law is existing/previous knowledge (precedent). Since technology is a combination and recombination of previous and current knowledge, skills and tools, one wonders, too, why the process of growth in common law precedent is a ceremonial system when it operates on the same principle as technological evolution. It is a process of knowledge production and growth. Judiciary systems do not only utilise precedent, they also listen to testimonies of scientific experts if the case requires it and they combine all such new and existing knowledge into a new rulings which grow the knowledge fund of the legal foundations of the social system (Hiedanpää and Bromley 2011, Rutherford 2011). The new rulings become new reasonable institutions.

Veblen (1914, p.291) classified judicial systems under ceremonial system at the time of his writing because instrumentally valuable matters of “current preconceptions touching human rights” had no place in existing legal discourses or could not be accommodated because the jurists were habitually given to establishing legal principles in statutes/precedent that confirmed existing doctrines and avoided finding new principles that might have contradicted their existing judicial social imaginaries. Changing social conditions required utilisation of the efficient cause logic rather than sufficient reason (Veblen 1914). The problem was not “authentication in terms of sufficient reason”, but it was an absence of investigative interest in “any question of the causes to which these [legal] principles owed their eternal fitness in the scheme of Nature at that particular time” (Veblen 1914, p.292). The jurists were not questioning the foundations of the legal principles they so depended upon. Judicial change was falling short of third-order change.

Commons (1924b) traced the evolution of United States judicial precedent over time from the transformation of the meaning of property from physical possession to economic power and the creation of a new category called liberty, which was important for human rights (the human life process that is so central to the Veblenian tradition of the OIE). It is here argued that this fundamental transformation of the habitual mental models of legal thought in judiciary practice as democratisation unfolded implies that some reclassification of this source of institutional change from the ceremonial category to instrumental category is long overdue. Commons (1942, p.369) described the new judicial way of reasoning that

transformed US precedent as “experimental reasoning”, which was quite distinct from the “historical doctrine of the rule of reason” (Commons 1942, p.382).

In showing the evolution of judicial reasoning from backward-looking sufficient reason to forward-looking experimental reasoning (principle of futurity), Commons’ logic suggests that classifying the judiciary as ceremonial is a misclassification (Ramstad 1989, Rutherford 2011). Appreciating this fundamental change in the scheme of evolving political and judicial institutions, makes for easy reconciliation of Commons’ system build on the logic of sufficient reason (final cause/purposeful explanation) and Veblen’s system build on the logic of efficient cause (pure/objective causal process explanation). Bromley’s (2006) theory of volitional pragmatism, which utilises the experimental reasoning logic, and is a posterior set of the reasonable valuation epistemological framework of John R Commons (the anterior set), naturally coalesces with instrumental theory of valuation despite being based on the logic of sufficient reason. Sufficient reason carries a different meaning in Bromley (2006) from the Veblenian connotation. It now carries a futuristic meaning rather than the past-binding meaning.

In Hayden’s framework, philosophy provides the valuation framework, which is the Deweyan instrumentalism based on the logic of efficient cause. In the Commonsian School, valuation is based on the logic of sufficient reason (final cause) as volitional agents interact, hence volitional pragmatism. Both forms of valuation yield the same result although they apply different logics. Instead of having philosophy as a guide to social value, Figure 3-2 introduces a transdisciplinary framework as a guide to valuation. Max-Neef (2005) raised two fundamental issues: there are multiple levels of reality in the first instance, and in the second, a theory relevant to a particular realm of reality does not exhaustively explain it. Thus, all disciplines yield partial truths about social and natural phenomenon, and the complete truth is possible when various epistemic communities congregate around a policy issue to integrate their domain-specific warranted assertions to come up with a grand valuable assertion. Unlike Max-Neef’s (2005) view that theology and philosophy provide guidance on social valuation, it can be argued that value is generated through transdisciplinary reasoned discourses. Bromley (2008a, p.238) supports this line of reasoning arguing that volitional pragmatism requires social agents to overcome the modernist “Myth of the other”. The theological view is that whenever human society

started, God had predetermined the values for humankind, but modernism eliminated God and enthroned philosophy as the new source of values.

“Philosophy became our new **Other**... The **Myth of the Other** is precisely concerned with the idea that *tough choices* cannot usefully be turned to God, or to philosophers, or to welfare economists. There is no **Other** – there is only us” (Bromley 2008a, p.238, emboldening in original, italics added).

The precise point he is making is that problems are resolved by deliberation through a “particular game of giving and asking for reasons” (Price 2013, p.31) and that valuable knowledge (reasonable value) is a product of that reasoned process (Norgaard 2007). Philosophers alone cannot guide us to social value. The age of High Philosophy is over. Transdisciplinarity suits Bromley’s view because all epistemic communities bring their warranted claims to the discussion table and the rest of the listening epistemic communities jointly evaluate the claims. Those that pass the joint valuation are the truth and the reasonable values for the time being. The essence of having a transdisciplinary valuation framework is to avoid truth claims of one epistemic community graduating into institutions that bind the democratic community before it has evaluated them, which would be a manifestation of epistemic violence.

Since volitional pragmatism and instrumentalism are premised on different logics, Figure 3-2 introduces the four instrumental principles of institutional adjustment (technological determination, minimal dislocation, socio-ecological co-evolution and recognised interdependences) as the sufficiency criteria. The social legitimacy of institutional adjustment in Figure 3-2 is evaluated on the bases of constitutionality, legality and judicial muster, which operate on the logic of sufficient reason (final cause). Both these sufficiency and social legitimacy evaluation criteria depend on the democratic process of participation in the determination of the sovereign will through the Commonsian negotiational psychology, which now also includes a new category called epistemic violence.

BD specifies evaluation criteria, while AC represents environmental/ecological systems (Figure 3-2). The transdisciplinary framework allows humanity to have a holistic view of the environmental/ecological systems. Instead of viewing it through a uni-disciplinary lens, which only gives the theoretical claims of a particular epistemic community,

transdisciplinarity consummates humanity's view of the environment/ biodiversity through an instituted process of deliberative valuation that yields reasonable value (Bromley 2006; 2008d, Norgaard 2007, Waller Jr and Robertson 1991). From this lens, one can evaluate the extent to which a policy process was transdisciplinary or uni-disciplinary thereby detecting the role of epistemic violence.

Another fundamental difference between Hayden's scheme (Figure 3-1) and the one in Figure 3-2 is that the Hayden scheme treats all knowledge from the arts and sciences as instrumental. However, if the Northean School is correct in postulating that knowledge also generates ideologies, fads and dogmas in addition to technology, and that some ideologies lead to regressive institutional change, then some knowledge produced by the arts and sciences might be ceremonial. This reconceptualisation of knowledge implies that there are two dialectical knowledge systems – the ceremonial and the instrumental. This reconceptualisation helps to capture problems such as scientism and fundamentalism in science, which are ceremonial in nature and are mechanisms of epistemic violence. Hodgson (2003a) and Rutherford (2011) support this view when they critique Clarence E Ayres for being a technological and cultural determinist and for attributing all knowledge production in sciences and arts only to "instrumental ways of thinking" (Rutherford 2011, p.335).

### **3.4. Theory of value as theory of knowledge and of power**

At the core of valuation is the idea of purpose and knowledge because what ought to be is defined by the knowledge frontier. The big question is whose knowledge defines the knowledge frontier? A theory of power begins with knowledge and a theory of knowledge might begin with Dewey's (1939, p.34) assertion that

"valuation takes place only when there is something the matter; when there is some trouble to be done away with, some need, lack, or privation to be made good, some conflict of tendencies to be resolved by means of changing existing conditions. This fact in turn proves that there is present *an intellectual factor – a factor of inquiry –* whenever there is valuation..." (emphasis added).

The thrust of Dewey's argument is that problem resolution is a process of knowledge creation. Peirce (1878) argued that a problem confronts society as a surprise, which in turn

induces doubt in the minds of the members of society about the existing truths concerning the evolving problem thereby putting epistemic communities to work in search of new truth. According to Dewey (1939), society evaluates both means and ends in a means-consequence-means-consequence continuum. The consequences are the expected outcomes of a contemplated course of action. The consequences of the action become the means in the next iteration. The consequence is the end-in-view that equivalently is the reasonable/instrumental value.

Bromley (2004b; 2006; 2008d; 2012) characterises the Deweyan process in the formulation of new institutions in a democratic society. Bromley (2010, p.40) calls the first effects of the surprise on the minds of the members of society “impressions”. Democratic beings with some epistemic capacity evaluate the surprise guided by their individual impressions leading to “individualized expressions” (Bromley 2012, p.17). Relative to an individual’s social situatedness in life, the individualised expressions summarise the perceived nature of the problem, the perceived scale of the problem, the perceived cause of the problem and the perceived group(s) responsible for the problem (Bromley 2007). The individualised expressions become “the stories we tell to ourselves and to others” about the situation (Bromley 2010, p.41). The expressions (data) are “the mental stage on which we live” (Bromley 2010, p.41). This stage constitutes the individually perceived and constructed reality. Similarly, individuals with epistemic capacity begin to create a mental future (end-in-view) as a function of the expressions (the data/means). The created future is a “set of created imaginings” (Bromley 2008d, p.6). As this process suggests, knowledge is being created at the individual level and its power is far from being felt at this stage.

Once investigators socialised to the same epistemic community discursively evaluate their individualised expressions and imaginings and converge on a particular expression and a particular imagining, they have a set of “warranted assertions” (Bromley 2008d, p.7). The theoretical claims of a particular scientific community are warranted but not necessarily valuable. Inasmuch as policy is to be formulated and implemented democratically in a democratic society, warranted assertions are data into the second hypotheses testing phase, the “process of working out an emergent consensus” (Bromley 2004b, p.93), by the national political leadership in legislatures and courts. This is the “*realm of reasons*”

(Hiedanpää and Bromley 2011, p.106, emphasis in original). The outcome of such a valuation might be a draft policy, draft regulations or some such policy-related product.

At this stage, a third phase of hypotheses testing brings the emergent consensus that defines the contents of the proposed institution into democratic valuation by the broader political community. This is the realm of justification, which involves the “actual practices of giving and asking for reasons” (Brandom 1995, p.899). The warranted assertions making up the emergent consensus that survives this stage become “valuable assertions” (Bromley 2004b, p.91), which constitute new habits, new laws, new directives or new regulations – simply new institutions – because they represent the implementable democratic will. Valuableness is a function of justification and informed reasoning (Price 2013). This somewhat linear account of knowledge production in democratic policymaking processes that lead to new institutions is actually non-linear. Bromley (2004b, p.82) emphasises that the divergent individual/group expressions and imaginings have to be reconciled in such a way that the emergent consensus satisfies two properties: feasibility and reasonableness. It is precisely for this reason that policy problems are mostly wicked. Warranted assertions can become new institutions before they are tested for valuableness whenever epistemic violence is prevalent in institutional change processes.

Following Foster’s (1981c) conceptualisation of a problem, it follows that what ought to be is rooted in existing and emerging knowledge that as yet has not been incorporated into the bloodstream of the current institutional systems. What ought to be is defined by a stochastic knowledge frontier of multiple imaginings from multiple epistemic communities. This suggests that the theory of social value is a theory of knowledge. But not all knowledge can define what ought to be. Ceremonial systems are entrenched in the status quo and are presumably backward-looking. The institutionalist account of institutional change across the three schools so far is that knowledge producers are separable from knowledge users in policymaking processes. However, there is a possibility that knowledge producers might be entrenched insiders in the policymaking networks leading to a convergence of ceremonial/instrumental interests of the newly admitted insiders and the incumbents. This means ceremonial systems become forward-looking in addition to being backward looking.

It is the claim of the thesis that producers of knowledge have power to shape the course, and, sometimes, the speed and extent of institutional adjustment. It is also claimed that, as the value frontier is defined by knowledge (technological process), the generators of knowledge define society's future course of institutional adjustment, notwithstanding the presence of ceremonial encapsulation. This means that communicable knowledge (the social imaginary) is a source of discursive power in shaping imaginings and emergent expressions. While the power of scarcity and bargaining power (Commons 1942) have been enduring avenues of participation in the determination of the sovereign will and action, knowledge is foundational to defining who participates in the determination of the sovereign will.

The thesis claims that producers of knowledge who also belong to the community of policymakers in a society undoubtedly have the best opportunity of shaping the sovereign will and power. Epistemic communities whose membership finds itself in the community of policymakers stand greater chances of defining the value frontier, deciding which imaginings to implement, which, most likely, are the warranted assertions of their epistemic communities, leading to epistemic violence. Ayres (1996, not paged) similarly argued that "the strength of those particular forces ... is indeed entrenchment, physical and ideological, that counts and not the power which ... accrues to ideas because they are right."

Physical entrenchment implies that the epistemic community has physical seats in the decision-making body and not just being advisors. Ideological entrenchment, on the other hand, implies that the epistemic community has intellectual seats in the decision-making body such that its instituted social imaginary (ideology, beliefs, metaphors, concepts and mental models) controls the thought processes in that policymaking body. The epistemic community becomes the "invisible governors" who govern through "their ability to supply needed ideas and by their key position in the social structure" (Bernays 1928, p.9). Either case is a manifestation of epistemic violence because "institutionally and ideologically entrenched authority prevails" (Ayres 1996, not paged). The inherent danger is one in which the warranted assertions of one epistemic community find their way into new public policy, regulations or law before the gestation period to qualify for valuableness is over. This then generates a series of bitter controversies over the newly created institution. Therefore, this

would be a manifestation of institutional hegemony (Dugger 1980) through the sanction of ignorance.

### **3.5. Conclusion**

The major hypothesis emerging from the review is that knowledge is indispensable to progressive institutional change, but it is inseparable from the ideologies of the epistemic communities producing the knowledge. Thus, most epistemic claims combine ideology and ideas. Ideology is the source of epistemic violence especially when an epistemic community gains ascendancy into a policymaking body. The ascendancy might be ideological or physical, but in each case it facilitates the epistemic community to appropriate sovereign power, to maintain it by epistemic violence and to participate jointly with the state in monopolising violence. In terms of the emerging social order, it would be the coexistence of an open access policymaking order and limited access policymaking order. The prediction in such cases is that regressive institutional change is the likely outcome, and will be contested, sometimes violently, which would be a wicked problem.

Chapter 4 reviews the methodology and the research methods used in this thesis to answer the question of whether institutional isolation, as perceived, really existed; the mechanisms by which it was transmitted and its potential economic effects on isolated sectors. The Chapter sets out the ontological and epistemological assumptions of the study. Since the study employs a mixed methods methodology adapted to suit the needs for institutional analysis, the Chapter presents both qualitative and quantitative methods used in the study.

*“It is the glory of God to conceal a matter; to search out a matter is the glory of kings.”*

Proverbs 25 verse 2 – Today’s New International Version, 2005

*“[Science] cannot overcome a society’s divisions. It can only winnow out the solid core of facts upon which society’s arguments with itself should be conducted. But it cannot bring those arguments to a conclusion... The past is an argument and the functions of... honest historians, is simply to purify the argument, to narrow the range of permissible lies.”*

- Michael Ignatieff, *Articles of Faith*, (1996, 114)

#### **4.0. Introduction**

The literature review in Chapters 2 and 3 revealed that at the core of institutional change are the concepts of purpose, futurity, power, knowledge and human design. It was shown that all three schools – the Northean, the Veblenian, the Commonsian – converged on the role of purpose in institutional change although they differed in terms of how the purpose worked out itself to produce institutional change. The ontological commitment of the present thesis is one of explaining the evolution of public purpose in alien and invasive species regulation – its configuration and execution – leading to the redefinition of the legal foundations, opportunity sets and potential welfare outcomes of various alien and invasive species-dependent groups of people in South Africa.

Since 2004, nearly a decade had elapsed with neither the final national list of invasive species nor the alien and invasive species regulations in place. They were only finally promulgated in August 2014. Even then, the management of trout was so controversial that the regulations and the national list of invasive species were published without deciding on, and excluding, trout until further deliberations (DEA 2014e; 2014f; 2014g). A protracted controversy surrounding the regulatory regime that government was proposing for trout fisheries had been evolving since the mid-1980s. These controversies were nothing but

disagreements over the truth and reality about the invasive capacity of trout species and the appropriate regulatory framework.

Chapter 4 presents the research methodology – the ontological and epistemological assumptions – and the specific methods that were used in each component of the research. The theoretical and conceptual purpose of the study guided the choice of the epistemological framework for investigating the process of institutional change. The objectives of the study were [1] to evaluate the process of institutional change in the management of biodiversity, and in particular, economically useful alien and invasive species; [2] to analyse, using a case study of the trout sector, the nature and cause of hitherto perceived institutional isolation and its economic implications on sectors utilising alien and invasive species; and [3] to evaluate the role of institutional entrepreneurship in the trout sector in trying to mitigate the effects of hitherto perceived institutional isolation. The thesis is concerned with the WHY question. Thus, the greatest question for this Chapter pertains to how the study examined the foregoing problem characterisation.

#### **4.1 Ontological assumptions**

To examine this complex evolutionary policy process, the thesis was organised around an ontological assumption about the nature of truth and reality in biodiversity management. The thesis assumed that society, whether through its epistemic communities, policymaking community or the broader political community, *creates* truth and reality (Bromley 2004b; 2006; 2008a; 2008d; 2012, Dawson 1994, Hirokawa 2014). Hirokawa (2014, p.1) emphasises the existence of multiple “frequently conflicting and competing [social] constructions of the world.”

The philosopher and progenitor of American pragmatism, Peirce (1878, p.300), defined truth and reality as the “opinion which is fated to be ultimately agreed to by all who investigate, is... the truth, and the object represented in this opinion is the real.” Truth is, thus, consensually and trans-subjectively constructed (Dawson 1994, Max-Neef 2005) and that it is that opinion which prevails against rival opinions because “an increase in justification leads to an increased likelihood of truth” (Rorty 1998, p.24). Bromley (2012, p.19) characterises truth as “shared mental objectification”, thus making it transactionally constructed through the negotiation psychology of argumentation and pleading as well as

persuasion. McCloskey and McCloskey (1994, p.372) similarly argue that “knowledge without persuasion of an audience is useless.” By rendering such knowledge useless, they imply that it is valueless (devoid of truth); it still is a warrantable assertion yet to become warranted after deliberative processes.

Brandom (1995, p.900) maintains that “the notions of belief, justification, reliability, and truth are inextricably intertwined”. Since truth is the opinion upon which there is ultimate agreement, it implies that truth is belief successfully fixed. More succinctly, Bromley (2008d, p.8) argues that “[t]ruth is not a property of objects or events. Rather, truth is a property of sentences about objects or events.” Taking this further, it means reality has an inseparable existence from that of scientific and political opinions. The central thrust of this argument is that truth is that for which sufficient reasons and justifications to be believed exist (Davidson 1963) or as Rorty (1998, p.21) puts it, truth is “assertibility at the end of inquiry”. Therefore, truth and reality are never absolute; they “are always in the process of becoming” (Bromley 2012, p.17).

The characterisation of truth and reality as being socially constructed is consistent with reasonable value and instrumental value theories as discussed in Chapter 2 and 3 and represented in Figure 3-2. Reasonable value theory defines truth as “Reasonable Practices”, “workable consensus” or “consensual idealism” (Commons 2009, p.742-743) and instrumental value theory defines truth as that which is valuable to the efficient causation of full human life development and cultural growth (Tool 1977). These theories postulate that valuable assertions (truth) are products of the Deweyan instrumental logic, which is a democratic process of truth production (Dewey 1939). In the policy context, the “particular game of giving and asking for reasons” (Price 2013, p.31) is the process of generating policy truth.

The implication of the foregoing characterisation of truth and reality is that concepts such as biodiversity, ecosystem, environment as well as nativity and alienness of species are socially constructed so much so that they might not be used as *objective* scientific concepts without considerable qualification (Chew and Hamilton 2011, Wylie 2008). For example, Bromley (2012, p.16) asserts that “there is no plausible, reliable, complete, irrefutable, comprehensive, true, and accurate account of a “forest,” or an “ecotype,” or an

“ecosystem.”” The argument is that the reality about environmental/ecological elements is known to people by their effects on them. Since the totality of the effects of biodiversity, the ecosystem or the environment on individuals differ from one to the other depending on their “situatedness in that world” (Bromley 2012, p.17), logically realities vary by epistemic communities, social groups or individuals (Rittel and Webber 1973). Similarly, Max-Neef (2005, p.15) asserts that “disciplinary investigations concern only one level of reality.” Valentinov (2015, p.145) also argues that “the reduction of environmental complexity is the main function of social systems, which thus allow people to make sense of the surrounding world.” The process of reducing environmental complexity is an interpretive process, which is a trans-subjective social process based on situatedness of the interpreters.

The theoretical framework in Figure 3-2 illustrated that transdisciplinarity was appropriate for providing guidance to social value. Max-Neef (2005, p.11) emphasises that there are “different levels of perception of reality and of multi-dimensional realities” and that there are disciplines that investigate certain domains of reality as opposed to others. However, he maintains that the body of theories of disciplines investigating a domain of reality do not exhaustively explain that domain. There is always a place for other disciplines to bring in alternative but complementary insights into other dimensions of the same domain of reality.

#### **4.2 Epistemological framework - Volitional Pragmatism**

The thesis applied pragmatism as the epistemological framework for explaining institutional change. Whilst Charles Sanders Peirce developed pragmatism from a physical science perspective, William James and John Dewey popularised it in social sciences, and John R Commons and Thorstein B Veblen customised it to economics (Bromley 2006). Bromley developed John R Commons’ theory of willingness further into a theory of truth and human action in public policy that he calls volitional pragmatism (Bromley 2006; 2008d). The thesis utilised volitional pragmatism as an epistemological framework. The discussion of the theory follows. Some of the elements of the theory were discussed under the Commonsian theory of institutional change, thus they are not reiterated here.

Bromley (2008a, p.219) defines volitional pragmatism as a theory of how societies “deploy reasons for choice and action”. The assumption underpinning volitional pragmatism is “that

we work out what it is we think we want as we work our way through what it seems possible for us to have (to get)” (Bromley 2008d, p.4). The first thing to note is that individual action is not an *a priori* (premeditated) choice, but the moment of choice is instigated by a *surprise* in the transactional context. The assumption ties together the five-part principles of the Commonsian theory of institutional change (Ramstad 1986). What one thinks he/she wants captures the principle of willingness of which the principle of futurity (created imagining) and principle of scarcity are decisive parts in this case. Commons (2009, p.152) asserted that “Pragmatism is Futurity”. It is a theory of how habit regulates future volitional action. Habit eliminates *uncertainty* for the time being. Belief creates a set of habitual assumptions or mental models that guide future human action (Bromley 2008a; 2008d, Denzau and North 1994).

What it seems possible to get captures two principles, namely the principle of working rules, which define the opportunity sets (possibilities), and principle of sovereignty (what the collective authority is willing to do to enforce one’s will/choice upon others). In essence the assumption summarises the dimensions of human willingness to act or wait. While the individual is in the decision context, he/she like everyone else involved, is thinking about the “problem, problem solution, instruments by which that solution is best achieved” (Bromley 2008d, p.8) and this leads to the process of “*stochastic belief updating*” leading to convergence of mental objectifications of actors (Bromley 2008d, p.6, italics in original).

#### **4.2.1. Belief fixation**

Volitional pragmatism proffers a way of knowing that is “diagnostic” or, to borrow Weaver-Hightower’s (2014, 117) expression, it seeks to “counter the “opacity” of contemporary policies by archaeologically uncovering multiplex influences.” Bromley (2008a; 2008d) asserts that volitional pragmatism seeks to answer why questions, hence its diagnostic/abductive nature. Since this epistemological programme is abductive, it enables the researcher to search for reasons for decisions and actions of policymakers, individuals and groups that are the policy clientele. Volitional pragmatism forces social agents/policymakers to ask themselves why they believe what they believe to be the right course of action. Ostrom and Cox (2010, p.451) also discuss the role of diagnostic approaches in discovering the “source, and possible amelioration, of poor outcomes for ecological and human systems”.

In reviewing the literature, it was shown that society is perturbed by problems that come as *surprises*, which, in turn, produce impressions (Bromley 2006, Dawson 1994). The impressions prick social agents with doubt about the beliefs they currently hold and this leads to a search for reasons leading to the production of new warranted assertions (expressions and created imaginings) of epistemic communities investigating the surprise (Bromley 2004b). The warranted assertions are widely shared theoretical claims (new beliefs) of an epistemic community. When the scientific community successfully gives reasons and justifications for its claims to the democratic community (including other epistemic communities), the warranted assertions graduate into valuable assertions (Bromley 2008d, Davidson 1963). It is on the basis of valuable assertions (valuable beliefs) that new policies, new regulations, new habits and new laws emerge.

The most pertinent issue in this brief account is the process of giving and asking for reasons, which leads to reasonable value (Brandom 1995, Hiedanpää and Bromley 2011, Price 2013). The researcher can assess a series of policy actions at any phase of that policy reform process to gain insight into the transactions that transpired between the sovereign agents and the polity. The transactions are argumentations and pleadings as well as rationalisations and justifications given by governmental actions.

#### **4.2.2 Abduction, induction and deduction**

Peirce (1878) distinguished three ways of knowing: namely deduction, induction and abduction. Abduction is the least discussed in literature (Staat 1993). Abduction is explanatory reasoning, whilst induction is classificatory/confirmatory reasoning, and deduction is analytical reasoning (Psillos 2009). Put differently, abduction and induction are “synthetic” modes of reasoning whilst deduction is “analytical” (Staat 1993, p.232).

Whilst both induction and abduction are synthetic modes of reasoning, induction does not generate new ideas. Abduction is generative. Psillos (2009, p.122) maintains that deduction and induction operate “with the principle of ‘garbage in, garbage out’” because their conclusions restate what the premises already stated. Induction increases content without generating new ideas because it extrapolates horizontally from a specific case to the general (Psillos 2009). The additional content, which really is not new, comprises observable causes of a phenomenon under study. However, abduction vertically extrapolates and exhumes

(unobservable) background beliefs that are causing the phenomenon under review, thus its diagnostic nature (Bromley 2008d, Psillos 2009).

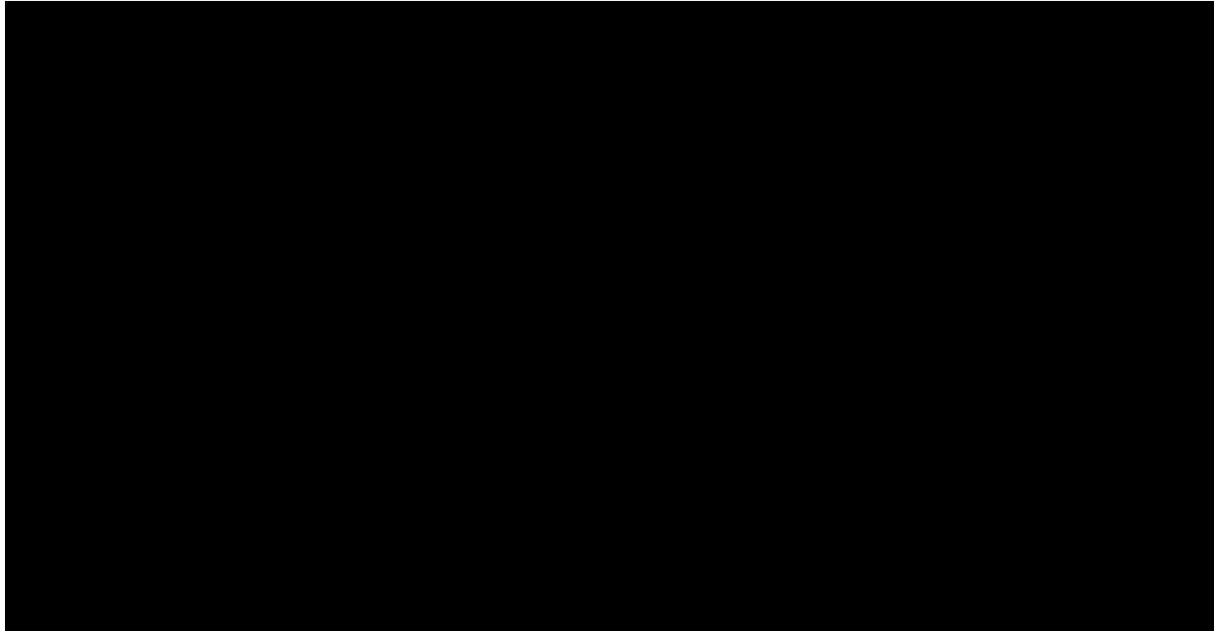


Figure 4-1: Comparison of abduction, induction and deduction

*Source: Author's construction based on the review*

Peirce (1878; 1905) attributed the growth of scientific knowledge to abductive reasoning because of its explanatory orientation. To him, new theories and ideas are progeny of explanatory reasoning, but not predictive and confirmatory reasoning. In his discussion of these three ways of knowing, Charles Sanders Peirce differentiated them based on two dimensions: uberty (fecundity) and certainty (security) (Psillos 2009). Figure 4-1 illustrates the argument. On the one hand, uberty captures the ability to generate new ideas and theories. It measures scientific fecundity or “productiveness” of a way of knowing (Psillos 2009, p.121). The argument is that the conclusion of an abductive reasoning process is a set of explanatory hypotheses and it contains new content that the premises never stated since the premises were a surprise (Bromley 2008d). On the other hand, certainty (security) guarantees that the “conclusion of a reasoning process is as certain as its premises” (Psillos 2009, p.121).

Closely considered, these two dimensions suggest that ways of knowing that score high on certainty marginally, or do not, produce new knowledge, ideas and theories. However, ways

of knowing that score high on uberty are the foundations of scientific growth although their conclusions are only plausible for the meantime until testing admits them as truth. In line with this argument, deductive reasoning excels at certainty but scores low on uberty (Psillos 2009). Psillos (2009, p.140) also draws attention to the fact that “deduction [is] truth-preserving”. This claim resonates with the positivistic claim that there exists one objective truth/reality waiting to be discovered (McCloskey and McCloskey 1994, Robbins [1945] 2007). Thus, once scientific investigation discovers the truth, the role of credible deductive science is to preserve the existing truth.

On the contrary, abduction excels at uberty, but scores low on certainty (Psillos 2009). Regarding certainty, there exist varying degrees of certainty in abductive explanations – some are more probable than others. However, induction scores moderately on both uberty and certainty. Based on this distinction, and linking the argument to Peircean categories of firstness, secondness and thirdness, Staat (1993) demonstrates that deduction, abduction and induction are *interdependent* ways of knowing as opposed to the popular belief that they are mutually exclusive or rival ways of knowing. In Peircean thinking, firstness captures the world of possibilities; secondness captures the world of real existence; and thirdness captures the world of potentialities (Short 1981). The interconnectedness of these modes of reasoning in the theory of inquiry implies that they are different stages of a single process of enquiry, and much more so in mixed research methods.

Building on the understanding of the levels of reality these three modes of reasoning address, Staat (1993, p.227) advanced the argument that the Peircean theory of inquiry leads to the ordering: “abduction, deduction, induction”. The essence of this argument is that abduction generates testable hypotheses, but it does not test them itself. Deduction and induction do the testing. Deduction invokes predictive testing, whilst induction invokes confirmatory testing. It becomes apparent that any scientific investigation necessarily involves at least two of these three modes of reasoning at the same time. What really differ are the relative degrees of predominance of the modes of reasoning in any given research.

The mode of reasoning that the pragmatist employs is one that explains – and it explains from effect to cause (Bromley 2006). One that exhumes the myths as well as ceremonial and ideological interests manifesting in any given “policy ecology”, to use Weaver-Hightower’s

(2014, p.116) phraseology. The study, therefore, relied much more on abductive reasoning as the principal epistemological strategy. The thesis also employed elements of deductive and inductive reasoning. A typical Peircean syllogism, following Psillos (2009, p.132), that the thesis formulated to examine the research questions is as follows:

*The surprising fact, institutional isolation of sectors utilising invasive alien species (C), is observed:*

*But if (A) = {hegemony over policy space by ecological invasion scientists; lack of administrative due process; ceremonial interests of policy administrators; regulatory incoherence; and environmental greed of the sectors utilising invasive alien species...} were true, institutional isolation would be a matter of course,*

*Hence, there is reason to suspect that A is true.*

Abductive analysis starts with a real observation that may be a puzzle – the surprising fact. The surprising fact (C) constitutes the irritation of doubt. A surprising fact is a regularity observed in a given context because regularities are rare and what are common in everyday life are irregularities (Bromley 2008d; Psillos 2009). Inasmuch as regularities and irregularities exist for a reason, explaining them amounts to the accumulation of sufficient reasons that account for their existence. A volitional pragmatist then formulates a family of explanatory hypotheses (A) that attempt to demystify the surprise. The pragmatist then sets out to validate/falsify the various hypotheses through deductive and inductive reasoning. If they turn out to be reasonable, the pragmatist has found a reasonable explanation for C. In the syllogism, A, which is a set of explanatory hypotheses, is nothing but a set of reasons for the existence of C. The plausibility of A, if confirmed, quenches doubt and fixes belief, which is the truth for the time being, which leads to habit formation.

However, the volitional pragmatist carries out further archaeological iterations using the same syllogism in which case, for example,

*The surprising facts, (C') = {hegemony over policy space by ecological invasion scientists; lack of administrative due process; ceremonial interests of policy administrators; regulatory incoherence; and environmental greed of the sector that utilise invasive alien species...}, are observed:*

*But if  $\hat{A}$  {that is, set of reasons for  $A$ } were true,  $\hat{C}$  would be a matter of course,*

*Hence, there is reason to suspect  $\hat{A}$  is true*

The diagnostic iterations continue until non-economic factors that explain economic phenomena have been identified (Bromley 2008d, Schumpeter [1954] 2013). At that stage, a pragmatist would suggest that sufficient reasons for the existence of  $C$  have been found. The degree of plausibility of  $A$ ,  $\hat{A}$ ..., determines the sufficiency of the reasons for  $C$ ,  $\hat{C}$ .... The thesis applied this epistemological framework to explain the controversies surrounding biodiversity governance as well as the perceived institutional isolation of sectors that utilise alien and invasive species.

#### **4.3 Mixed Research methods**

As the adjective “Mixed” connotes, these methods bring together qualitative and quantitative analysis thereby “exploiting the strengths of both types of research and offsetting each others’ weaknesses” (Starr 2014, p.242). The synergy arises from a combination of “the strength of confirmatory results” of quantitative analysis and ““deep structure” explanatory descriptions as drawn from qualitative analyses” (Castro *et al.* 2010, p.342). Although there are various ways of doing mixed method research designs, the study utilised a “concurrent nested” design (Castro *et al.* 2010, p.345). Both quantitative and qualitative data were collected simultaneously, but owing to the abductive nature of the research, qualitative data were assigned greater weight than quantitative data. To some extent there was a sequential element in the design because the researcher, through desktop analysis of various private and public documents, socialised with critical qualitative issues. The socialisation, in turn, informed the content of the survey questionnaire and, to an extent, the interviews.

Although the collection of data was concurrent, the researcher attempted an integrative interpretation of the results. Bazeley (2009, p.203) emphasises: “All mixed methods studies, by definition, attempt some form of integration.” Integration facilitates mutual illumination of the qualitative and quantitative results (Jang *et al.* 2008). Weaver-Hightower (2014, p.132) also emphasises that whenever the qualitative and quantitative components are properly integrated, “the whole of the findings [exceed] the sum of the individual quantitative and qualitative parts.” Table 4-1 summarises the research design.

Table 4-1: Mixed methods research design

<p><b>QUAL Study - Stage 1A (qual)</b>  <u>Analytical Procedure</u></p> <ul style="list-style-type: none"> <li>• Institutional comparative analysis of NEM:BA 2004, NEMA 1998 and the Constitution 1996, judicial precedent on regulatory reforms under the NEM:BA in 2008</li> <li>• Volitional pragmatic (abductive) analysis of public hearing reports during the formative years of the NEM:BA; written submissions from sectors interested in alien and invasive species</li> <li>• Institutional abductive analysis of evolution of pecuniary institutions that promoted development of trout e.g. Sydney Hey 1926-1928 Inland fisheries surveys; 1867 Fish introduction Act</li> <li>• Trout controversies 1986 (Rhodes University Trout Colloquium; secondary literature</li> <li>• Strategic interviews with policymakers and representatives of trout industry and ichthyologists, invasion and aquatic scientists</li> <li>• Volitional pragmatic (abductive) analysis of written submissions from trout sector made to the DEA (2005-2014); Semiotic analysis of the process (2005-2014)</li> <li>• Judicial proceedings, Affidavits (Kloof Conservancy vs. Government 2014)</li> </ul>	<p><u>Outputs</u></p> <ul style="list-style-type: none"> <li>• Economic incentive structure, economic interpretation; institutional coherence; economic implications of verdicts; administrative themes censured in judgments (Chapter 5)</li> <li>• arguments, ideologies, expressions and imaginings, negotiation psychology (Chapter 6)</li> <li>• Sources of institutional path dependence, ceremonial and instrumental values and behaviours (Chapter 8)</li> <li>• Ideologies, solutions, causes of controversy (Chapter 8)</li> <li>• Transcripts and field notes (Chapter 8)</li> <li>• Arguments, ideologies, expressions, imaginings, interpretive conflicts (Chapter 8)</li> <li>• Verdict, arguments, themes from affidavits (Chapter 8)</li> </ul>
<p><b>Embedded quan phase - Stage 1B (quan)</b>          (quan – identified underlying factors that might explain controversial regulatory reform process from perspective of trout sector) (Chapter 7)  <u>Procedure</u>          Stage 1: Online survey of perception survey          Stage 2: Data cleaning          Stage 3: Data analysis</p> <ul style="list-style-type: none"> <li>• descriptive analysis</li> <li>• reliability analysis</li> <li>• exploratory factor analysis</li> <li>• logistic regression analysis</li> </ul>	<p><b>Integrative analysis - Stage 2 (qual + quan -&gt;&gt;qual)</b> (Chapter 7 and 8)          Integrate <i>qual</i> and <i>quan</i> to produce a story of institutional change. The quan results are now interpreted in the larger scheme of qualitative factors to give insight into the magnitude of the quantitative estimates and their signs. Nuanced theoretical explanation of institutional change and institutional isolation</p>

Source: Constructed by the author

#### **4.3.1. Qualitative analysis**

Chapter 5 presents results of the qualitative component that focused on economically interpreting the incentive structure in the NEM:BA. The findings in the economic interpretation of the NEM:BA revealed paradoxes that Chapter 6 explored further through a legislative historical analysis of the evolution of the NEM:BA. This helped determine the configuration of interests that shaped the NEM:BA. Once the incentive structure in the NEM:BA was interpreted and the interest configuration determined, the thesis then drew insights from the perceptions of the trout sector to evaluate the process of institutional change. This case study component had two qualitative components – an institutional analysis of the evolution of pecuniary institutions in trout fisheries presented in Chapter 8 and integrative analysis of quantitative and qualitative components of the current regulatory controversies presented in Chapters 7 and 8.

##### ***a. Economic interpretation of the NEM:BA's fifth chapter***

The focus was on interpreting the National Environmental Management: Biodiversity Act (NEM:BA) of 2004 using institutional theory. Since the regulation of alien and invasive species turned out to be controversial, it was necessary to start by explaining the economic incentive structure embedded in the NEM:BA. Such an analysis was also necessary as the entry point into investigating the hitherto perceived institutional isolation of sectors utilising alien and invasive species. A comparative analysis of the fifth chapter of the NEM:BA and the overarching environmental legislative framework (the National Environmental Management Act (NEMA) of 1998) and the Constitutional provisions for environmental governance insofar as alien and invasive species were concerned was carried out.

In addition, there were two court decisions one of which dealt with the development of regulations for captive breeding of hunting game under the NEM:BA and the other dealt with the denial of a permit to keep an animal that was declared an economically harmful species to farmers. The verdicts were critical for interpreting the economic incentive structure in the NEM:BA and the governance practices of the Department of Environmental Affairs (DEA).

##### ***b. Interest configuration in the NEM:BA***

The findings in Chapter 5 generated a *surprise* – a seeming strong biological nativism in the NEM:BA coupled with some indications of overregulation of sectors utilising alien and

invasive species. For example, carrying dead specimens such as dead fish and dead timber/wood from alien and invasive plantation trees required a permit. An economic user needed no less than nine permits to carry out a complete operation for a restricted activity associated with an alien and invasive species. This *surprise* led to an abductive analysis into the interest configuration of the NEM:BA (Weaver-Hightower 2014). Questions that emerged here included: “Whose interests shaped the NEM:BA?”, “What imaginings and expressions were transacted in the formative years of the NEM:BA?”, “Which imaginings and expressions were selected?” “Why were those imaginings selected?”

The arguments that were presented during public hearings and written submissions made by interested and affected parties in 2003 when the NEM:BA was being formulated were extracted and analysed. To get a firmer grip of the evolution of the epistemological system that influenced the NEM:BA, the researcher carried out a historical analysis of policy thought in the 1980s when the invasion biology research programme in South Africa was first institutionalised (Ferrar and Kruger 1983). The researcher extracted institutional themes from the South African National Scientific Programme reports (1982, 1983, 1985 and 1988). These reports dealt with alien and invasive species.

Following Weaver-Hightower’s (2014) definition of an argument, the researcher coded as an argument an utterance or a statement in a report if it satisfied three criteria. First, the public hearing utterance or the statement in the report had to be a “generalized argument rather than a question or a description limited to a specific person, place, or context,” (Weaver-Hightower 2014, p.122). However, given that interest groups speaking at public hearings were highly specialized and, often, argued for their specific interests, this criterion was relaxed. Since arguments, allowing for some exceptions, about most alien and invasive species are generalisable to various other alien and invasive species the researcher coded a specific statement as a valid argument. Second, the utterance or the statement in the report had to be directly related to some aspect of alien and invasive species, preferably in a broad sense. Finally, “the utterance had to be a clear assertion by the witness, not a quotation or reference to someone else’s position, unless the witness explicitly proclaimed agreement,” (Weaver-Hightower 2014, p.122).

The next step involved “quantitizing qualitative data—that is, taking qualitatively derived codes and converting them into numbers for counting or statistical description” (Weaver-Hightower 2014, p.122). Only simple agreement and disagreement scores between views that were presented by groups and the text of the NEM:BA were computed to discover whose interests shaped the NEM:BA.

***c. Institutional analysis of pecuniary institutions of trout sector and NEM:BA controversy***

With the researcher carefully following the controversies (a surprise) over the regulation of trout, a decision was made to first trace the evolution pecuniary institutions that guided the development of trout fisheries. This step was important because it not only assisted in evaluating some of the arguments in the current controversies as ceremonial or instrumental, but it also assisted in assessing the extent to which the regulation of trout suffered from institutional path dependence. The data used in this subcomponent were the Fish Introduction Act 1867, the Inland Fisheries Surveys reports (1926-1928) by Sydney Hey and the Colloquium report in which “trout wars” were finally addressed at Rhodes University in 1986. The analysis involved recasting the storyline in these documents in terms of the Veblenian theory of the leisure class (Chapter 8).

This qualitative component utilised strategic interview data; correspondence between the DEA and the trout sector; media releases by the DEA in response to the trout sector’s media campaigns against the regulations; risk assessment reports for trout species that were commissioned by the DEA in 2014; as well as submissions made by the trout industry. The interviews were “strategic” in the sense that they purposively targeted knowledgeable agents who were directly or indirectly involved in the regulatory decision processes and structures of the DEA. Seven strategic interviews with key stakeholders were carried out. The data collection instruments were certified by the Department of Economics Ethics Committee and they adhered to Rhodes University guidelines for ethical conduct for research involving humans. The first interview was with two senior representatives of the Federation of Southern African Flyfishers (FOSAF). These two interviewees had different areas of expertise – one was a respected environmental lawyer and another was a business person who ran trout fisheries and was a fly-fishing guide.

The third, fourth, fifth and sixth interviews were with scientists – two ichthyologists and two invasion biologists. These informants each participated in one capacity or another in the evolution of the regulatory process since 2005 and are academic authorities in their own fields of specialisation. These scientists disagreed among themselves about the regulation of trout and its invasive capacity. The last interview was with a senior official (decision maker) in the DEA, who is also an environmental scientist. These five interviews were critical in that they were a contest of scientific claims and two scientists were firmly pro-trout, while the other two were weakly pro-trout and another was anti-trout.

Although the researcher had an interview guide, it was minimally used. Interviews were audio-recorded and later personally transcribed so as to take advantage of the cues that might be useful in interpreting results (Maree 2013). The interviews were spontaneous and the researcher interrupted the storyline only when there was need for clarity on issues being raised. The interviews *almost* approximated an unstructured interview format (Piore 2006). The researcher emailed the interview guide at the time of requesting the opportunity to interview the informant. This allowed the interviewees to gather information about the questions. As Piore (2006, 18) argues, “people agreed to be interviewed in the first place only because they had a story to tell”. Interestingly, the best way to characterise these seven interviews is that they were a hypotheses testing process themselves because the researcher invoked as questions surprising and less obvious aspects of the previous interview in the next interview. The knowledge claims of the experts were intentionally played out against each other in order to distil the best possible information, thus enhancing the validity and reliability of the interview data.

There was litigation against the government – *Kloof Conservancy v The Republic of South Africa 2014* – for failing to implement the NEM:BA’s fifth chapter within the statutory timeframe, which required the implementation to begin after two years of the NEM:BA becoming law. This litigation, fortunately, provided the researcher with rare information that could not be accessed through any other way, perhaps not even by interviewing officials. By analysing the affidavits the researcher was able to evaluate the information that the senior official and other experts revealed during the interviews. Institutionalists have an established tradition of evaluating each piece of evidence (data) against other pieces of evidence (Dugger 1979, Wilber and Harrison 1978). Evaluated in this way, the stories told

during interviews were judged to be honest. This strengthened the researcher's conviction about the validity and reliability of the interview data and the subsequent findings of the thesis.

While the interviews were data, they were also used as "arguments for particular revisions in theory" (Piore 2006, p.18) and "a way of building theory, by offering a critical perspective on the standard theoretical assumptions" (Piore 2006, p.17). Thus, the interview data was used also as a critique of the assumptions of institutional economic theory about how individual agency influences institutional change. Piore (2006, p.18) cautioned that the "problem plaguing open-ended interviews as inputs into the reconstruction of theory is that they appear to be so personal and idiosyncratic". The usefulness of the seemingly idiosyncratic data depends on the "capacity of the individual researcher to *generate surprises*, to *recognize patterns*, and to *organize* those patterns to form a theory" (Piore 2006, p.18, emphasis added).

The interpretations of interviews that generate surprises are "at least as much a matter of intuition and instinct as it has been of systematic methodology" (Piore 2006, p.18). Because Piore (2006, p.19) recommends "the use of theory to stimulate the interpretation of interviews", the integrated institutional framework was used to interpret interviews (Figure 3-2). Piore (2006, p.20) advises that a researcher has "to trace down systematically the 'surprise' that violated [the theoretical] expectation." The essential feature of this strategy is to look for "the surprise in the interviews, tracing its source in theory, and then trying to identify how the theory might be amended" (Piore 2006, p.20).

As such, the thesis evaluated arguments as either ceremonial or instrumental following the original institutionalist theory of change. The evaluation criteria for progressive institutional change (democratic test, instrumental efficiency test, minimal needs test, environmental continuity test and growth of knowledge test) and the evaluation criteria for regressive institutional change (invidious defence test, pecuniary gains test, possession of power test and status quo defence test) were used to unlock forces shaping the evolution of the regulatory reform. Chapter 8 presents the analysis.

The qualitative analysis component had a dynamic analytical component that applied semiosis to the NEM:BA institutional change processes and semiosis is an abductive

framework which aligns with volitional pragmatism (Bromley 2008d). The essence of this analysis was to develop a dynamic explanation of how the process of institutional change evolved and the forces that kept shaping it. This called for coding the affidavits and lobbying efforts of the trout sector using the Peircean triadic system of interpretants - emotional, energetic and logical. A brief discussion of the theory of semiosis follows.

#### **4.3.2. Method and theory of semiosis**

Epistemic communities know reality by its consequences (Bromley 2008d; Peirce 1878). Abductive analysis investigates reality (the cause) from its observed or perceived consequences (the effect). The cause is not immediately plain to the researcher, but the effects are ubiquitous. Consequences are signs flowing in society and they signify some underlying fundamental cause(s). The consequences generate reactions such as perceptions and actions in the minds and lives of social agents (Deledalle 2001). Thus, to know the cause (the object) the consequences (signs) must be interpreted (interpretants). Semiotics is a triadic framework that comprises an object, a sign and an interpretant (Figure 4-2).

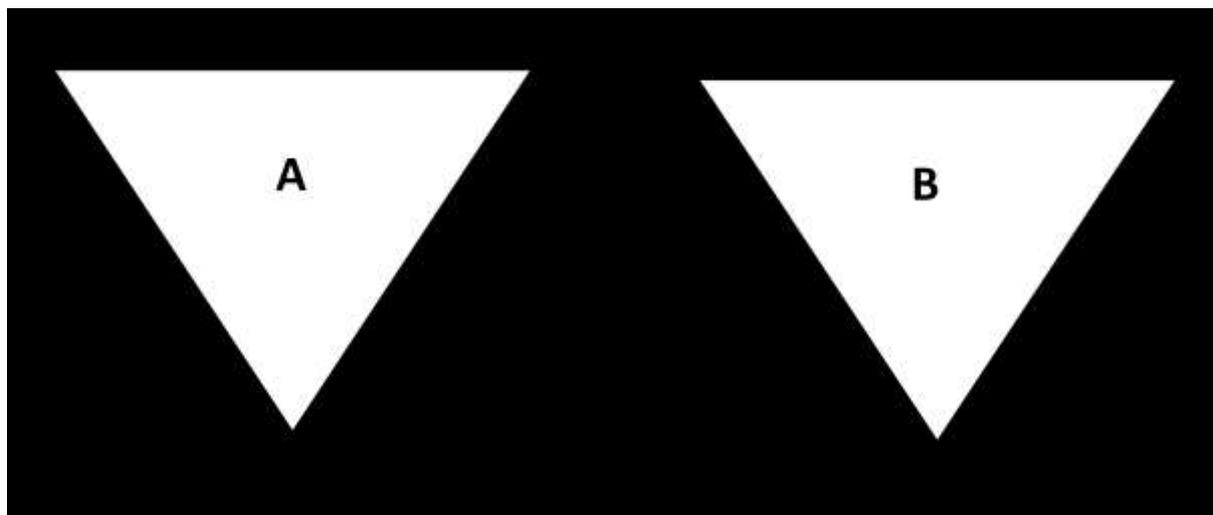


Figure 4-2: Semiotic process - an illustration

*Source: Author*

An object determines its sign and its interpretant (Short 2007). A sign represents an object and social agents can understand the obscure object through the vehicle of its sign. An interpretant is the meaning, conception, perception, idea, thought, feeling or action that a sign invokes in the mind of an interpreter (Hiedanpää and Bromley 2012, Short 2007).

***a. Immediate, dynamic and final interpretants***

An immediate interpretant is an objective and purposeful interpretation of a sign and it is the “right understanding of the sign” (Short 2007, p.181). Objectivity enhances the assessment of whether the “purpose in interpretation ... is in process of being satisfied” (Short 2007, p.182). An immediate interpretant is a ‘maybe’, that is, one of a number of possibilities.

A dynamic interpretant is “the actual effect which the Sign, as a Sign, really determines” (Short 2007, p.181) such as anger, agitation, outrage, road shows, media wars, propaganda as responses, for example, to perceived ill-implementation of a law. Thus, a dynamic interpretant is a single event that actualises or instantiates the immediate interpretant. A dynamic interpretant is one actually formed, but an immediate interpretant is one represented in the sign.

The final interpretant is the “Normal Interpretant” or “Genuine Interpretant” in that it gives the fullest meaning of the sign thereby revealing all that it says about an object (Short 2007, p.182). The final interpretant is normative; it is a ‘would be’ (a potentiality). The final interpretant is “one to which all other signs are relevant” (Short 2007, p.183). It is the convergence of “mental objectification” (Bromley 2012, p.19) of social actors in the process of interpreting a sign. The final interpretant is normative, while the dynamic interpretant is positive (Short 2007, p.183).

Charles Sanders Peirce did not demystify the difference between the dynamic interpretant and the final interpretant in terms of actual sources of the difference. The way people interpret a sign is influenced, in large measure, by the instituted social imaginary that comprises culture, beliefs, habits, norms, customs, traditions, taboos, power, economic interests, fads, dogmas, ideologies and epistemological systems (Ayres 1996, Brinkman and Brinkman 2006, Bush 1987, Denzau and North 1994, Galiani and Sened 2014, Moky 2014, North 1990, Veblen [1899] 2005). These factors constitute the gap between the positive and the normative. They are filtering forces and hindrances to the fullest possible interpretation of a sign.

From a Veblenian Dichotomy perspective, a ceremonially warranted interpretation of the NEM:BA falls far short of the final interpretant. It leads to ceremonial encapsulation of part

of what could have been known had the interpreter(s) utilised all relevant facts and knowledge about the sign. An instrumental interpretation is likely to reduce the gap between the dynamic interpretant (an actuality) and the final interpretant (a potentiality) because it carefully attempts to unpack all that there is in a sign. What the provisions of the NEM:BA really mean and ought to mean is the final interpretant, but the actual interpretations of the DEA, or of the trout industry, are dynamic interpretants. However, either interpretations might be partial or one might be the fully correct one.

In the interpretive process, “recognition of the sign *as such* to a *comprehension of its meaning*, suggests a progression from an immediate to a final interpretant,” (Short 2007, p.184) (emphasis added). It is possible to observe an iterative process from an immediate interpretant to successive dynamic interpretants until a final interpretant finally obtains. For example, the DEA commenced the drafting of AIS regulations and development of a national list of invasive species from 2005/6 through to 2014 and this process is likely to continue until the last iteration of the AIS regulations captures the entire essence of the NEM:BA’s fifth chapter.

#### ***b. Emotional, energetic and logical interpretants***

The trichotomy of emotional, energetic and logical interpretants is critical in studying the process of institutional change and necessarily gives flesh to immediate, dynamic and final interpretants. An immediate, dynamic, or final interpretant might be an emotional, energetic, or logical interpretant. An emotional interpretant is the feeling that a sign produces in the interpreter of the sign (Hiedanpää and Bromley 2012, Short 2007). It is a possibility. An energetic interpretant is the action that the sign causes the interpreter to take. For example, a misapplication of the biodiversity law that has potentially ruinous economic and social consequences for interested parties might generate agitation, outrage or anger. These are emotional interpretants. When the outrage, anger or agitation explodes, action becomes manifest. The action might take the form of litigation, demonstration, road shows and campaigns in media against the administrative decision. These are energetic interpretants.

The policymaker responds with energetic interpretants such as an invitation to a public hearing, negotiating table or a public justification of the policymaker’s actions, which is a

process of supplying sufficient reasons that the energetic interpretants might be demanding (Brandom 1995; 1997, Price 2013). The outcome of the negotiations, which is a logical interpretant, might be a change of the policy or implementation strategy to pacify the outraged people. It would be a habit change. Since institutions are habitual patterns of correlative behaviour and rules for volitional action, fixing belief and generating new habits is the process of creating new institutions (Bromley 2008d).

#### **4.3.3. Quantitative analysis**

The subsection discusses the survey design and the data analytic strategies that were used in this component. It also discusses how the questionnaire was developed. The method that was used to distribute the questionnaire is also explained.

##### ***a. Survey design***

The study used an internet-based survey design to solicit perceptions of the trout sector. The trout industry is diverse. It includes trout aquaculture, hatchery operators, guiding services, tackle dealing, accommodation and agro-processing among other activities. The size of the sector, especially the fly-fishing component, is not known because government has not been measuring the economic contribution of this sector (McCafferty *et al.* 2012). Leibold and van Zyl (2008) is the only known non-peer reviewed nationwide study on recreational fishing in South Africa that estimated that there were 45,000 fly-fishers in South Africa, of which 4,500 were affiliated to clubs.

Since it was costly to administer the questionnaire instrument to a dispersed trout-based community, the researcher decided to conduct an uncontrolled online survey. An internet-based survey was appropriate because the target population was difficult to access through traditional survey methods such as mail and telephone (Couper 2000, Fricker 2008). This strategy was also preferred because of affordability, timeliness of responses as well as the possibility of high response rates (Couper 2000, Schonlau *et al.* 2002).

Fricker (2008) and Schonlau *et al.* (2002) argue that internet-based uncontrolled surveys are convenience-sampling procedures, which suffer from non-representativeness. Since the objective of the study was not to generalise based on the perception survey, but to triangulate the findings of the qualitative analysis, issues of representativeness were not necessarily a major concern. It was difficult to draw a sampling frame from which to draw

survey participants, and, as is typical of all online surveys, the design suffered from self-selection bias because there was no way of generating a random sample (Fricker 2008, Schonlau *et al.* 2002). Because the internet survey was anonymous, it was difficult to control for multiple submissions of responses and determine response rates. Couper (2000) draws attention to the fact that a person may respond or not, depending on whether s/he has vested interest in the research and, usually, those with vested interest in the research overwhelmingly participate. Schonlau *et al.* (2002) warned that theoretically spurious, but statistically significant relationships might be derived from internet-based survey data especially if it generates a high response rate. Fricker (2008) also warns that inferential statistics must be applied to internet-based survey data with caution since the validity and reliability of the online survey data is often indeterminate.

Although the validity and reliability of the data from internet surveys is difficult to establish, the questionnaire had items that were used to evaluate the reliability of the data. Conformity of the survey to previous South African studies as it regards descriptive statistics such as racial composition, education levels, income levels, destination choices and perceptions on policy issues was also used to test the reliability and validity of the data collected through the uncontrolled online survey. Theoretical consistency of the estimates was also another mechanism for inferring the validity of the data.

#### ***b. Questionnaire design and distribution***

Following the publication of the July 2013 interim AIS regulations that listed trout as a species that had to be compulsorily controlled under a species management programme, the trout industry formed a lobby group called Trout South Africa (Trout SA) which, together with the Federation of Southern African Flyfishers (FOSAF), led campaigns and protests against the AIS regulations as well as writing articles for the public media, which were described by the DEA as “provocative” (DEA 2014d, not paged). To solicit the perceptions of the trout industry, the questionnaire was designed using the content of the draft AIS regulations, submissions made to the DEA by the FOSAF as well as the FOSAF and Trout SA, the content of media articles on the policy process and media releases made by the DEA in reaction to the trout sector’s campaigns against the draft regulations. The major reason for doing this was to ensure that the instrument captured the relevant dimensions of the controversy.

The major themes that seemed apparent from the debate were (1) the role of science in the development of the regulations; (2) the extent of reliance on global scientific evidence in developing regulations; (3) the role of trade-offs between conservation of indigenous fishes and economic utilisation of trout, an alien species; (4) administrative due process and participatory regulatory development; and (5) reasons hindering consensus. The questionnaire had 47 items. The researcher grouped questionnaire items into clusters: understanding the NEM:BA (4 items); controversies in the process of developing AIS regulations (17 items); social aspects of trout fly-fishing (6 items); economic aspects of trout fly-fishing (15 items); and demographics (4 items). The 47<sup>th</sup> item was the declaration of consent to participate in the survey. The questionnaire is in Appendix 2.

The questionnaire passed through several phases of development. Its readability and comprehensiveness was assessed by the Environmental and Natural Resource Economics Research Group in the Economics Department at Rhodes University. Members of this research group were given the questionnaire twice during group meetings to evaluate it. After each meeting, they gave comments about aspects that were less readable or whose wording could be improved. Aquatic scientists, ichthyologists and invasion biologists at Rhodes University who were close to the decision making structures in the regulatory reform process also evaluated the questionnaire. This was to ensure that the instrument correctly captured major issues in the controversy, which would enhance the content validity of the instrument (Maree 2013, Williams *et al.* 2012). The Ethics Committee in the Department of Economics approved the questionnaire. The Committee checked the instrument for ethical issues as well as the wording and content of the questions.

The survey link was distributed through the FOSAF website, which represents of the trout industry since 1986 and the administrator of the website encouraged fly-fishers to participate in the survey (Appendix 1). Only those who had access to the internet and, thus the FOSAF website, participated. The researcher launched the online survey on the 13<sup>th</sup> of May 2014 and it was open until 31<sup>st</sup> of July 2014.

#### **4.3.4. Data analysis**

A combination of techniques was used to analyse the data. First, descriptive analysis relying mostly on graphs was used to summarise the data. Second, estimation techniques were used.

##### ***a. Cronbach's alpha***

Cronbach (1951) emphasised that measurement-based research must establish the correctness and dependability of the survey instrument. Cronbach's alpha, therefore, assesses the extent to which a researcher was right in "expecting a certain collection of items to yield interpretable statements about individual differences" (Cronbach 1951, p.297). Thus, the reliability of the instrument using Cronbach's alpha, which conventionally is used to test the internal consistency of a survey instrument, tested for (Cronbach 1951, Maree 2013). Maree (2013, p.216) states that items measuring the same latent variable must have "a high degree of similarity". Thus, the higher the Cronbach's alpha the more reliable the instrument. Reliability analysis creates a scale out of the individual items and the alpha seeks to evaluate the reliability of the constructed scale (Gliem and Gliem 2003). The correlation between the scale and the latent factor is  $\sqrt{\alpha}$  (Williams *et al.* 2012). Using individual items in econometric analysis usually generates tenuous results owing to the prevalence of measurement errors in individual items with the concomitant pathological effect of multicollinearity (de Winter *et al.* 2009, Gorsuch 1997, Williams *et al.* 2012).

##### ***b. Exploratory factor model***

Exploratory factor analysis was used to reduce the large number of items in the questionnaire into fewer variables (DiStefano *et al.* 2009, Maree 2013, Williams *et al.* 2012). Since the researcher had no a priori theoretical expectations about which items would measure the same construct, exploratory factor analysis was used to reveal the underlying factorial patterns (Gorsuch 1997). As Williams *et al.* (2012, p.3) argue, exploratory factor analysis "allows the researcher to explore the main dimensions to generate a theory, or model from a relatively large set of latent constructs often represented by a set of items." They also state that exploratory factor analysis "is considered the method of choice for interpreting self-reporting questionnaires" (Williams *et al.* 2012, p.2).

Generally, it is argued that exploratory factor analysis can be used to reduce the number of variables; explore structural relationships of variables; assess the dimensionality of a



bias, while producing highly valid scores. The argument follows from the fact that “Bartlett scores are produced by using maximum likelihood estimates ... which produces estimates that are the most likely to represent the “true” factor scores” (DiStefano *et al.* 2009, p.4-5). The regression scoring method, as an alternative to Bartlett scoring, does not account for bias despite producing maximally valid scores (DiStefano *et al.* 2009, Gorsuch 1997).

Maree (2013) argues that the exploratory factor analysis technique allows the researcher to identify, through item analysis, items that may not be suitable for further use in the analysis. Exploratory factor analysis is, thus, the conventional approach by which a researcher is able “to determine which items “belong together” in the sense that they are answered similarly and therefore measure the same dimension or factor” (Maree 2013, p.219). The factor loading matrix was then used to determine the items which belonged to a factor. The factors were then assigned names based on the nature of items clustered in them. Using the reduced number of variables, a logistic regression model was estimated. Two logistic regressions were estimated – one for the perception of the invasiveness of trout and the other for the perception of the reasonableness of the draft AIS regulations.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to evaluate the appropriateness of carrying out factor analysis. It determines the proportion of variance amongst the items that represents the common variance. Dziuban and Shirkey (1974, p.359) emphasise that the “index yields an assessment of whether the variables belong together psychometrically” in which case the resultant correlation matrix will establish the reasonableness of carrying factor analysis. The rules of thumb are that a KMO of 0 – 0.49 is unacceptable; 0.50 – 0.59 is miserable; 0.60 – 0.69 is mediocre; 0.70 – 0.79 is middling; 0.80 – 0.89 is meritorious and 0.90 – 1.0 is marvellous (Dziuban and Shirkey 1974).

### ***c. Factorial logit model***

Assuming a latent variable  $y^* \in (-\infty, +\infty)$ , a structural equation can be expressed as

$$\mathbf{y}^* = \mathbf{C}\boldsymbol{\alpha} + \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}, \quad \mathbf{y} = \mathbf{1}[y^* > \mathbf{0}] \quad \text{Equation 4-2}$$

$\boldsymbol{\varepsilon}$  is a continuously distributed random variable independent of C and X, with a symmetrical distribution around zero and  $\mathbf{1}[\cdot]$  is an indicator function. C is a vector of categories of qualitative predictors such as strongly disagree, disagree, ..., strongly agree for each item;

and  $X$  is a vector of quantitative predictors. The dependent variable assumes a value of 1 as long as the latent variable is positive, otherwise it assumes zero. In the present case, the perception that trout is invasive assumes a value of 1 if the respondent's opinion falls on the threshold of the continuum of  $y^*$ , where  $y^* > 0$ . The categories  $C$  are binary variables assuming two values, that is, 0 if the category is not realised and 1 when the category is realised. In the case of a five-point Likert scale qualitative predictor, four categories are included in Equation 4-2 and the fifth category becomes a base category, otherwise the equation would be inestimable because of perfect multicollinearity (Agresti 2002, Long and Freese 2006). Any one of the categories can be excluded as the base category. The probability of perceiving trout to be invasive, therefore, can be represented as:

$$\Pr(y = 1 | C, X) = \Pr(y^* > 0 | C, X) \quad \text{Equation 4-3}$$

$$\text{Thus, } \Pr(y = 1 | C, X) = \Pr(C\alpha + X\beta + \varepsilon > 0 | C, X) \quad \text{Equation 4-4}$$

$$\Pr(y = 1 | C, X) = \Pr(\varepsilon > -(C\alpha + X\beta) | C, X) \quad \text{Equation 4-5}$$

$$\Pr(y = 1 | C, X) = 1 - \Lambda(-(C\alpha + X\beta)) \quad \text{Equation 4-6}$$

$$\Pr(y = 1 | C, X) = \Lambda(C\alpha + X\beta) \quad \text{Equation 4-7}$$

Equation 4-5 reveals that the probability of perceiving trout to be invasive depends on the distribution of the error term. Since Equation 4-7 is non-linear in the parameters, it has to be estimated by the maximum likelihood approach. In the present analysis, a logistic distribution was chosen because of the possibility of interpreting odds in addition to marginal effects (Greene 2003, Long and Freese 2006). The variance of the error term in a logistic distribution is given by

$$\text{Var}(\varepsilon) = \pi^2/3 \quad \text{Equation 4-8}$$

The binary logit can be expressed as

$$\Pr(y = 1 | C, X) = \frac{e^{C\alpha + X\beta}}{1 + e^{C\alpha + X\beta}} \quad \text{Equation 4-9}$$

Since  $y^*$  is unknown, the magnitude of the estimated coefficients has little value because the objective is not to estimate the effect of each  $c_j$  and  $x_i$  on  $y^*$ . Thus, it is the sign of the

estimated coefficients that matters. The marginal effect of a change in  $x_i$  (which is a continuous variable) on  $P(y = 1|C, X)$  can be estimated by the partial derivative of Equation 4-7:

$$\frac{\partial \Pr(y=1|C, X)}{\partial x_i} = \Lambda'(X\beta) \cdot \beta_i = \lambda(X\beta) \cdot \beta_i \quad \text{Equation 4-10}$$

Since the cumulative density function for  $\varepsilon$  in Equation 4-7 is strictly increasing, it follows that  $\lambda(X\beta) > 0$ . Thus, the effect of  $x_i$  on  $P(y = 1|C, X)$  depends on the sign of  $\beta_i$ . However, Equation 4-10 measures an instantaneous change in probability, which is likely to be a poor interpretation strategy if there are non-linearities in the relationships of the  $x_i$ 's and the probability of perceiving trout to be invasive. In the presence of non-linearities, the alternative is to interpret the effect of discrete changes in both  $x_i$ 's and  $c_j$ 's on the probability of perceiving trout to be invasive. Equation 4-11 illustrates the effect of a change from  $c_k$  to  $c_k + 1$  on the probability of perceiving trout to be invasive. In this case,  $c_j$ 's are dummies, but the same approach works for continuous variables as well.

$$\Lambda(\alpha_0 + \beta_0 + \alpha_1 c_1 + \dots + \alpha_k (c_k + 1) + \beta_1 x_1 + \dots + \beta_h x_h) - \Lambda(\alpha_0 + \beta_0 + \alpha_1 c_1 + \dots + \alpha_k c_k + \beta_1 x_1 + \dots + \beta_h x_h) \quad \text{Equation 4-11}$$

The special case of Equation 4-11 treats categorical predictors as quantitative predictors and that reduces Equation 4-7 to Equation 4-12 since the  $C$ 's are now quantitative just as the  $X$ 's are.

$$\Pr(y = 1|X) = \Lambda(X\beta) \quad \text{Equation 4-12}$$

A likelihood ratio test of the hypothesis that the special case (Equation 4-12) is nested in Equation 4-7 determines whether one can interpret categorical predictors quantitatively or not (Agresti 2002). The test statistic tests the claim that the special case holds given that the factorial logit model is adequate. Thus, if the test for the null hypothesis that the special case is nested in the complex model is not rejected, one can proceed with the special case in further analysis.

Since the study aimed at evaluating the reasonableness of the regulatory reform process, a logistic regression of the perceptions about the reasonableness of the 2014 draft AIS regulations was estimated. The questionnaire had an item, which stated: "In my opinion,



The marginal effects are obtained by taking the partial derivatives of Equation 4-16. For example

$$\frac{\partial \Pr(y=0|X)}{\partial x_k} = -\beta_k \lambda(\alpha_1 - X\beta);$$

$$\frac{\partial \Pr(y=j|X)}{\partial x_k} = \beta_k [\lambda(\alpha_{j-1} - X\beta) - \lambda(\alpha_j - X\beta)], \text{ for } 0 < j < 4; \text{ and}$$

$$\frac{\partial \Pr(y=4|X)}{\partial x_k} = \beta_k \lambda(\alpha_4 - X\beta)$$

Equation 4-17

#### 4.3.5. Conclusion

The chapter presented the methodology and various methods of analysis that the study employed to answer its research question. As was apparent, there was no “one way of knowing” that was preferred to others. Each component of the study had a different method of analysis. Owing to the complexity of the policy issue under study, a combination of qualitative and quantitative methods was used within a concurrent nested mixed methods design. The goal was to analyse a process and provide a processual explanation. The epistemological programme that tied all the methods of analysis together was volitional pragmatism, which is particularly developed for institutional analysis.

Subsequent chapters present the analyses of the policy process, each applying a relevant component of the methods of analysis just reviewed. Chapter 5 provides an interpretation of the NEM:BA using institutional economic theory. Chapter 6 provides the legal history of the NEM:BA. Chapter 7 provides econometric results. Chapter 8 gives a semiotic analysis of the entire NEM:BA AIS regulatory reform process from 2003-2014. Chapter 9 provides discussion and conclusions.

*“That the economist takes statutes to be complete when enacted is striking to a lawyer, who realizes that the meaning of a statute is not fixed until the courts have interpreted the statute,” (Posner 1982, p.264).*

#### 5.0. Introduction

In light of the National Environmental Management Act (NEMA) of 1998 and the Constitution of South Africa 1996, Chapter 5 uses institutional economic theory to interpret the controversial fifth chapter of the National Environmental Management: Biodiversity Act (NEM:BA) of 2004. The incentive and value systems embedded in these three institutions are evaluated. The chapter also evaluates the scientific ideology that provided foundational concepts to the NEM:BA.

As the South African Legislature was adopting the National Environmental Management: Biodiversity Bill in 2003, the Member of Parliament, Chalmers (2003), remarked:

*“[W]e are not being unrealistic when we say that this is one of the most important pieces of legislation to be passed since 1994, and certainly the most important piece of biodiversity legislation for decades. If coupled with *sound enabling regulations*, and if sufficient resources are devoted *to ensure adequate implementation*, this Bill, providing as it does an *effective legal framework*, has the ability to transform biodiversity management in South Africa *for the good of all of its people*,” (emphasis added).*

The promulgation of biodiversity policy and law in South Africa was considered to be an important milestone in the post-apartheid dispensation. This might suggest that policymakers, scientists and the general polity, in broad terms, shared a “remarkable consensus on the issues needing to be addressed by this policy” (White Paper on Conservation and Sustainable Use of South Africa’s Biological Diversity, hereafter

Biodiversity Policy, 1997, p.18). Despite the celebration over the enactment of the NEM:BA, the implementation phase (realm of rules) of the NEM:BA has been a heavily contested terrain in the history of environmental policy in South Africa (Kepe *et al.* 2005). Since the NEM:BA became law in 2004, it took the Department of Environmental Affairs (DEA) nearly a decade to develop substantive Alien and Invasive Species (AIS) Regulations, and eight years to develop a national list of invasive species. One wonders whether it was the failure of the DEA to promulgate sound enabling regulations or whether it was the NEM:BA that was so 'disabling' that it was difficult to develop sound enabling regulations.

Claims and counter-claims characterize the debate about regulation of economically useful alien and invasive species. On the one hand, sectors that utilise alien species that were listed as invasive claimed that the DEA was misinterpreting and misapplying the NEM:BA (FOSAF 2013, FOSAF and Trout SA 2014a; 2014b). On the other hand, the DEA claimed that these sectors were sensationalising matters and spreading propaganda as well as misinterpreting the NEM:BA (DEA 2014b). It was a battle of interpretations, which is typical of laws that are developed within a limited access policymaking order, while implementation is left to democratic processes (Table 3-1).

Another set of claims and counter-claims also characterised the two decades (1980-2003) that preceded the enactment of the NEM:BA. Discursive wars were fought over the management of alien species in both the media and peer-reviewed publications. The pro-alien lobby argued that invasion biologists and the DEA were purists and "eco-nationalists" with distaste for anything called alien (Brown 2013, p.57). The anti-alien lobby argued that at the core of alien species introductions lay utilitarianism, "environmental greed" (Skelton 2000, p.41) and financial greed (Cambray 2003a). They also argued that species introductions and the spreading of already naturalised species was "eco-terrorism" comparable, in degree of evilness, to "political terrorism" (Cambray 1997, p.27).

There was also a voice in the middle that maintained that alien invasive species that were of socio-economic significance could be utilised in a sustainable manner by striking a balance between utilisation of invasive alien species and conservation of indigenous species (De Moor and Bruton 1988, Ellender and Weyl 2014, Ferrar and Kruger 1983, Skelton and Davies 1986). For example, De Moor and Bruton (1988, p.86) argued that economically useful

invasive species had “a permanent place in the economy and ecology of South Africa”, but had to be sustainably managed. They acknowledged fungibility of species and co-existence to the extent that it was possible (Maier 2012).

Having sketched the background, Chapter 5 then offers an explanation of the incentive structure enshrined in the NEM:BA. Such an explanation helps to determine why protracted controversies exist at the regulatory phase if legislators and the DEA did their homework well at the legislative phase. Could it be that the NEM:BA had some questionable provisions insofar as management of alien and invasive species were concerned? What were the likely economic implications of the NEM:BA’s provisions for the management and utilisation of alien and invasive species? Section 5.1 presents the method of analysis. Section 5.2 presents results of the comparative analysis. Section 5.3 extends the analysis to sustainable use, conservation and financing of biodiversity management. Section 5.4 examines the judicial interpretation of what makes regulations reasonable and section 5.5 concludes Chapter 5.

### **5.1. Analytical framework**

The analysis carried out in Chapter 5 was largely comparative and evaluative. The comparison focused on the statutory content of the relevant provisions of the Constitution of the Republic of South Africa 1996, the National Environmental Management Act (NEMA) 107 of 1998 and the NEM:BA of 2004. The NEM:BA is subsidiary to the NEMA. The idea was to locate the perceivable sources of the controversy from the statutory content of the NEM:BA relative to the foundational environmental governance legislation (the NEMA) and founding constitutional provisions for environmental governance as outlined in section 24 of the Constitution.

The OIE theory of valuation, with a bias towards John R Commons’ reasonable valuation, was used. This framework of analysis lends itself well to the task because the controversies in biodiversity governance in South Africa are nothing if not controversies over values, valuation and interpretation. As already reviewed, there is considerable literature on OIE theory of valuation (Bush 1987; 2009, Hayden 2006, Hiedanpää and Bromley 2002, Ramstad 1989; 2001, Tool 1977). A society is a “set of institutional systems” and an institutional system is “a set of institutions” (Bush 1987, p.1076). Bush (1987, p.1076) goes on to define an institution as “a set of socially prescribed patterns of correlated behavior”. The emphasis

is on both socio-structural relations and values that prescribe/proscribe behaviour. Bush (2009, p.293) advances the idea that the process of institutional change necessarily entails an accompanying reconfiguration of the value structure of society. The reconfiguration of the value structure is inevitable because values correlate human behavior within the nexus of opportunity sets created by the different institutions. Bush (1987, p.1076) also argues that the “value system of society [determines] the character of the institutional structure.”

Values are “[standards] of judgment” and valuation is the “application of a “value” as a standard of judgment” in arriving at a value-consistent public policy decision (Bush 2009, p.296). Since in any society multiple and, sometimes, irreconcilable values exist by reason of existence of multiple social groups, a choice of the relevant values has to be made from the broader set of values. Bush (2009, p.296) calls that choice a “value judgment”.

#### **5.1.1. Reasonable valuation**

Hayden (2006) argues that reasonable/instrumental valuation theory is consistent with democracy. At the core of the reasonable valuation framework is the idea of purpose. A process of “giving and asking for reasons” (Brandom 1995, p.898), which entails purposeful deliberative valuation, is a distinguishing feature of these valuation frameworks (Hayden 2006). Commons (2009, p.697) asserts that “[t]he Constitution [and any statute or regulation] is not what it says it is – it is what the Court says it is.” Thus, according to Commons (2009, p.690) reasonable valuation is the legislative, administrative and judicial “process of weighing practices, customs, precedents, statutes, and constitutions in light of changing conditions and conflicting habitual assumptions.”

In a constitutional democracy, a minimum core set of values exists that coordinates and correlates various norms and standards specific to various institutions (pieces of legislation). The constitution and judicial precedent supply the core values (Hayden 2006). State (authoritative) agents determine what is reasonable to do to enhance institutional coherence and favourable socio-economic and environmental outcomes (Bromley 2008a). Codified values become the predominant value system that provides valuation criteria for new institutions as well as guiding formation of new institutions (Hayden 2006).

A change in any one of the pieces of legislation entails a change in norms and standards, which are still required to conform to the foundational constitutional values. It follows that

a new institution that is poorly aligned to the constitutional value structure causes institutional misfit, renders dysfunctional the value framework, and leads to adverse institutional outcomes and conflicting opportunity sets (Bromley 1985, Bush 1987; 1989). Put differently, the new institutional complex might be regressive, even though the original intention was desirable.

### **5.1.2. Environmental policy as economic policy**

Goddard (1972) prescribes that economists ought to interpret environmental policy as economic policy. His argument is that the same questions central to economics concerning what to produce; how much to produce it; for whom to produce it; where to produce it and at what cost (including costs imposed by externalities) are likewise addressed by environmental policy. Typically, environmental policy determines production and consumption patterns by determining what to conserve, how to conserve it, where to conserve it, what activities to proscribe in the interest of the environment as well as what activities to permit under either stringent or accommodative regulatory conditions (Hayden 2006).

Environmental policy, thus, has important implications for transaction costs, economic incentives and relative economic viability of activities that directly or indirectly rely on utilisation of environmental resources (Mettepenningen *et al.* 2009). Goddard (1972) proposes a positive model of economic analysis as a guide to the choice of an efficient environmental policy. However, in a social context where multiple value systems and beliefs coexist, policy is likely to be less deterministic and more discursive (Balint *et al.* 2011, Gray and Gill 2009, Rittel and Webber 1973). Once it turns out to be discursive, reasonableness/instrumentality, as opposed to efficiency, becomes the guiding principle in choosing alternative environmental policy (Waller Jr and Robertson 1991). Bromley (2008d, p.11) supports this argument stating that realms of reasons and rules have “less faith in rational choice models, and in related efficiency-based policy prescriptions, than do those economists who insist that such approaches are necessary and sufficient for rational public policy.”

In the realm of social and economic policymaking (including environmental policymaking), the problems that policymakers seek to address are wicked in nature (Gray and Gill 2009,

Rittel and Webber 1973). Wicked problems defy determinism because of the absence of an inclusive instituted social imaginary (King 1993). In a pluralist society, there are as many divergent social beliefs and value systems as there are social groups, each wanting to dominate the policy space. As such, notions of efficient legislation or policies might not necessarily deliver widely acceptable outcomes. Instead of being guided by efficiency criteria, policymakers are guided by “sufficient reason(s) to alter specific institutional arrangements in the interest of – for the purpose of – modifying particular economic outcomes in the future” (Bromley 2008d, p.11). The principle of sufficient reason is the basis of reasonable legislation.

### **5.1.3. Human-centeredness versus environment-centeredness**

Conservation interests and socio-economic interests have been battling to control the policy space in South Africa. Nelson (2010) asserts that controversies surrounding environmental or biodiversity governance go beyond science. He demonstrates that behind these controversies lies a host of undeclared “theological assumptions” (Nelson 2010, p.30), which are the real sources of discursive power. Theological assumptions qualify for ideology in the Ayresian explanation since they are transcendental. Equipped with undeclared theological assumptions, the environmental creationist/conservationist, at least for non-Darwinists, ideally attempts to re-create the grand pattern that the creator of the earth originally laid out, which humankind disrupted afterwards (Maier 2012, Mooney and Drake 1989).

In Nelson’s (2010) view, environmental creationism is the most recent messiah seeking to save Nature, which has been/is being lost due to disruptive human activities. On the other hand, he sees another old time dominant paradigm of salvation – economic progress. The goal of economic progress (the economic messiah), through domination of nature, is to save the world from the evils of scarcity, poverty and inequality among many other evils. Fundamentally, both so-called religions seek to save the world, but through quite disparate approaches. The former saves the world (nature) by protecting it *from* people. The latter saves the world (people/society) by *exploiting* nature through technological progress.

Nelson’s (2010) argument suggests that there are multiple social views of the world. Simberloff *et al.* (2013) distinguish amongst four environmental views, namely ecocentrism,

anthropocentrism, zoocentrism and biocentrism. Ecocentrists have a bias towards ecological systems and emphasise that it might be reasonable to eradicate alien and invasive species to protect biodiversity. On the other hand, anthropocentrists are people-centred and they “do not worry about ecological impacts of invasions unless these also drive economic or social damages” (Simberloff *et al.* 2013, p.63). Zoocentrists grant equal moral rights to both human and non-human sentient beings and they “oppose sacrificing the interests of individual animals for the sake of human interests or biodiversity per se and have often opposed eradication plans” (Simberloff *et al.* 2013, p.63-64). Lastly, biocentrists consider all biological entities to be intrinsically valuable regardless of whether they are sentient or non-sentient.

#### **5.1.4. Method of analysis**

To interpret the NEM:BA from an institutional perspective, a textual analysis strategy was used (Maree 2013). The approach used here was a comparative analysis of the relevant provisions in each statutory instrument. In particular, the fifth Chapter of the NEM:BA was the focus of the analysis because it is the one that governs the utilisation and management of alien and invasive species. The data used in this Chapter consisted of the NEMA of 1998, the Constitution of the Republic of South Africa of 1996 and the NEM:BA of 2004.

## **5.2. Results**

Table 5-1 depicts broad generalizations of the comparative results. Discussion of results gives finer details about each broad thematic aspect. Some of the themes cut across several themes. As such, they are not discussed separately.

### **5.2.1. People at the forefront of environmental management concerns**

Findings suggested that a fundamental point of difference between the Constitution/NEMA and the NEM:BA was the relative consideration of people and the environment (Table 5-1). The NEMA and Constitution are anthropocentric (people-centred) whereas the NEM:BA is biocentric/ecocentric. Section 24 of the Constitution specifies the founding provisions for environmental governance. Section 24 provides that

“Everyone has the right— (a) to an environment that is not harmful to their health or wellbeing; and (b) to have the environment protected, *for* the benefit of present and future generations, through reasonable legislative and other measures that - (i)

prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development” (emphasis added).

Table 5-1: Summary major findings of the comparative analysis

Aspect	Constitution Act 108 of 1996	NEMA 107 of 1998	NEM:BA 10 of 2004 <sup>2</sup>
Environment protected <i>for</i> people	Yes	Yes	No, but for its own sake
Value framework	Consequentialist	Consequentialist	Deontological
Implied definition of natural resource	Both alien and indigenous	Both alien and indigenous	Only indigenous
Sustainable use	Yes, all resources	Yes, all resources	Yes, indigenous resources only
Fate of alien and invasive species	Sustainably utilise them to manage harmful effects	Sustainably utilise them to manage harmful effects	Eradicate or combat with view to gradual eradication
Justifiable social and economic development	Unconditional yes	Unconditional yes	Yes, if based on indigenous resources
Economic thrust	Facilitative of all activities as long as they are justifiable social and economic developmental activities	Facilitative of all activities as long as they are justifiable social and economic developmental activities	Prohibitive and inhibitive for activities based on listed invasive species no matter how justifiable

Source: Author’s analysis

The constitutional environmental governance framework is human-centred. The environment needs protection, *but not for its own sake*. It is to be protected *for the benefit of people*. It is not to be protected *from* people. By providing that “everyone has the right”, the Constitution is not assigning to people property rights over the environment. Rather,

<sup>2</sup> This is the NEM:BA before the National Environmental Management Laws Amendment Act (NEMLAA) of 2013, which now provides for regulation of alien and invasive species by demarcated areas, by activity, by species management programme – aspects that the NEMBA 10 of 2004 failed to provide for and which made it inhibitive.

right here seems to refer to liberty. Commons (1942) distinguished two related constitutional meanings of economic (and, perhaps, social and political) power: liberty and property. Property is the “power of scarcity” (Commons 1942, p.370), which is the power of an owner to withhold something from those who need it, but do not own it. Liberty, on the other hand, is “bargaining power” (Commons 1942, p.370). In the preamble, the NEMA sheds light on the concept of right stating that “the State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone.” Social, economic and environmental rights encompass both property and liberty.

The NEMA, which operationalises section 24 of the Constitution, goes a step further to elaborate what it means to have the environment protected *for* the people. In section 2, the NEMA lays down a peremptory normative, guiding and evaluative framework that binds all organs of state and all other subsidiary pieces of legislation. Among other principles, it provides that “Environmental management *must* place people and their needs at the *forefront of its concern*, and *serve* their physical, psychological, developmental, cultural and social *interests equitably*,” (NEMA, s.2 (2), emphasis added). Notice, this is a peremptory provision. It is a statutory command and government administrators have to obey it both in letter and in spirit. Thus, the NEMA provides for rights to a livelihood (physical and psychological needs), developmental rights, cultural rights and social rights (Christiansen 2006). Environmental management must *serve* (facilitate) progressive realisation of these rights or strengthen them where they already exist as long as they do not promote and perpetuate unfair socio-economic discrimination.

Ordinarily, one would expect environmental management’s *primary* “concerns” to be the conservation, restoration, preservation and protection of the environment. Paradoxically, the *primary* “concern” in the NEMA is the people (Table 5-1). One wonders why the NEMA goes to such lengths to make this provision. Steyn (1999, p.15) points out that the dominant belief in the 1980s was that “people (especially black people) were the enemies of conservation.” To be sure, it was an “environmental policy to “‘save’ Africa from Africans”” (Nelson 2010, p.260). The Biodiversity Policy (1997, p.16) advances the same argument and is worth quoting here:

“After Union, and indeed up until recent times, *influential lobbies* continued to secure additional areas and *stronger legislation for protected areas* ... Moreover, the establishment of protected areas was often accompanied by forced removals and *resource dispossession* among black people. The dominant approach prevailing during this period was that protected areas ought to be “*pristine*”, fenced-off areas,” (emphasis added).

The quote reveals the depth of disenfranchisement of the black (and other disadvantaged) peoples from access to, and utilisation of, environmental resources. At the core of the disenfranchisement was environmental creationism, which required protection and restoration of the environment to its pristine or near-pristine condition (Phillips 2003). The institution of property defined the racially entrenched power structures insofar as utilisation of environmental resources was concerned. Thus, it was used in a ceremonially warranted way (Tool 1994).

In peremptorily providing for a framework that places people at the forefront of the concerns of environmental management, the NEMA, thus, is invoking remedial legal-economic interventions (Commons 2009). The purpose of remedial interventions is to restore and promote equity and economic liberty (Mashaw 1980; 1981). To persist with the pre-democracy model of environmental management that created “Noah’s Ark” (Nelson 2010, p.12) and islands of purity would have entrenched the green apartheid system in a post-apartheid political dispensation.

### **5.2.2. Consequentialism versus Deontology**

In providing for the protection of the environment “for” the people, the Constitution places ultimate value in the people rather than the environment (Table 5-1). By providing that environmental management must place people at the “forefront” of its concern, the NEMA, like the constitution, assigns ultimate value to the people. These are value rankings. However, the NEM:BA is founded on a fundamental principle that underpins the Convention on Biological Diversity (CBD) of 1993. In its preamble, the CBD declares that “Contracting parties [are] [c]onscious of the intrinsic value of biological diversity”. The first principle that the Biodiversity Policy (1997, p.20) specifies is that “*All life forms and ecological systems have intrinsic value,*” (emphasis added). The NEM:BA, thus, expanded the CBD principle to

include all life forms (humans and alien non-humans included) and ecological processes and interactions. This is biocentrism (Simberloff *et al.* 2013). The NEM:BA does not assign ultimate value to humans, but it assigns it to all life forms, ecological processes and ecological interactions.

From an environmental philosophy point of view, the claim to intrinsic value is the bedrock for egalitarianism of life forms (Maier 2012, Sarkar 2005). Intrinsic value means that every life form has value in and of itself regardless of any utilitarian value it has to other life forms (Maier 2012). Instrumental value means that a life form has value only insofar as it yields utility to other life forms, especially humans (Norton 2003, Sarkar 2005). To the extent that attributing intrinsic value to non-human life forms grants them moral rights, they are moral equals with humans. Similarly, every ecological process and system, as per the NEM:BA, has moral claims equal to those of humans. There is a fundamental point of difference. The NEM:BA ascribes to egalitarianism of all life forms including humans as well as alien and invasive species (biocentrism). The NEMA and the Constitution place ultimate value in the people as well as recognizing the instrumental value of the environment and its components. They subordinate the environment to humankind, subject to a conservation ethic or duty of care (Glavovic 1984).

The NEMA and the Constitution are built on a consequentialist value framework insofar as they make humans ultimate holders of value, whereas the NEM:BA's value framework is deontological because humans are not assigned the role of valuing agent (Maier 2012). Consequentialism focuses on environmental consequences and outcomes only as they relate to human welfare (Maier 2012, Norton 2003, Sarkar 2005). On the contrary, deontology eliminates humans as valuing agents and propounds that all life forms have equal moral rights (Maier 2012).

In Nelson's (2010, p.3) view, consequentialism is prevalent because societies often advocate "that economic religion should not be abandoned, but rather revised and reworked to reflect new environmental concerns and ecological understandings." Nelson's argument is that consequentialism does not abandon the pursuit of economic progress. It only calls for factoring in of environmental issues in the dominant discourse. The environment is to supply material inputs to the production process and be used as a waste sink (Hanley *et al.*

2013, Tietenberg and Lewis 2010). The environment is to be a means to the advancement of human ends, although it warrants earnest protection, preservation, conservation and care. The ultimate purpose of all this is to *serve* the physical, psychological, developmental, cultural and social needs and interests of people. Therefore, the founding environmental governance framework is anthropocentric and consequentialist, whilst the NEM:BA is biocentric and deontological.

### **5.2.3. Implied statutory definitions of natural resources**

The comparative analysis revealed that the NEM:BA has a different *implied* conception of what a natural resource is relative to what is implied by the NEMA/Constitution (Table 5-1). The term natural resources is not defined in the NEMA and the NEM:BA. Section 24 of the Constitution and the preamble to the NEMA provide for “ecologically sustainable ... use of *natural resources*” (emphasis added). However, the preamble to the NEM:BA provides for “the sustainable use of *indigenous* biological resources” (emphasis added). Whilst it is logical that the Constitution and the NEMA have broader implied definitions of natural resources than the NEM:BA because they are including biological and non-biological resources, it is not apparent whether their implied definitions of the biological component are restricted to *indigenous* resources.

The term “natural resources” does not seem to place any identity restrictions, such as indigenousness or alienness, onto the resources. To the NEM:BA, natural resource means indigenous resource, but this, probably, is a narrow and restrictive conception insofar as indigeneity cannot be fully characterised in terms of biological and geographical factors alone (Chew and Hamilton 2011). Temporal and cultural factors also play a critical role in defining what an indigenous resource is (Chew and Hamilton 2011, Wylie 2008).

The only piece of South African legislation that defines a natural resource is the Conservation of Agricultural Resources Act (CARA) of 1983. The CARA, section 1, states that “‘natural agricultural resources’ means the soil, the water sources and the vegetation, excluding weeds and invader plants.” In this case, the CARA defines a natural resource as one that has potential or actual economic value in agriculture. The CARA definition is utilitarian. However, a less obvious aspect of this definition is that the CARA regards alien species that are non-invasive and are agriculturally valuable as natural resources. It only

excludes invasive plants from the definition. Even here, there is an *ambiguity* because an invasive plant/animal that is also agriculturally beneficial does not so easily fit into that definition.

The foregoing discussion reveals that the concept of naturalness is a social construction (Bromley 2012, Hirokawa 2014, Max-Neef 2005). Nature is what people commonly perceive its effects on them to be (Bromley 2012, Peirce 1878). In a pluralistic society, multitudes of competing and conflicting definitions of a natural resource exist. The degree of convergence of “mental objectification” of investigators, policymakers and the general polity about nature becomes the natural (Bromley 2012, p.19). The claim here is that leaving the concept of natural resources undefined in legislation necessarily created conditions necessary for institutional isolation (marginalisation) of some sectors to the extent that a dominant epistemic group will utilise its instituted social imaginary to exclude from its conception of natural resources what other groups would identify as natural resources. As the literature review suggested and as illustrated in Table 3-1, loose legal provisions create necessary conditions for epistemic injustice or monopoly over the sanction of ignorance by epistemic communities that manage to appropriate sovereign power in policy processes (Ayres 1996, Code 2008, Commons 2009, Dotson 2011, Dugger 1996b, North 1990, North *et al.* 2007; 2012). Interpretive battles are likely to characterise implementation processes.

#### **5.2.4. NEM:BA requires eradication of alien species and invasive species**

This sub-section devotes itself to the analysis of relevant concepts that the NEM:BA employs because, not only have controversies arisen over the interpretation of the concepts, but also the legislative intent can be inferred from them.

##### ***a. Alien species***

An alien species is defined in the NEM:BA as

“(a) a species that is not indigenous; or (b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention,” (NEM:BA, section 1(1)).

An indigenous species that extends its natural distribution range by “natural” means is non-alien. However, invasion is invasion. Insofar as a species extends its natural range by natural means, but its invasive effects are the same as those of a species that spreads by human assistance, Chew and Hamilton (2011), Davis *et al.* (2011), Shackelford *et al.* (2013) and Warren (2007) question the wisdom of focusing on the mode of range extension rather than the degree of damage caused by a species. Central to this definition, to be sure, is the presumption that humans are exogenous to nature (Nelson 2010). Thus, human interventions such as translocation of species are interpreted as exogenous disturbances to nature.

***b. Invasive species***

The entire controversy about the proposed regulatory regime for alien and invasive species centred on the definition of an invasive species because it was upon this basis that a species was subjected to stringent controls or prohibited. The NEM:BA defines an invasive species as

“any species whose establishment and spread outside of its natural distribution range (a) *threaten* ecosystems, habitats or other species or have a *demonstrable potential* to threaten ecosystems, habitats or other species; and (b) *may result* in economic or environmental harm or harm to human health,” (NEM:BA section 1(1), emphasis added)

The definition has a biological invasiveness component, a socio-economic and an environmental invasiveness component. The Federation of Southern African Flyfishers (FOSAF) (2013) argued that this definition created a *conjunctive test of invasiveness*. It further argued that the obvious implication was that a species could only be invasive if it satisfied both conditions. To be invasive, conclusive scientific evidence about the negative ecological and socio-economic impact of a species must have been gathered. Thus, impact has to be of such a magnitude that it threatens long-term survival of another species, perhaps, leading to extinction. However, in some cases, the evidence is only circumstantial in which case the potential impact must be demonstrable.

Table 5-2: Potential conflictual and consensual decision scenarios regarding the identification of invasive species

A Species is invasive if...	May be causing harm to human health	May be causing economic harm	May be causing environmental harm	May not be causing economic, environmental or human health harm
Establishment and subsequent spread by natural means threatens indigenous species	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree
Establishment and subsequent spread by natural means threatens habitats	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree
Establishment and subsequent spread by natural means threaten ecosystems	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA, invasion biologists, sectors that utilise alien and invasive species all agree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree
Establishment and subsequent spread by human assistance threaten indigenous species	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree
Establishment and subsequent spread by human assistance threaten habitats	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree
Establishment and subsequent spread by human assistance threaten ecosystems	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree	DEA and invasion biologists agree; sectors that utilise alien and invasive species disagree

Source: Author's analysis

The definition imbeds in itself the criteria for classifying a species as invasive. The fundamental (and sufficient) criterion according to the NEM:BA is that the species causes ecological harm. The second, expressed as a mere possibility by the use of “may result”, is a

necessary condition. That a species does not cause socio-economic harm does not prevent it from being listed as invasive for as long as ecological harm has been established. Viewed from this perspective, the provision indicates that the NEM:BA provides a conjunctive test, but the test criteria are ranked in such a way that one is a sufficient condition and the other is only a necessary condition. Interest groups such as the FOSAF were interpreting the definition in a broader sense than the restrictive sense that the NEM:BA definition stipulates.

Table 5-2 dimensionalises the definition of an invasive species in order to determine potential conflictual and consensual scenarios in the regulatory reform processes that followed the promulgation of the NEM:BA. It combines socio-economic criteria and ecological criteria in order to decode the underlying cause of the non-convergence of the dynamic interpretants of the players in the regulatory reform process. The first scenario (shaded) is the convergence of mental objectification between economic sectors that utilise invasive species, and the DEA and invasion biologists for species that satisfy both ecological and socio-economic criteria of invasiveness.

In the second scenario, the sectors utilising alien and invasive species disagree with the DEA and invasion biologists on the invasive status of species that might not be causing economic harm, environmental harm or harm to human health although they might be threatening species, habitats or ecosystems (Table 5-2). To the economic sectors, such species are non-invasive by virtue of them failing to satisfy the socio-economic/environmental harm test of the conjunctive test of invasiveness. The problem with the interpretation of socio-economic sectors that utilise invasive species is that it assigns equal weight to ecological and socio-economic criteria when, in effect, the NEM:BA makes the ecological criterion a sufficient condition and the socio-economic/environmental criterion a necessary condition.

It is difficult to find a species that threatens species, habitats or ecosystems that does not harm human health, the economy or the environment *in the long-term* (Norgaard 2007). Short-termism guided by the Veblenian pecuniary culture shapes the argument of economic sectors in this scenario. However, the constitutional/NEMA environmental framework builds on “tempered anthropocentrism”, which Sarkar (2005, p.75) considered to balance short-term and long-term interests. ‘Short-term’ anthropocentrists “do not worry about ecological

impacts of invasions unless these also drive economic or social damages” (Simberloff *et al.* 2013, p.63). The discount rate for the economic sectors might be higher than the underlying social discount rate implied by the long-term anthropocentrism in the constitutional/NEMA framework. Thus, the argument of the economic sectors was ceremonially warranted in this scenario and failed to pass the environmental continuity test and, in effect, was an argument for the maintenance of the status quo (Tool 1994).

The third scenario concerns species that harm human health, the economy or environment, but can potentially threaten species, habitats or ecosystems if and only if human beings subsequently spread them (Table 5-2). The DEA/invasion biologists declare such species invasive, but the economic sectors disagree. Differentiating between natural and human-assisted subsequent range extension, however, can clarify matters because it helps the policymaker to focus on fundamental rather than consequential problems. The case of natural range extension after the first instance of introduction is fundamental because it means that the species has a potentially colonisable suitable habitat available (Macdonald and Jarman 1985, Richardson and Van Wilgen 2004). The case of human-assisted range extension is consequential because it implies that the species can only invade if it is propagated in new areas. In this case, the species is not the problem, but human/economic motives and behaviour are the fundamental problem. The policymaker has to think in terms of economic incentives and sanctions that could be instituted to modify economic behaviour to minimise further volitional spread of the species.

To the extent that invasion biologists and the DEA do not differentiate species by mode of subsequent range extension, it leads to a logical failure in their argument in the sense that a species that can only subsequently spread by human assistance is not an *established* species. If not established, then the subsequent spread ceases to be by natural means. A species that is established, but cannot expand its range because suitable habitats are discrete and separated by impassable non-suitable habitat, cannot be a spatially dynamic threat to indigenous species. It is a threat to those species within the invaded area.

The NEM:BA’s definition of an invasive species, however, underplays the grand purpose of environmental governance as enunciated in the Constitution section 24. The central thrust of environmental governance is to guarantee an environment not harmful to people’s

health and wellbeing. The real issue lies in what “wellbeing” might mean. An environment that threatens the socio-psychological and economic/livelihood assets of people harms their wellbeing insofar as it can generate economic and social ruin. Viewed from this perspective, it implies that a species can only be invasive if the ecological threat it poses is such that it inflicts harm on the environment that, in turn, harms human health and wellbeing.

The definition of invasiveness in the NEM:BA seems too narrow to fit the broader constitutional vision because it only concentrates on biological invasiveness. In a consequentialist value framework, such as the one the Constitution and the NEMA provide for, it is not enough to say a species threatens “ecosystems or habitats or other species”. The threat has to be such that it jeopardises human wellbeing since humans are the ultimate object of environmental governance (Maier 2012, Simberloff *et al.* 2013). The issues that legislation has to deal with, as outlined in section 24 of the Constitution, directly affect human health and wellbeing through compromising the production of ecosystem goods and services, economic viability of environmental resource-based activities, as well as causing diseases to humans and their livestock.

### ***c. Controlling alien and invasive species***

A closer inspection of the definition of “control” reveals that the NEM:BA prescribes eradication of alien or invasive species regardless of their *socio-economic worth*. Nor does the eradication depend on damage criteria (Chew and Hamilton 2011; Davis *et al.* 2011; Warren 2007). Rather, being alien or invasive provides sufficient ground for eradication. The NEM:BA section 1(1) states,

““Control”, in relation to an alien *or* invasive species, means – (a) to *combat or eradicate* an alien *or* invasive species; or (b) where such eradication is impossible, to prevent, as far as may be practicable, the recurrence, re-establishment, re-growth, multiplication, propagation, regeneration or spreading of an alien *or* invasive species,” (emphasis added).

Alien species and invasive species alike are to be combated or eradicated. If immediate eradication is impossible, gradual elimination of alien species and invasive species is the ultimate goal. Although the NEM:BA claims that all life forms have intrinsic value, it might be internally inconsistent to the extent that it provides for eradication of alien species. If all life

forms have intrinsic value, it is difficult to conceive the bases upon which their eradication is premised. The argument the NEM:BA gives is that they “may” harm ecosystems (discussion of this point follows later). Note that “all life forms” is a universal set that does not attach identity to the various life forms in question. Since alien species must be eradicated, human activities based on those aliens face the risk of being proscribed unless some exemption framework is invoked.

To be sure, the provisions of the fifth chapter of the NEM:BA are founded on Article 8(h) of the Convention on Biological Diversity (CBD) 1993. Article 8(h) provides that “Each Contracting Party shall, as far as possible and as appropriate [p]revent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.” Apparent from this article is the focus on eradication of *invasive* alien species. The assumption is that the threatening processes would have been scientifically identified. Whether eradication is to be prioritised based on the degree of damage, is not evident in the CBD provision.

The Conference of Parties to the CBD did not develop guiding principles for implementing Article 8(h) until 2002 in its Decision VI-23. Decision VI-23 sets the international regulatory regime for alien and invasive species and emphasises that invasive aliens must be eradicated and, if that is not possible, contained and controlled in the sense of reducing their number. Since the CBD is a contractual institution, in terms of its framing, it is binding to all signatory member states. The peremptory injunction that invasive aliens must be eradicated is to be obeyed by signatory member states. However, the NEM:BA went further to also state that alien species regardless of whether they are invasive or not have to be eradicated as its definition reveals. In a sense, this appears to point towards *purism or eco-nationalism* as the pro-aliens lobby has argued (Brown 2013). Eco-nationalism is “Strict biological nativism” (Peretti 1998, p.188).

#### ***d. Regulation of Alien and Invasive Species***

The fifth chapter of the NEM:BA provides for the management framework for alien and invasive species. The purpose of the chapter is (a) to prevent unauthorized entrance of *new* alien species into South Africa, and, more importantly,

“(b) to *manage* and *control* alien species *and* invasive species to prevent or minimise harm to the environment and biodiversity in particular [and] (c) to *eradicate* alien species *and* invasive species from ecosystems and habitats where they *may* harm ecosystems or habitats” (NEM:BA, s.64 (b, c), emphasis added).

The NEM:BA does not define the term “manage”, but it defines “control”. A closer examination of the purposes of the chapter reveals that a species is to be eradicated whether it is alien or invasive. It is to be eradicated not because it has caused harm, but because it “may” cause harm. It is a question of possible harm, but not actual harm caused since the precautionary principle is a guiding dictate of global environmental management (Balint *et al.* 2011). Such a broader purpose, however indispensable, in the estimation of the present study amounts to a *blanket approach* to alien and invasive species management. There seems also to be a loose usage of the terms control and eradicate in this chapter of the NEM:BA. Whilst to control is to eradicate and combat as the Act defines it, the fifth chapter of the Act seems to use the term control to imply any intervention other than eradication.

In terms of economic use of the species, there seems to be no enabling provision. It follows that investing in an activity that involves an alien species or an invasive species is such a risky economic activity that the risk amounts to uncertainty. The problem is that, whatever species invasion biologists suspect to have the potential to harm ecosystems, habitats or other species becomes eradicable. While the definition of an invasive species requires a species to be *presently causing evident damage* or to have *demonstrable potential* to do so, the NEM:BA’s fifth chapter creates a different criterion, namely, that *suspicion* that a species may cause harm is sufficient ground for eradication. A much more surprising point is that alien species are also liable to eradication despite the fact that they are not listed as invasive species. The construction, “alien species and invasive species” (NEM:BA, section 64(c)), makes explicit that whether invasive or not, an alien species is to be eradicated. This outcome seems to substantiate the claim that a *spirit of eco-nationalism* pervades the NEM:BA (Brown 2013).

#### ***e. Fate of activities based on alien species***

An economic activity that utilises an alien species is permissible only to the extent that a “prescribed risk assessment” has been carried out (NEM:BA section 65(2)). The transaction costs of obtaining a permit, therefore, involve the application for the permit and costs of hiring a consultant to do the risk assessment. The NEM:BA prescribes a permission and exemption framework for regulation of alien species. Unlike a property right, a permit creates a system of revocable privileges (Bromley 2009, Macinko and Bromley 2003).

The NEM:BA, section 66, however, provides that the Minister “may” *exempt* some alien species or categories of such species as well as persons or categories of persons utilising the alien species. To economic sectors that utilise alien species, the possibility of an exemption is their hope. The problem, however, is that leaving exemptions as a matter of *ministerial discretion*, does not sufficiently guarantee that the Minister will indeed exempt the species that matter to these sectors. The Minister has a *right of refusal to exempt* a species. Having already indicated that an alien species is eradicable if scientists suspect that it causes or may cause harm, complete uncertainty as to whether the Minister would in any case exempt economically useful alien species prevails.

#### ***f. Fate of activities based on invasive species***

As an obligatory matter, the Minister must “publish a national list of invasive species in respect of which this chapter must be applied nationally” (NEM:BA s.70(1)(a)). A window of hope for economic sectors that utilise invasive species is implicit in this provision. The fact that a list must be published implies a process of prioritisation such that only species that inflict the most significant damage on ecosystems, habitats, species, the environment and human wellbeing are listed and those causing the least damage are not be listed. The problem, though, is that if the criteria for listing the species are equivocal, there is little guarantee that invasive species serving important socio-economic purposes will not be listed. However, the Act seems ambiguous in that the stated purpose is the eradication of “alien species” and “invasive species” where they “may” cause ecological harm (NEM:BA, s.64 (c)). The fact that species belonging to both categories – alien and invasive – are subject to eradication, demonstrates the ambiguity.

Even though listed as invasive, a species can be economically utilised, but only under a permitting arrangement. The permit requires a prescribed risk assessment to be carried out

to the satisfaction of the DEA or a competent authority (NEM:BA section 71(2)). The difference in treatment between an alien and a listed invasive species is that a listed invasive species cannot be “exempted” from permitting conditions whereas some alien species may be exempted at the discretion of the Minister. This also implies that non-listed invasive species can be utilised with/without a permit applicable to them. By default, they would be treated as alien species. Economic sectors that utilise invasive species would find it more attractive to have the species of interest left unlisted so that they are treated as alien species and, thus, eligible for exemption. The advantage of that arrangement is that transaction costs of maintaining the species are lower than for listed invasive species.

### **5.3. Permission, sustainable use and conservation finance**

Whilst the fifth chapter of the NEM:BA provides for a permitting system to facilitate utilisation of alien or invasive species, it creates quite substantial uncertainty about the regulatory regime that would be employed. Section 91 specifies additional requirements regarding alien or invasive species.

“An issuing authority *may* issue a permit for a restricted activity involving a specimen of an alien species or an invasive species *only if* ... (b) the relevant specimen *has been found to have negligible or no invasive potential*; (c) the benefits of allowing the activity are significantly greater than the costs associated with preventing or remedying any resultant damage to the environment or biodiversity...” (emphasis added).

Again, alien species, a category that seems to have been created for those species that cause no/negligible harm to ecosystems, habitats and other species, are included in the restrictions. Thus, an investor whose business is going to utilise an alien species or a listed invasive species can obtain a permit if and only if the concerned species has negligible or no invasive potential. In most cases, the net benefits of allowing the alien species-based activity might be ambiguous (De Moor and Bruton 1988) because of inaccuracies in valuation techniques.

The paradox is that most economically useful alien species have been identified in policy and scientific circles as highly invasive (Biodiversity Policy 1997, Ellender and Weyl 2014, Moran *et al.* 2013, Richardson 2011, Richardson and Van Wilgen 2004, Skelton 2000, Van

Wilgen *et al.* 2001). For example, “Up to 60% of the threatened endemic freshwater fish of South Africa may be threatened by introduced fish species such as trout, carp and bass,” (Biodiversity Policy 1997, p.37). It follows, therefore, that a permit would be impossible to obtain in such a situation since a species must have negligible or no invasive potential for a competent authority to grant a permit. The unperceived effect of this provision is that it amounts to prohibition or shutting down of economic activities that utilise alien and invasive species for which scientists claim evidence of non-negligible invasiveness.

In *Christopher Lance Mercer v State 2003*, a governmental agency turned down a permit application because “the caracals [which Christopher Lance Mercer kept in the Kalahari Raptor Centre] were *earmarked as potential problem* animals to farmers” (emphasis added), that is, they were declared economically invasive. Evidently, the listing of a species as invasive or potentially so has drastic implications for the possibility of obtaining a permit, and understandably so, with potentially ruinous social and economic consequences. This case suggests that the test of invasiveness has to consist of biological and socio-economic criteria jointly.

The concept of sustainable utilisation as envisaged in the NEM:BA seems to be narrow because it only focuses on indigenous resources. Sustainable funding for biodiversity conservation could be secured through sustainable utilisation of alien and/or invasive species. Figure 5-1 illustrates the argument. Conservationists (C) and economic sectors that utilise alien and invasive species (E) have irreconcilable interests. The bundle of environmental services for environmentalists includes goods (indigenous species) and bads (alien/invasive species). Thus, their welfare increases as indigenous species diversity increases and the propagule pressure as well as the spread of alien and invasive species decreases.

Economic sectors that utilise both alien species and invasive species, on the other hand, have a bundle of environmental services that has two goods (indigenous and economically useful alien/invasive species). Their welfare increases as both goods increase. There exist two alternative institutional arrangements NAIS (no-AIS, that is eradicate or manage with a view to gradually eliminating alien and invasive species) and AIS (allow use of alien and invasive species). The former is what the fifth chapter of the NEM:BA envisages and the

latter is the pre-NEM:BA scenario. The indifference curves for economic sectors are labelled ( $E_1$  and  $E_2$ ) and those for conservationists including the DEA are labelled ( $C_1$  and  $C_2$ ). The contract curve is the line NAIS-AIS.

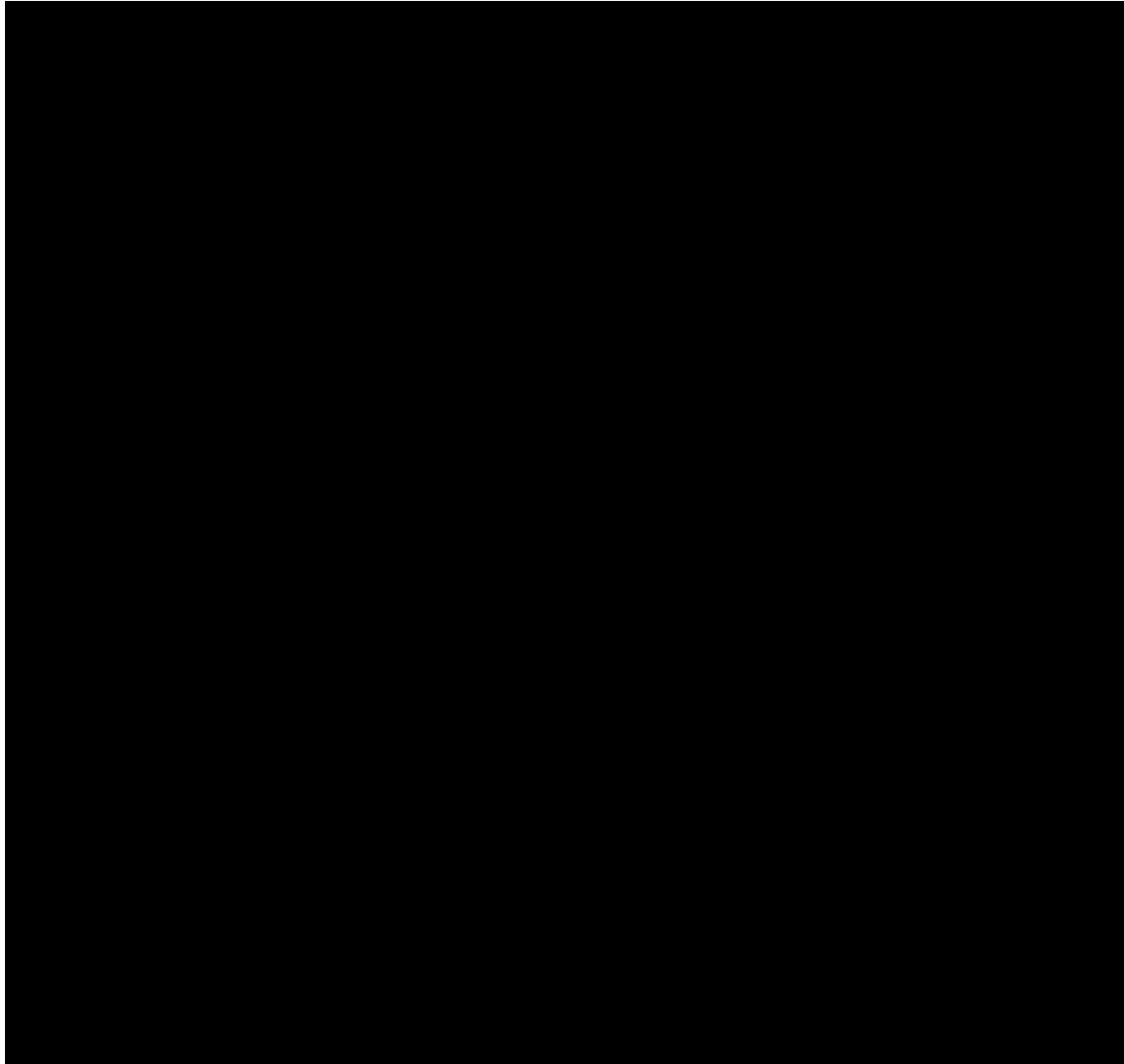


Figure 5-1: Sustainable use of species and financing of biodiversity conservation

*Source: Author's analysis*

Figure 5-1 can be interpreted as an arrangement for payment for ecosystem goods and services. Since the NEM:BA came into effect when it was legitimate to utilise alien/invasive species in South Africa, the starting position is AIS on the contract curve. Thus, a “grandfathering or first possession” approach is assumed (Libecap 2009, p.133), whereby AIS-based sectors are protected by a property rule by virtue of having prior-use over the

resources before the NEM:BA came into force (Bromley 1978b). The task is to reform institutions in such a way that the final institutional arrangement is one at NAIS where AIS at worst are to be eradicated and at best utilised within a payment for ecosystem goods and services framework. At NAIS, conservationists can be protected by a liability rule. While a property rule ensures that conservationists will not eradicate alien and invasive species without the consent of economic sectors, protecting conservationists with a liability rule imposes duty on economic sectors to utilise invasive species for as long as they compensate the conservationists for the biodiversity losses induced by the species they utilise (Bromley 1978b). Thus, at NAIS, a redistributive policy that imposes liability on economic sectors is envisaged. At NAIS, there is efficiency in exchange since the marginal rate of substitution (MRS) is equal for conservationists and economic sectors.

$$MRS_{\text{alien,indigenous}}^C = MRS_{\text{alien,indigenous}}^E = \frac{\text{Price}_{\text{alien}}}{\text{Price}_{\text{indigenous}}} \quad \text{Equation 5-1}$$

In this setting, conservationists will have to *extort* payment from AIS-based economic sectors because they are the ones now protected by a liability rule at NAIS. Daly and Giertz (1975, p.998) define extortion as

“the act of obtaining payments from some entity in return for not imposing upon that entity some harmful effect, where the generator of the external effect receives no direct net internal benefit from the act.”

The harmful effect in the present analysis is the eradication of the alien and invasive species upon which some sectors’ economic activities rely. Extortion is a process of economic coercion, conditioned on the relative degree of bargaining power (or liberty, as Commons (1942) would say), to obtain payment from another party that is not protected by a property or liability rule (Bromley 1978a; 1978b). It is possible to interpret extortion, from a monetary perspective, as a strategy for enjoining parties to internalise negative externalities caused by their activities. However, Samuels (1972b) argues that monetary prices are surrogates of the structure of rights and the distribution of power in society and, as such, extortion is essentially assenting to the reality that the party whose economic activities are imposing a social burden is the one whose rights count in public policy. Even after extortion, the real cost, which is the material flow in the form of an externality still occurs, thus it is an

issue of interdependence rather than externality (Samuels 1972b). That one's right is permitted to be a cost factor in others' decision processes is the real cost (Samuels 1972a; 1972b).

Since the conservationists have to extort payment from AIS-based sectors, they bear positive transaction costs in the process. They would demand a payment that although off the contract curve, will leave them just as well off as they would be on the contract curve. This means that they will demand HJ as payment. Notice, the price offer curve J is tangential to  $C_2$  at V. Being at V or at NAIS makes no difference to conservationists because they are equally well off at either position. However, AIS-based sectors are prepared to pay HK where the price offer curve K is tangential to their indifference curve at W.

The final equilibrium can be one in a range of potential outcomes, one of which is NAIS and many of which are off the contract and bounded by the price offer curves J and K. Since  $HK > HJ$ , it follows that a bargainable surplus exists equivalent to  $HK$  less  $HJ$ . Negotiation, therefore, centres on the control of the bargainable surplus. The magnitude of transaction costs determines the distribution of this surplus. The magnitude of transaction costs is a function of economic power (property and liberty) as well as tastes and preferences of the parties involved (Bromley 1978a, Commons 1942). At the limit, the transaction costs can only be as large as the bargainable surplus in which case extorting payment becomes unattractive. The smaller the transaction costs of extorting payment, the greater is the incentive to negotiate for as much of a share of the bargainable surplus as possible. This way, financing resources for biodiversity conservation are raised through sustainable utilisation of alien and invasive species. This leaves aggregate welfare higher because everyone is better off – the conservationists and the AIS-based sectors as well as society in general.

In effect, this conclusion resembles the *conservation levies* that Provincial Nature Conservation Authorities in South Africa collect from the hunting industry. In *SA Predator Breeders Association and Others v Minister of Environmental Affairs and Tourism, 2009*, Justice Van Der Merwe stated the “the financial benefits of the hunting industry comprised direct financial benefits such as ... revenue for provincial conservation authorities and *conservation levies*,” (emphasis added).

The conservation levies could then be used to finance conservation programmes, such as Working for Water and Working for Indigenous Biodiversity, among others. It must be remarked at this stage that the financing implications emanating from this analysis do not pass the neoclassical efficiency test. Petrick and Pies (2007, p.256) describe such an outcome as “the *establishment of an (attainable) institutional arrangement* that allows the realisation of mutual gains” to the extent that “policy is no longer guided by the desire to attain the ideal of a perfect market” (italics in original). The extorted amount is not the optimal one consistent with NAIS, which lies on the contract curve. Rather, it is a reasonable amount arrived at through deliberative valuation. It is here that the role of economic power comes into play. Conservationists have the environmental right (liberty) enshrined in the Constitution, section 24, and, therefore, could bargain with AIS-based sectors. AIS-based sectors have property rights and privileges to portions of the environment where they engage in their economic activities. They also have the environmental right (liberty). They can withhold their property interest from conservationists.

Because both parties have liberty, they enter into bargaining using the negotiational psychology of economic coercion or persuasion to arrive at a *reasonable extortion* (Albert and Ramstad 1998, Commons 1931, Hiedanpää and Bromley 2012). This is the concept of reasonable value/ just price (Dugger 1996a; 1996b). “Reasonable Value itself is nothing other than a coherent and pragmatic, albeit secularized, solution to the problem of just price,” (Ramstad 2001, p.254). Ramstad further characterises reasonable value “as a desideratum of public policy..., an imperfect *compromise* to be reached through an administrative process” (Ramstad 2001, p.272, emphasis added). He argues that it is “not a metaphysical entity discoverable through abstract logic, as is the case with the “optimal” or “efficient” outcomes serving as desiderata in mainstream practice” (Ramstad 2001, p.272).

The point to note here is that the conclusion reached in the analysis above resulted in a non-efficient compromise solution that, nevertheless, was a “workable consensus” (Commons 2009, p.743), which left all parties concerned satisfied. Reasonable value/just price is a product of discursive valuation rather than deductive reasoning that, in the neoclassical sense, underpins Pareto optimality analysis (Norgaard 2007, Waller Jr and Robertson 1991). It is a pragmatist’s approach to fair compensation. Dugger (1996b, p.429)

described the reasonable valuation outcomes that “all lay somewhere within the gap between what the conflicting interests in transactions actually wanted.” Similarly, conflicting interests in biodiversity conservation fall within the confines of reasonable valuation.

The Coasean approach, where the party without the property right has to *bribe* the party vested with the right in property to reduce the scale of a harmful activity or stop it completely (Coase 1960), would produce a stalemate. Bribe is the obverse of extortion. Conservationists pay the sectors utilising alien and invasive species to reduce their scale of operation. No institutional change would take place. Notice, in the Coasean approach, conservationists would offer to pay economic sectors a *compensating variation* (HJ) for them to reduce the utilisation scale of alien and invasive species. HJ is consistent with the conservationists’ welfare at V in order to move from the status quo institutional arrangement (AIS) to the desired institutional arrangement (NAIS) on the contract curve. However, economic sectors would consider their own welfare to determine whether to accept or reject the offer. In this case, they would be willing to accept HK, which conservationists are not willing to pay. Hence, to accept the offer (HJ) would generate a negative net compensating variation ( $HJ - HK < 0$ ).

The real issue that the reciprocity argument in the Coasean approach underplays is that optimality is a function of who first has the entitlement and, therefore, a function of the power structure and wealth distribution of society (Samuels 1972a; 1972b). The optimality just strengthens the status quo, which is to say no institutional change takes place, while the environmental problem still awaits redress.

#### **5.4. Reasonable legislation**

This section utilises the judicial decision in the first NEM:BA implementation case to discuss governance challenges that have undermined emergence of consensual regulations. The case is not about alien and invasive species, but provides important insights into the limited access policymaking order in the realm of rules in the NEM:BA processes. In *SA Predator Breeders Association and Others v Minister of Environmental Affairs and Tourism 2010*, South African courts had to decide the *rationality/reasonableness* of regulations made under the NEM:BA to regulate the hunting of captive bred lions. In particular, the

regulations made provisions to the effect that captive bred lions were not to be hunted until they had become self-sustaining after being released into the wild. The regulations stipulated a minimum period of twenty-four months as sufficient for these animals to become self-sustaining. Self-sustenance, by implication, meant that the lions would have become independent of the humans such that they would be food self-sufficient. However, the hunting industry argued that captive-bred lions lacked the capacity to become self-sustaining.

It also argued that adjusting the hunting freeze period from the conventional (3 days to 4 months) to 24 months before the lions are legitimately huntable, would cause irreparable economic ruin to the sector. Beyond the direct financial ruin, social provisioning would be curtailed and many livelihood opportunities and jobs would be lost. This ultimately meant the closure of this sector of the hunting industry. Thus, before the court was the question of whether the regulatory provisions being challenged would pass the *rationality/reasonableness test*.

In the Supreme Court of Appeal of South Africa, Justice Heher remarked that rationality/reasonableness was an indispensable element of administrative conduct so as “to avoid capricious or arbitrary action by ensuring that there is a rational relationship between the scheme which is adopted and the achievement of a legitimate government purpose”. It was also indispensable because it ensured that the administrative “decision is rationally related to the purpose for which the power was given”. Lastly, rationality ensured that “the action of the functionary bears a rational connection to the facts and information available to him and on which he purports to base such action.”

The Court’s interpretation of reasonable administrative action and legislation suggests two broad evaluative criteria. The intervention, firstly, must be capable of reasonably achieving the stated purpose. If an intervention is connected to some government purpose, but is not the most reasonable approach to achieving that purpose, it would fail the rationality test. For example, prohibiting an existing activity versus managing it to minimise negative impacts, while allowing sustainable use are two alternative approaches to governing an activity to achieve the same purpose, but have disparate implications. However, prohibition might not be the most reasonable approach even if it has a direct connection to the stated

government purpose. In most cases, finding acceptable win-win solutions is much more reasonable than prohibition (Dugger 1996b, Hiedanpää and Bromley 2002, Ramstad 2001).

Secondly, to be reasonable, the intervention must be science-based or evidence-based. This criterion safeguards against arbitrariness. On cross-examination, the Minister's, and his panel of scientists', justification of the 24 month-freeze on hunting failed to withstand judicial scrutiny. The hallmark of rationality is reasonableness. The court ruling suggests that rational official intervention is capable of being justified through "a particular game of giving and asking for reasons" (Price 2013, p.31). It must be demonstrable that the action is a justified and reasonable approach to the achievement of the state's ends-in-view and is informed by all available scientific facts.

Justice Heher further noted that

"The Minister's intention as expressed in that sub-regulation was to allow hunting of captive-bred lions to be pursued under the specified circumstances and not to make such hunting impossible or even impracticable. *But if there can be no real prospect that such lions will be able to look after themselves then there will be as little prospect of hunting being permitted* and the purported upliftment of the ban in [regulation] 24(1)(a) will be meaningless and [regulation] 24(2), in its present form, irrational" (emphasis added).

The Court's intuition was that since captive-bred lions were not to be hunted until the lapsing of at least 24 months at which point, purportedly, they would have become self-sustaining, yet scientifically they would never be so, the unperceived effect of the regulations was to shut down this sector of the hunting industry. The permitting arrangement became a phantom. It would amount to a property taking without fair compensation. Thus, the court ruled in favour of the appellants. The verdict was that the regulations were unreasonable/ irrational.

The foregoing judicial analysis corroborates the conclusion reached concerning Chapter 5 of the NEMB:A. It was shown that section 91 of the NEM:BA stipulates that a competent authority can issue a permit for utilisation of alien species *only if* the specimen has been proven to have no or negligible invasive potential. It was also shown that the majority of

alien species that are economically useful are mostly perceived and proven to be invasive species and, sometimes, highly invasive. From that perspective, section 91 of NEM:BA has the same effect as the regulatory requirement that captive-bred lions be hunted after they become self-sustaining which, scientifically, they would never be, thus effectively implying a shutting down of the concerned sector. The permitting provisions become both immaterial and irrational. Thus, the fifth chapter of the NEM:BA seems to be an unreasonable piece of legislation.

Responding to a query by Kloof Conservancy about delayed promulgation of AIS regulations, the Minister of Water and Environmental Affairs' (2012, p.1) argument corroborates the conclusion just stated. She wrote:

“Notwithstanding the invasive nature of some alien species, due consideration had to be given to the contribution of certain species to the national economy .... Therefore provision was made to regulate those invasive species to be listed in terms of section 70 of NEM:BA, in different categories, namely invasive species to be subject to compulsory control, to be managed in terms of species management programmes, or to be regulated by (demarcated) area or activity. However, *insufficient enabling provisions* in NEM:BA have posed a challenge as far as it relates to the implementation of regulations of such a comprehensive nature” (emphasis added).

The Minister's response states plainly that the NEM:BA, in its original intentions, never made provision for the sustainable use of alien and invasive species. Rather, guided by an eco-nationalistic ideology it focused on eradication and gradual elimination of alien and invasive species over time. Thus, the fifth chapter of the NEM:BA seems unreasonable from an economic point of view.

## **5.5. Conclusions**

Based on the foregoing analysis, the following conclusions seemed reasonable and inescapable. The NEM:BA's fifth chapter seemed to be internally inconsistent in terms of its value system, conceptual underpinnings, incentive structure and, to some extent, intent. The NEM:BA's fifth chapter seemed to be externally (comparatively) inconsistent with the Constitution of the Republic of South Africa 1996 and the National Environmental

Management Act (NEMA) 1998. The NEM:BA is deontological/ biocentric, but the NEMA and Constitution are consequentialist/ anthropocentric. The conspectus of the two dimensions of inconsistency leads to a dissonant institutional system that creates conflicting opportunity sets.

To the extent that the permitting provision accommodates alien species with negligible or no invasive potential, and many economically useful alien species have been scientifically proven to be invasive or suspected to be invasive, it follows that sectors relying on such species face an implied prohibition. The legislature failed to strike reasonable balance between conservation of indigenous species and sustainable use of alien and invasive species in the drafting of the Act in 2003. The definition of an invasive species underplays anthropocentric factors (social and economic considerations), but it concentrates on biocentric/ecocentric matters. Consequently, the restrictive stance of the Act foreclosed options for sustainable utilisation of species as well as sustainable financing of biodiversity conservation. The NEM:BA's fifth chapter seems to reflect an ideology of eco-nationalism (indigenous is good, alien is bad), notwithstanding the anthropocentric environmental governance dispensation upon which it claims to build. The conspectus of the scientific and lawmaking-political processes, through the discernible spirit of eco-nationalism, leads to the institutional isolation (marginalisation) of sectors that utilise alien and invasive species.

The concept of sustainable use, as defined in the NEM:BA, seems to be conceptually weak, restrictive of economic development and eco-nationalistic because it focuses exclusively on indigenous species. This leads the thesis to argue that the NEM:BA, insofar as governance of alien and invasive species is concerned, might be a less reasonable piece of legislation that has created uncertainty and risk, and has constricted investment. The ultimate conclusion of the thesis is that the NEM:BA might be such a disabling piece of legislation that the DEA cannot develop enabling regulations that are socio-economically progressive without first amending it.

With these conclusions, it is demonstrable that the NEM:BA, at the time of promulgation, might have potentially foreshadowed institutional isolation of sectors reliant on alien and invasive species even though at that time few interested and affected parties might not have perceived it. Read as an economic document, the fifth chapter of the NEM:BA is a

policy that dissuades the sustainable investment in, and use, of all biological resources insofar as alien species are excluded from the biological resource stock. Its economic rationale seems to be ambiguous. By restricting itself to sustainable use of indigenous biological resources, and declaring war on eco-terrorism as anti-alien lobbyists would say, the NEM:BA forecloses opportunities for sustainable financing of biodiversity conservation.

The study recommends that the implementers of the NEM:BA identify reasonable win-win solutions. A balancing mechanism is required. A reconstruction of the biodiversity concept in the NEM:BA is envisaged. As it stands, it seems too narrow to be facilitative of South Africa's economic reconstruction. In concluding, the study argues that, rather than it being the DEA failing to promulgate "sound enabling regulations" to make NEM:BA effective, it might be the NEM:BA that is so disabling that the DEA finds it difficult to promulgate sound enabling regulations. Under such circumstances, any attempt to promulgate sound enabling regulations is declared *contrary to the Act*. The regulations that rather are sound and enabling for the NEM:BA would be the type that requires blanket eradication of alien species and invasive species, which the DEA might be finding to be politically inexpedient to implement because they would be draconian.

With reference to the theoretical framework, reviewed in Chapters 2 and 3, one can conclude that the statutory content of the NEM:BA suggests a failure of reasonable/instrumental valuation during the enactment process. The strong biological nativism of the Act suggests that a unidisciplinary knowledge system, rather than a transdisciplinary knowledge system, informed the content. A defensible inference that the process of designing the NEM:BA was a limited access policymaking order seems reasonable, hence the disabling content. A dominant social imaginary was used to marginalise any other epistemological systems that could have contributed to better institutional design. The role of ideology (ceremonial knowledge) in shaping institutional change is evident in the statutory content of this Act.

Chapter 6 abductively investigates why the NEM:BA became a disabling piece of legislation as is now apparent in Chapter 5's findings. It takes an archaeological approach to the problem and reconstructs the legislative history of the NEM:BA.

*“Nevertheless, whoever leaves economic pressures out of history or out of the discussion of public questions is in mortal peril of substituting mythology for reality and confusing issues instead of clarifying them,” (Beard [1935] 2012, not paged).*

#### **6.0. Introduction**

Until now, the study has identified a pattern of institutional dissonance in the legal foundations of environmental governance. It has also identified in the NEM:BA a phenomenon of institutional isolation of sectors that utilize alien species and invasive species. It derived seven contextually validated conclusions. In summary, the conclusions covered aspects such as internal inconsistency of the NEM:BA’s fifth chapter and the external inconsistency of the NEM:BA’s fifth chapter relative to the NEMA and the constitutional environmental governance framework. It also concluded that eco-nationalism pervaded the fifth chapter of the biodiversity legislation. Finally yet importantly, the thesis observed the absence of enabling provisions for utilisation of alien species and invasive species that historically played, and continue to play, a socio-economically important role.

The objective of Chapter 6 is to reconstruct the interests (influences on public policy) that might have shaped the NEM:BA’s fifth chapter into the controversial piece of legislation that it has become. The result is an identification of “social groups, ideologies, and discourses” that dominated biodiversity legislative processes (Weaver-Hightower 2014, p.116). Could the sources of the incoherence be rooted in history? Could it be a recent paradigm shift in conservation thinking? The chapter demonstrates that the NEM:BA was predominantly shaped by the administrative preferences of the directorate that presided over the drafting of the Act. Chapter 6 is organised as follows. Section 6.1 presents method of analysis. Section 6.2 presents emerging views in conservation thought in the 1980s. Section 6.3 reviews the NEM:BA enactment process. Section 6.4 synthesises the findings and section 6.5 concludes the chapter.

### 6.1. Data and Method of analysis

To deconstruct policy influence, Chapter 6 utilised South African National Scientific Programmes (SANSP) reports (number 61 of 1982, number 72 of 1983, number 118 of 1985 and number 144 of 1988) that focused on alien and invasive species. The study also utilised public hearings that the Department of Environmental Affairs (DEA) and the Environmental Affairs and Tourism Portfolio Committee conducted in 2003 during the drafting and enactment of the NEM:BA. An internal document that the DEA produced which tabulated its responses to submissions by interested and affected parties was also used. It was accessed from the Parliamentary Monitoring Group Website. Lastly, three of the study's key informants occasionally alluded to one historical aspect or another of the evolution of biodiversity conservation thinking and legislation in South Africa and, so, the chapter occasionally used interview data. One of the interviewees was a senior official in the DEA and two of them were academic authorities in aquatic and fisheries sciences.

Two major epochs are discernible from the NEM:BA processes – the two decades (1980-2003) of the evolution of scientific/policy thought on how to regulate alien and invasive species prior to the NEM:BA and the NEM:BA drafting/enactment process (2003-2004). The analysis first synthesized scientific/policy thought characteristic of the 1980s and 1990s prior to the NEM:BA. The NEM:BA enactment process was subsequently analysed.

The researcher coded the arguments raised in the data sources using Weaver-Hightower's (2014) definition of an argument, which was discussed in Chapter 4. From the coded arguments, an agreement score was computed. It was computed as

$$\text{agreement (or disagreement) score} = \frac{\text{number of codes that agree (or disagree)}}{\text{total number of codes (=12)}} \times 100$$

Equation 6-1

### 6.2. Emerging biodiversity conservation thought

Fifty-eight overlapping codes emerged from coding the SANSP reports. Related codes were merged, leading to 12 ultimate codes. The codes were grouped into definitional issues, institutionalisation of biological invasion research, value framework, and envisaged regulatory framework (Table 6-1).

Table 6-1: Summary comparison of pre-NEM:BA and NEM:BA enactment process

Aspect	Task Group for Invasive Biota (TGIB) 1980s	NEM:BA 2004	NEM:BA Enactment process
Alien species	Standard definition plus political origin	Standard definition	Standard definition; groups claimed it was wide and unscientific
Invasive species	Standard definition and equal emphasis on ecological and economic impacts	Standard definition but underplays economic impact and overplays ecological impacts	Standard definition but groups advocated for linking it to scale of invasion and propagule pressure
Focus of research	Politically alien species	Indigenous species	Groups lobbied for research on invasives to inform policy measures
Environmental creationism	Yes, with propaganda campaigns by botanical societies and conservation authorities against invasive alien species	Yes, strong anti-alien stance	Yes, strong anti-alien stance led by botanical societies
Value framework	Partly consequentialist; partly deontological; partly virtue ethics	Deontological	Deontological ; some traces of consequentialism
Science driven policy	Yes, explicit focus	Implied	Majority lobbied for a science-based approach
Trade-offs	Strategic intention	No	Groups lobbied for trade-offs
Zonal system	Major institutional mechanism	Intended but delegitimized by anti-alien stance in NEMBA	Groups warned that Act will fail without zonal system
Determination of invasiveness	Explicit scientific criteria	Implied but too vague	Groups recommended focus on scale of impact and propagule pressure
Cost benefit analysis	Indispensable	Provided for in the NEMA	Yes, case by case assessment of aliens
Sustainable utilisation	All species- alien and indigenous	Only indigenous	All species- alien and indigenous
Financial incentives/ disincentives	Subsidies for landowners to eradicate invasive species	Financial penalty for actual invasions	Subsidies; financial guarantees for introducing aliens

*Source: Compiled by the author from the South African National Scientific Programmes Reports (1982, 1983, 1985, 1986); the NEM:BA of 2004; NEM:BA Bill 2003 and public hearings.*

Summarily, the agreement score between the approach of the Task Group for Invasive Biota (TGIB) and submissions by interested and affected parties during the NEM:BA enactment process was approximately 75% (Table 6-1). There was agreement on definition of an invasive species; the use of science-based approaches; balancing mechanisms; need for zonal system; determination of invasiveness, need for cost-benefit analysis; sustainable use of all species and financial incentives for managing invasives. While there was agreement on determination of invasiveness, the submissions during the enactment process only considered two of the five parameters that the TGIB discussed in the 1980s (Macdonald and Jarman 1985), which are discussed below. Similarly, on financial incentives, the submissions had more novel ideas than the subsidies that the TGIB proposed to incentivise landowners to control invasive species on their land because subsidies were likely going to fail because of moral hazard.

The agreement score between the promulgated NEM:BA provisions and the TGIB's views was 33.3% (Table 6-1). There was agreement on political dimension of alienness; traces of environmental creationism; deontological value framework and the need for cost-benefit analysis in biodiversity policy decisions. On the other hand, the agreement score between the submissions by interested and affected parties and the content of the NEM:BA of 2004 was 25% (Table 6-1). There was agreement on traces of environmental creationism, deontological value framework and the need for cost-benefit analysis. Detailed examination of these patterns follows.

### **6.2.1. Definitional issues**

In keeping with the global shift in conservation thinking, it was a consensual observation that the spread of alien and invasive species was becoming a globally significant problem (De Moor and Bruton 1988, Ferrar 1983, Ferrar and Kruger 1983, Moran and Moran 1982, Siegfried and Davies 1982). The formative definitions of alien species and invasive species were quite similar to the definitions in the NEM:BA. An invasive species was defined as one that had the "ability to establish self-sustaining populations in natural communities, with tendency to dominate the host community" (Ferrar and Kruger 1983, p.5). The emphasis was on self-perpetuation and the ecological impact of a species. This definition excluded aspects of socio-economic invasion, but entirely focused on ecological aspects.

An alien species was defined as “a species remote from its centre of origin, *usually* from a different continent or subcontinent” (Ferrar and Kruger 1983, p.5, emphasis added). De Moor and Bruton (1988, p.2) defined an alien species as “an introduced species from outside the boundaries of Southern Africa.” The definitions gave weight to the political origin of a species in addition to the ecological origin. Recent thinking in the NEM:BA process has developed new terminology that seems to concur with this definition. An indigenous species translocated within South Africa now is called an extralimital species rather than an alien species (Ellender and Weyl 2014). By defining a translocated indigenous species as extralimital, conservation authorities have latitude to ignore such species even if they are invasive and focus on politically alien species that are invasive. Some references in the SANSP reports reveal the focus of the TGIB on political origin of species.

“Although the Working Group for Invasive Biota is *mainly* concerned with alien invasive species, information on translocated indigenous species has also been included as they are also foreign to their new environment and may cause severe environmental problems there,” (De Moor and Bruton 1988, p.2, emphasis added).

Bruton and Merron (1985) also expressly state the same scientific orientation in the TGIB. To the TGIB, translocated indigenous species really were not alien species, hence not deserving urgent scientific attention. This seems to indicate that less weight was assigned to research on invasion processes associated with translocated indigenous species. The recent concept of extralimital species seems to build on this historic conceptual strategy by which the TGIB problematised alien and invasive species politically. This concept seems to corroborate the claim that an ideology of eco-nationalism drives the NEM:BA alien and invasive species regulatory reform processes (Brown 2013).

To the extent that effects of invasion are indistinguishable along lines of translocated indigenous species and politically alien species, as they *pose the same threat*, it begs the question of why the species are differentiated if the focus is on the damage caused rather than the origin of species (Davis *et al.* 2011, Warren 2007). Ferrar and Kruger (1983, p.5) provide some clues revealing that “Propaganda campaigns organised by botanical societies and the [provincial] conservation authorities ... resulted in a strong “anti-invasive alien

plant” groundswell.” Thus, a mobilization process accentuated a well build-up opinion in a large section of the activist, policy and scientific community against invasive alien species.

The epistemic community that managed to partner with governmental agencies not only shaped the ideological climate and climate of ideas, but also physically participated in the decision making process. The holders of scientific knowledge and the issuers of the sanction of ignorance determined the nature and extent of institutional adjustment. The role of knowledge, ideology and propaganda in driving institutional change is self-evident in this account (Ayres 1996, Denzau and North 1994, Galiani and Sened 2014, North 1990). It was around the mid-1980s that campaigns against alien fishes such as trout also began (Crass 1986b, Skelton and Davies 1986). The propaganda, which started in terrestrial ecosystems, soon spread to aquatic ecosystems.

### **6.2.2. Value framework**

Since the formative times of the invasion biology research programme in South Africa, a mixture of value frameworks is observable. One group was “concerned with the survival of species of plants and animals for their own sake” (Siegfried and Davies 1982, p.4). Here non-human species were assigned ultimate intrinsic value, hence a deontological framework. This is the position botanists maintained since the 1980s, which the NEM:BA ultimately assumed. Yet, another group maintained a consequentialist view, namely that “[c]onservation is for people and about people. If there were no people, there would be no need for conservation. People are conservation’s beneficiaries,” (Siegfried and Davies 1982, p.4). The point here is that adverse consequences on human welfare were to be avoided. Thus, the environment was managed in the interest of generating desirable consequences for humans.

“Transformations of larger parts of the earth’s surface and significant modification of much of the remainder are therefore inevitable. The challenge for management is to ensure that such transformations and modifications do not create biological deserts...,” (Siegfried and Davies 1982, p.5).

This view indicates that it was impossible to maintain an unaltered ecological system, because humanity had become too technologically advanced not to modify the ecological systems (Swanson 1994). An anthropocentric inclination defined this view, focusing on how

people derive “[i]nspiration, art, poetry and song, dance, religion and ritual, recreation and refreshment” from animals and plants (Siegfried and Davies 1982, p.6). This group’s views foreshadowed the NEMA’s provision for environmental governance that requires the placement of people at the forefront of its concerns so that it addresses their cultural, developmental, physical, psychological and social needs and interests equitably.

### **6.2.3. Institutionalisation of biological invasion research**

With the establishment of the Scientific Committee on Problems of the Environment (SCOPE), South African conservation and invasion biologists assumed an instrumentally leading role (Peretti 1998; 2010). The need to institutionalise invasion biology research in South Africa subsequently emerged (Ferrar and Kruger 1983). The TGIB was established in 1980 and its mandate was to generate and systematise knowledge on invasions and engender a science-based biodiversity governance framework (Ferrar and Kruger 1983).

#### ***a. Dimensions of the TGIB’s biological invasion research programme***

The research programme was multidimensional in that it focused on the “biogeography of invasions”, “autecology of invasive species”, “characteristics of invaded ecosystems”, “impacts of invasions on natural and semi-natural ecosystems” and “systems for management and prevention” (Ferrar and Kruger 1983, p.9-11). Thus, the programme focused on ecology of biological invasions, socio-economics of invasive species and a possible regulatory framework that would strike a balance between conservation of indigenous biota and socio-economic utilisation of alien and invasive species (De Moor and Bruton 1988, Ferrar and Kruger 1983, Macdonald and Jarman 1985).

The programme was to establish characteristics of resilient and vulnerable ecosystems, reasons why they were resilient or vulnerable and “the factors [that affected] the rate and extent of recovery of an invaded ecosystem during and after eradication or control of the invading species” (Ferrar and Kruger 1983, p.10). The TGIB endeavoured to develop “ecologically sound management strategies for tackling the problems of invasion” (Ferrar and Kruger 1983, p.2). Since the maintained view was that invasive alien species with socio-economic significance were to be utilised within a zonal system, the starting point was to identify the invasive attributes of species in order to inform control measures (Ferrar and Kruger 1983).

### ***b. Invasive species listing criteria***

The TGIB was not under any illusion about the difficulties of controlling and eradicating invasive aliens and, therefore, scientifically sought to establish “threat criteria or impacts of invasions [that could] be used to rank invasive species” (Ferrar and Kruger 1983, p.11) as a basis for prioritising eradication/control interventions. Macdonald and Jarman (1985) discussed a typical prioritisation framework that was used to determine the degree of invasiveness of a species and, thus the decision to declare it invasive or not. The listing criteria for invasive species focused on aliens that had “established self-sustaining populations in areas of indigenous vegetation and which are considered to be having *significant* environmental or economic impacts” (Macdonald and Jarman 1985, p.3, emphasis added). The framework was a two stage process, the first of which was a less rigorous *a priori* sorting of species into three categories: “very bad, medium or not so bad” (Macdonald and Jarman 1985, p.27). The second stage then applied criteria that were more rigorous and Macdonald and Jarman (1985, p.20) defined the parameters of the listing criteria as follows:

A = current degree of species infestation (propagule pressure)

B = degree of difficulty in controlling the species given the current state of technology

C = Extent of potential habitat for the species

D = the potential rate of spread [range extension] of the species

E = the degree of impact of the species in the invaded area

The novelty of this invasive species-listing framework was that the TGIB weighted the five parameters. The TGIB assigned a weight of half-unity to A and B, a double weight to C and a weight of unity to D and E. Thus, the TGIB defined the importance value (I) of a species as

$$\mathbf{I = 0.5A + 0.5B + 2C + D + E} \qquad \text{Equation 6-2}$$

The framework had both spatial and temporal dimensions. To the TGIB, it mattered most that a species had abundant potentially colonisable habitats since it is inherent in the invasion process that a species must be expanding its distribution range (the spatial dimension). The historic and innate rate of extension of the distribution range (the temporal dimension) (D) as well as the degree of damage caused by the species (E) mattered as the second weightiest parameters. The higher the importance value of a species the greater the

priority the TGIB placed on its listing for control and eradication. Thus, the criteria focused on relative degree of damage caused and potential damage a species was likely to cause. Only species with large importance values qualified for listing. This guaranteed a shorter and more economical list of controllable invasive species than what blanket listing prescribed.

The criteria, however, focused on ecological parameters only. The framework excluded socio-economic criteria although the focus was on species with “significant environmental or economic impacts” (Macdonald and Jarman 1985, p.3). Therefore, it is unclear what parameters determined the degree of economic impact and whether economic impact was ever considered beyond mere acknowledgement. The TGIB was aware that the “[n]ature of a threat, as well as its recognition, often involves complex interacting ecological and social factors,” hence policymakers had to consider the interactions in “developing policy and programmes for conservation” (Siegfried and Davies 1982, p.12).

De Moor and Bruton (1988) considered the case of aquatic species that had socio-economic value of some sort either to the local, regional or national economy. They proposed an ecological-economic listing framework. The four categories comprised pest species, nuisance species, equivocal species and beneficial species. A pest species was one with a “major negative impact on the environment and does not have any [socio-economically] desirable attributes” (De Moor and Bruton 1988, p.2). A nuisance species, on the other hand, was one for which “its negative [environmental] impact generally outweighs any positive [socio-economic] attributes which the species may have” (De Moor and Bruton 1988, p.2).

They found in existence equivocal species, which they defined as “species which are known to be extremely harmful, but may be of some value to certain interest groups” (De Moor and Bruton 1988, p.3). Such species were “detrimental under some circumstances or in some localities and beneficial in others,” (De Moor and Bruton 1988, p.3). Finally, Bruton (1986, p.2) defined beneficial invasive species as a “classical environmental dilemma, and one which needs to be viewed from different angles in order to achieve a balanced perspective” because it simultaneously has a major economic contribution and major negative environmental impacts in the same locality. Policymakers still needed to manage

the concomitant environmental impacts. Management of such species was a wicked policy problem (Balint *et al.* 2011, King 1993, Rittel and Webber 1973).

To list a species under any of the four categories, deliberative scientific consensus determined “whether the impact of the species, be it detrimental or beneficial, has been *major, minor or unknown*, or whether it is considered that it will have a *potential major impact should it extend its range*” (De Moor and Bruton 1988, p.3, emphasis added). The four categories (pest, nuisance, equivocal and beneficial) approximately fitted into Macdonald and Jarman’s (1985) second stage, since they defined the degree of damage caused by a species.

Macdonald and Jarman’s (1985) framework, however, was more applicable to terrestrial systems than it was to aquatic ecosystems, which are continuums. As Ferrar and Kruger (1983, p.7) emphasise, “Invasive species other than vascular plants have received very little attention and research to date is therefore inadequate in this respect.” The Federation of Southern African Flyfishers (FOSAF) 2013) argued that the NEM:BA was terrestrially biased, thus making it difficult to implement in aquatic ecosystems. It seems that the terrestrial bias of the NEM:BA has historical roots in how invasion biologists mostly focused research efforts on terrestrial floral ecosystems. Some aquatic invasion biologists, for instance Ellender and Weyl (2014), have also acknowledged the infancy of aquatic invasion research in South Africa.

### ***c. Benefits of eradication and control measures***

The TGIB emphasised how indispensable it was to conduct cost-benefit analysis in evaluating eradication or control of “*major invaders, including the environmental impacts of the control measures themselves*” (Ferrar and Kruger 1983, p.11, emphasis added). The TGIB understood that every intervention had established and hidden costs and benefits. The benefits of such intervention programmes would be in the realm of provision of public goods and conservation-related jobs (Macdonald and Jarman 1985). Other beneficial considerations in the view of the TGIB included the economic use of biomass of invasive biota in economic activities such as furniture production. Direct costs of such interventions would include financial costs of running the eradication and control programmes (Moran *et al.* 2013). However, another set of costs that often escaped consideration was the socio-

fiscal implications of the interventions on the tax base and employment if they targeted an economically beneficial invasive species.

***d. Socio-economic regulatory framework of invasive alien species***

From the inception of the TGIB, balancing mechanisms were considered in every discussion on management of invasive alien species. The TGIB recognized that “[s]everal of these [invasive] species are of considerable economic importance in agriculture, forestry, fisheries and other forms of rural activities” (Ferrar and Kruger 1983, p.1). Similarly, Siegfried and Davies (1982, p.11) emphasised that the “*ultimate problem ... is almost always related to development policy and the long-range use of natural resources and, although such ultimate problems require most attention, they are the most neglected*” (emphasis added). Thus to ensure that such ultimate problems are not neglected, the TGIB sought balancing mechanisms that simultaneously promoted both conservation of indigenous biota and utilisation of invasive alien species. To that effect, two major questions occupied the TGIB in its research programme.

“What *options* are available for control when the *invasive* species is *simultaneously* a useful crop or otherwise valuable asset in the *same region*? How can *control systems* be developed when invasive species are *useful and desirable in one area but undesirable elsewhere*?” (Ferrar and Kruger 1983, p.11, emphasis added).

The kind of questions that guided the search for a consensual biodiversity governance framework focused on identifying win-win solutions. The first question dealt with what Bruton (1986) called classical environmental dilemmas (wicked problems) because the species was economically beneficial, but at the same time invasive in the same geographical area. The second question was the basis of zonal systems whereby environmental authorities granted permission for economic utilisation of an invasive alien species in one region, while they proscribed it in another region.

The formative institutionalisation phase of invasion biological research in South Africa sought to attain conservation objectives, while promoting ecologically sustainable and justifiable socio-economic development that relied on alien and invasive species. The TGIB framed the sustainable utilisation of species within the context of coordinated land uses that would facilitate minimisation of the impact of invasive species. The concept of

sustainable utilisation was much broader than the one in the NEM:BA, which focuses on indigenous species only. Land use coordination, to the TGIB, meant creation of zonal systems (spatial property and use rights systems) that would facilitated differential treatment of species so that economic agents could sustainably utilise invasive alien species without sacrificing the objective of conserving indigenous biota. Zonation would facilitate “the differential investment of control effort in different portions of an alien [species]’ distribution range” (Macdonald and Jarman 1985, p.57).

The envisaged regulatory framework would create zones in some of which the first priority was “total eradication”; the second priority was “eventual elimination”; and third priority was elimination from protected areas only (Macdonald and Jarman 1985, p.58). As Macdonald and Jarman (1985, p.76) discussed, “zonation would also allow for permissible use of a species within an area where infestation is already severe, in cases where invader species are valued by one sector of society.” Therefore, the TGIB considered demarcation of zones to “improve the practicality of legislative control [of invasive species]” (Macdonald and Jarman 1985, p.76).

Since in some cases such demarcated zones already existed, but were serving non-conservational purposes, the TGIB maintained that a rational approach was to de-proclaim some invasive alien species by removing legal protection as well as restricting the number of demarcated areas where aliens are protected/permitted (Macdonald and Jarman 1985). De-proclamation of trout waters in the mid-1980s was a typical application of this wisdom. However, it generated media and academic ‘trout wars’ amongst fly-fishers, conservation authorities and some scientists (Crass 1986b). The problem was that colonial pecuniary institutions had allocated environmental entitlements and privileges that guaranteed protection of alien species of interest to some beneficiary groups, but at the expense of indigenous species. De-proclamation would result in redistribution of socio-economic advantages from the formerly privileged by revoking some of the colonially entrenched environmental entitlements. Demarcation of sensitive and non-sensitive waters eventually resolved the wars (Brown 2013, Skelton and Davies 1986).

### 6.3. NEM:BA's enactment process

While coding the public hearings and the DEA's internal document, an unusual observation was that there was little discussion on chapter 5 of the NEM:BA in 2003 except a few references to definitional issues and exemptions. Ten organizations (some of which were joint advocacy efforts of several organizations) submitted their positions to the Environmental Affairs and Tourism Portfolio Committee. The majority of the submissions focused on bioprospecting of genetic resources and genetically modified organisms. The submissions, much less, focused on economic issues related to invasive species.

Only twelve codes emerged from the analysis and were categorized into definitional issues, NEM:BA-NEMA conflict, value framework, differential treatment of invasive species and socio-economics of regulating alien species and invasive species and financing of biodiversity conservation. Of these twelve codes, the DEA agreed with interested and affected parties on three of them (a disagreement score of 75%, Table 6-1). Considering that on the three agreed submissions only one was already implicit in the Bill and two were never subsequently implemented, it follows that the effective disagreement score was 91.7% (Table 6-1).

#### 6.3.1. Value framework

Environmental non-governmental organizations (ENGOS) made submissions to the effect that the Biodiversity Bill explicitly ought to have included the intrinsic value principle. The Animal Welfare Community, a consortium of ten ENGOS, submitted an all-encompassing position on intrinsic valuableness of all life forms. The Animal Welfare Community (2003, not paged) considered the Biodiversity Bill to represent "a *utilitarian* and *purist* view of biodiversity" because it excluded the intrinsic value principle, which is a deontological framework. Thus, the group believed that "without this principle, the Bill as currently formulated is *completely utilitarian* in the sense that it focuses merely on conserving biological diversity because of *its use or value to humans*," (emphasis added).<sup>3</sup> The ENGOS had two key paradoxical views, namely, that the biodiversity bill was consequentialist and had a semblance of strict biological nativism (purism). Concerning consequentialism, Justice for Animals (2003, not paged) argued that the Bill made animals "the property of humans",

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<sup>3</sup> The Biodiversity Bill and the Protected Areas Bill were jointly debated and interested and affected parties submitted comments or represented their interests at public hearings in respect of both Bills.

yet “animals are sentient beings with *inherent value in themselves*, whose lives are not reducible to *whatever value humans might place on them*” (emphasis added).

By arguing that the lives of animals were irreducible to utilitarian value, ENGOs pushed for a deontological framework in which animals had the same inviolable moral rights as humans do. They placed equal ultimate intrinsic value in animals as in people. Since the Bill sought to eradicate alien species, the ENGOs, presumably zoocentrists as their policy views suggest, argued that it was purist (Simberloff *et al.* 2013). They maintained that not all alien species were necessarily bad. The Bill, ENGOs argued, empowered governmental agencies to “make *arbitrary* decisions regarding the management of... non-indigenous wild animals who are free-roaming and living in areas of South Africa... and non-indigenous wild animals... bred for *commercial* purpose,” (Justice for Animals 2003, not paged, emphasis added).

To these submissions, the DEA (2003, not paged) responded by emphasising that it was “[n]ot recommended as principles are dealt with in NEMA.” Implicit in this statement was an agreement with the ENGOs that animals had intrinsic value just as the humans do. The difference was in the express content of the Bill. The DEA did not respond to the argument that the Bill was purist. The DEA (2003, not paged) argued that the “purpose of the legislation is to regulate for the conservation of *South Africa’s* biodiversity and this is the paramount objective. Exotic species should be conserved in their range states” (emphasis added). Since there existed no ecological space for conservation of alien species even those that were regarded as livestock, chances that eradication would be justified against any alien species were relatively high. The DEA’s response confirms the claim that a spirit of eco-nationalism guides the NEM:BA and this is captured by the possessive expression “*South Africa’s* biodiversity”, which evidently refers to indigenous biological resources.

### **6.3.2. NEM:BA overrides NEMA**

The thesis has so far concluded that the NEM:BA’s fifth chapter is externally inconsistent with the NEMA and the Constitution. The Animal Welfare Community (2003, not paged) also argued that the Biodiversity Bill created “a significant and potentially fundamental exception which undermines NEMA’s principles” insofar as it stated that

“In the event of any conflict between a section of this Act and (a) *any other* national legislation in force *immediately* prior to the date of commencement of this Act, *the*

*section of this Act prevails* if the conflict specifically concerns the management of biodiversity or indigenous biological resources” (NEM:BA, section 8(1), emphasis added).

It is obvious that the National Environmental Management Act (NEMA) of 1998 qualifies into the category “any other” and the category “in force immediately prior”. Thus, where the NEMA is anthropocentric and the NEM:BA is biocentric/ecocentric, the Bill proposed that the section (such as its fifth chapter) would always prevail. The DEA (2003, not paged) dismissed the argument by the Animal Welfare Community because “the issue [had] been approved by the State Law Advisers who did not see any conflict”. However, a decade after the NEM:BA became law in 2004, the inconsistency between the NEMA and the NEM:BA continued to haunt implementation of chapter five.

### **6.3.3. Definitional issues**

Convergence of mental objectification of participants in a policy process depends on agreement on a minimum set of definitional issues that help focus attention. The Friends of the Tahr queried the definitions of alien and invasive species in the Bill because the definitions of alien and invasive species were “*wide and unscientific*” and assumed that “*any alien species is invasive or potentially invasive per se, i.e. by definition of its ancestral ethnic origin*” (DEA 2003, not paged, emphasis added). The Friends of the Tahr also argued that there was “no burden or criteria on the management authority to scientifically establish the invasive threat or the extent of the threat” (DEA 2003, not paged, emphasis added). The argument was that there was “no requirement that invasiveness be linked to “*scale*” of the invasion” (DEA 2003, not paged, emphasis added). The argument was that “regardless of the “*density*” of the species the management authorities have the capacity to declare a species as invasive” (DEA 2003, not paged, emphasis added). The DEA (2003, not paged), however, maintained that “the definition[s] adequately address the issues relating to the purpose of the bill.”

### **6.3.4. Differential treatment of invasive species**

One of the most comprehensive submissions related to a differential approach to invasiveness. The major view was that the Biodiversity Bill failed to differentiate degrees of invasiveness (DEA 2003). A graded approach to invasiveness would facilitate prioritisation of species to eradicate, to prohibit and to permit if they had socio-economic significance. As

the Bill stood, whether a species had socio-economic significance or not mattered little. What mattered was its invasiveness and, much less, the degree of invasiveness. An organisation called Integrated Biodiversity Solutions submitted that the major weakness of the fifth chapter of the NEM:BA was

*“the lack of differential treatment of invasives and/or activities relating to invasives, to allow for geographical uniqueness... Without this management direction, effective management of invasive species will remain an ever elusive and extremely costly mirage and the bill will fail in this sector as spectacularly as did similar provisions of CARA, of which current provisions of the bill is a rehash”* (DEA 2003, not paged, emphasis added).

Perhaps, Integrated Biodiversity Solutions' view was the most accurate prediction of all considering that it is precisely the failure to differentiate degrees of invasion that subsequently made it difficult to implement the fifth chapter of the NEM:BA for nearly a decade since the NEM:BA became law in 2004 (Bashoff 2013a; 2013b, Minister of Water and Environmental Affairs 2012). Implementation failed right where Integrated Biodiversity Solutions perceived the fault line was. While precedent of such a framework having failed under the Conservation of Agricultural Resources Act (CARA) of 1983 was known to the DEA, it still chose to promulgate the same system.

The default position of the NEM:BA was to eradicate every species listed as invasive. If a systematic and scientific framework for listing species were available, then relative invasive impact would determine eradication and listing priorities. Only those species with *major* invasive impact would deserve listing, whilst the rest would be managed as mere aliens under a strictly enforced permitting system that required risk assessments (environmental impact assessments) to be conducted. Integrated Biodiversity Solutions' submission suggested a zonal system that accounted for regional ecological and climatic differences and, thus regionally differential invasive capacities of species. The DEA acknowledged the recommendation, but never subsequently acted upon it.

It was not until 2013 that the DEA amended the NEM:BA in line with Integrated Biodiversity Solutions' submission to allow for a zonal system. There seemed to have been some

powerful forces that had rigidly predetermined the content of the Act insofar as alien and invasive species were concerned. In the interviews, the senior official of the DEA stated:

“We are now empowered to differentially treat invasive species by the changes to NEM:BA. So, the problem was that we had an Act that was *not well drafted...* [and] *the science behind it was very fundamentalist*. But we are trying to take a *pragmatic approach* to how we regulate against invasive species... So, there was some *very theoretical, impractical thinking* in those who drafted this [NEM:BA] Act and it’s been a problem for us” (Expert 1 2014, *pers comm*, emphasis added).

The NEM:BA itself as already established was a badly drafted piece of legislation insofar as there were internal inconsistencies in the Act. The Act had theoretical novelty that nonetheless was impractical. The NEM:BA, much more so, was built on a fundamentalist scientific ideology. Fundamentalism defies reason. Bromley (2012, p.14) argues that “reason liberated us from the tyranny of imposed ideas” Bromley (2007, p.680), which an instance of an exclusive epistemological system. Degnbol *et al.* (2006, p.534) describe fundamentalism as “painting the floor with a hammer”, “technical fixes” and “tunnel vision”. Ostrom and Cox (2010, p.451) define fundamentalism as a “panacea problem” by which they mean scientists approach complex socio-ecological problems in a deterministic fashion and recommend linear solutions to policymakers and legislators.

The fundamentalist position of the NEM:BA’s fifth chapter required a blanket eradication of alien and invasive species alike, unless exempted at the discretion of the Minister. The Friends of the Tahr recommended that the “blanket eradication of alien species, other than those exempted... should be avoided and that species be evaluated on a case-by-case basis” (DEA 2003, not paged). While the DEA acknowledged the recommendation, it never subsequently amended the provision. A case-by-case approach would have promoted a more evidence-based, balanced and scientific approach to biodiversity governance.

The senior official’s point about the substantive content of the NEM:BA’s fifth chapter is concerned with a fundamentalist ideology that shaped the text. It seems such fundamentalism is a recent phenomenon because the discussion of the scientific and policy thought of the 1980s revealed a determined search for win-win and practical approaches to

management of biological invasions without unnecessarily constraining economic utilisation.

### **6.3.5. Socio-economics of invasive species and exemptions**

The Biodiversity Bill made a permit a compulsory requirement for anyone to utilise alien species. The Bill partly relaxed the provision providing that it did “not apply to an alien species which immediately before that section took effect was lawfully utilised in the Republic for the production of agricultural products.” However, some interested and affected parties perceived some ambiguity in the provisions when evaluated in the entire scheme of the Biodiversity Bill.

Forestry South Africa (2003, not paged) submitted that the NEM:BA’s fifth chapter failed to provide “an exemption for commercially grown tree species that have received permission to be planted in terms of *other* legislation” (emphasis added). Important to Forestry South Africa was the need for an explicit exemption of invasive species that served commercial purposes. Forestry South Africa, like other commercial players, grappled with species that were declared invasive despite their economic worth. Since these commercial agricultural species were regulated as economically useful invasive species under the Conservation of Agricultural Resources Act (CARA) of 1983, Forestry South Africa (2003, not paged) considered the Biodiversity Bill to add to the regulatory burden, which would increase transaction costs of compliance and render economic activities based on such species less viable. The South African Nursery Association (SANA) viewed the entire issue as a diminution of existing economic rights (DEA 2003). The SANA took note of the fact that much of what is cultivated or reared is non-indigenous, but the NEM:BA had an anti-alien stance.

The Botanical Society of South Africa, however, submitted that the “provisions of the Bill relating to alien and invasive species need to be *significantly strengthened* to fill the gap left by the *dilution* of the provisions of CARA” (DEA 2003, not paged, emphasis added). While economic players viewed the Bill as unduly burdensome and ambiguous insofar as economic utilisation of alien and invasive species was concerned, conservation interests considered the Bill to be porous. Provision for economic utilisation was equated to dilution. To the recommendations of economic interests, the DEA (2003, not paged), however, counter-

argued that they were not acceptable because no “blanket exemption for any alien species ... [and] ... no blanket exemption for any organisation is considered.”

### **6.3.6. Balancing mechanisms and financing of biodiversity conservation**

While the DEA had a fundamentalist stance against alien species, the Working for Water Programme of the Department of Water Affairs recommended locating win-win solutions and permit utilisation of alien and invasive species in a user-pays framework. The Working for Water Programme was established in 1995 to eradicate alien and invasive plants that were threatening the water security of the country. Having the experience, the Programme chair made presentations with quite innovative economic measures that would facilitate sustainable utilisation of alien species and invasives.

“It is important to *balance* the concern for invasions with the *significant benefits* that we derive from alien species... What is necessary... is a sufficient measure of control over the potential risks of the importation, and an enforceable “or user-pays” approach to *accountability for any actual invasions*” (Working for Water Programme 2003, not paged, emphasis added).

The essence of proposal was to locate win-win solutions and provide for in-built mechanisms that would facilitate payment for ecosystem goods and services or external costs of the permitted activities and species. This is the framework that was represented in Figure 5-1. The problem was how to ensure that those who used alien and invasive species were accountable for subsequent actual invasions. Similarly, since birds, wind, water and animals can easily disperse seeds of most floral species, it would be difficult for the DEA to enforce accountability for actual subsequent invasion. The Working for Water Programme (2003, not paged, emphasis added) also submitted that “the person or group proposing an introduction to *bear the risk*, and for this to be *underwritten by accredited insurance*”.

Having experience in managing invasive plants, the Working for Water Programme contended that the net benefits of most introduced species were low, if not negative. The “vast bulk of introduced species are brought in for *marginal profit*, and yet society (including the environment) has to bear the risks and costs” (Working for Water Programme 2003, not paged, emphasis added). By introducing a host of financial measures to ensure that beneficiaries bore the risk rather than shift the burden to the taxpayer, such activities would

evidently become unviable. The point was that players in such activities, understandably, would have to reallocate their resources to other species since that would be the most rational thing there was to do.

The Working for Water Programme had some reservations about taking an anti-alien stance as it would be self-defeating because in the future, as climate change trends worsen, threats imposed by food insecurity might necessitate importation of more productive alien species. Therefore, it was unreasonable to foreclose such opportunities. The novelty of the Working for Water Programme's recommendation was that should "we find some alien "wonder crop" that can make a massive difference to the well-being of society, the *Government can underwrite the introduction of these species*" (Working for Water Programme 2003, not paged, emphasis added).

The historical precedent created by a pecuniary system of colonial privileges allowed people to introduce species for private gain without paying for external costs imposed on society and the environment. Thus, the Working for Water Programme's submission urged legislators to clarify two things – who benefited from the species introduction and who bore the risk and cost of managing impacts of subsequent invasions. So far, private persons benefited, but the taxpayer bore the risk and cost of invasions. The taxpayer subsidised private economic agents. Thus, the Working for Water Programme (2003, not paged) further recommended addition of provisions "to ensure that the costs of preventing, controlling or eradicating invasive alien species are borne by those who have been responsible for their introduction or who have derived a direct financial or other benefit from them."

The DEA (2003, not paged), however, was of the opinion that the views of the Working for Water Programme were "[n]ot recommended, due to the impracticality of implementation." The Deputy Director General: Biodiversity and Conservation of the DEA argued that "Working for Water's suggestion that introducers of alien species should supply financial guarantees had merit, but it was unclear how the cost of the introduction of alien species would be estimated" (DEA 2003, not paged). While a Bio-security unit within the DEA had the role of creating a database of invasive species in the country and could easily verify the invasive capacity of a new alien species from its country of origin through global

collaborative efforts, the DEA did not consider it. Using the results of a risk assessment coupled with knowledge of extra-territorial invasive capacity available to the Bio-security unit, the DEA could easily provide a provisional estimate of the financial guarantee.

#### **6.4. Synthesis**

Since the agreement score between TGIB's views and views expressed in the submissions to the Environmental Affairs and Tourism Committee was high (75%), as shown in Table 6-1, what forces might have shaped the NEM:BA? One could infer traces of failure in democratic policymaking or as Bromley (2012, p.18) characterises it: it was "environmental governance [that] resembles the neo-colonial practice of ruling down on others". Such a non-democratic policymaking culture amounted to ceremonial encapsulation of all ideas that could have shaped the NEM:BA to be a progressive biodiversity law at the time of enactment/drafting. If ceremonial encapsulation defines the paradox, whose ceremonial interests resisted instrumental/reasonable legislation? One answer is fundamentalism in governance (Expert 1, pers comm). The analysis suggested that much of the content that went into the NEM:BA was shaped by the conservation ideology of the then directorate of the Department of Environmental Affairs. Environmental creationism lay at the core of all the views of the then directorate of the DEA that presided over the drafting processes.

There always exists the possibility that ceremonial interests – especially buttressed by a pecuniary culture – would curtail any proposed institutional change that would bolster intergenerational stewardship (Bolduc 2009, Hiedanpää and Bromley 2014, Mora and Valentinov 2012, Tool 1994, Veblen [1899] 2005, Wisman 2011). The dominant social imaginary can also promote ideological interests that undermine progressive biodiversity governance. Since reason seems to have been undermined by fundamentalism and impractical theoretical considerations in the NEM:BA process, the NEM:BA's fifth chapter could be classified as an "imbecile institution" (Veblen 1914, p.25). Findings suggested the possibility that ceremonial interests – especially driven by scientific ideologies through the medium of epistemic violence – played an equally important influence that resulted in path independent change, which theoretically led to regressive institutional change (Ayres 1996, Bush 1987; 1989, North 1990). This is what Veblen (1914, p.25) calls "the triumph of imbecile institutions over life and culture".

According to Veblen (1914, p.49), “disserviceable institutions easily arise and continue to hold their place in spite of the disapproval of native common sense”. The fact that he argues that imbecile institutions “easily arise” means that there exists a futuristic component to their evolution, but once established, they become past-binding and “continue to hold their place”. The extent to which institutions (laws, regulations, policies, culture, custom, traditions, beliefs and taboos) are unreasonable or discordant to the socio-political and scientific context determines the degree of imbecility of those institutions. Nelson (2010, p.169) asserts that environmental creationism often leads “to ill-conceived and unjust environmental policies, as when many black Africans were evicted from their native lands in the twentieth century to protect “the creation””. This argument corroborates the concepts of imbecility, epistemic violence and Lysenkoism. Bromley (1985, p.790) similarly discusses environmental creationism as the “myth of management” by which governments in a “number of countries passed laws that prohibited” utilisation of environmental resources.

While conservation is inevitable and most desirable, it takes place in a socio-cultural context in which the natural/environmental resource has multiple meanings to various social beings and groups depending on their situatedness in that environment. The problem is one of institutional change that not only endangers people’s livelihoods because it is non-anthropocentric, but also threatens the continuity of culture. Scientific hegemony also is an inevitable culprit in this analysis and, through a fundamentalist ideology (an instituted social imaginary), it strengthened epistemic violence. Jentoft (2006, p.672) urges that the “hegemony of the natural sciences should be replaced by a multi- or, ideally, inter-disciplinary approach”. He argues that such a multi-disciplinary approach would examine the “social and economic issues... as thoroughly and systematically as those of the natural systems” (Jentoft 2006, p.672). Fundamentalism is a uni-disciplinary approach to knowing and policymaking.

Valentinov (2015, p.148) describes uni-disciplinary knowledge as “partial rationalities of individual functional systems”. Policy problems as already established are at best messes and at worst wicked, thus defying uni-disciplinary solutions (Balint *et al.* 2011, Hartmann 2012, Ritchey 2011, Rittel and Webber 1973). Bromley (2008a, p.237) emphasises that “public policy cannot legitimately be held hostage to the prescriptive truth claims imposed on it ... (...from any other discipline).” Arguing that wicked global policy problems cannot be

resolved by uni-disciplinary epistemic claims, Max-Neef (2005, p.15) emphasised that “disciplinary investigations concern only one level of reality.”

Emerging from the findings is the possible conclusion that the NEM:BA legislative process was a limited access policymaking order or the transitional phase with high risk of relapse into a limited access policymaking order characterised by a high incidence of epistemic violence (Table 3-1) as the analysis revealed the DEA was doing. Entrenched insiders effected their sovereign will through the mechanism of epistemic oppression or the sanction of ignorance as argued in Chapter 3 and illustrated in Figure 3-2 and Table 3-1. The major conclusion is that not all knowledge is instrumental and there is an ever present problem in policymaking that epistemic communities might assume hegemonic influence over the policy space. The immediate consequence is that warranted assertions graduate into new institutions before the gestation period for them to become valuable assertions is over.

As Bromley (1985, p.790) describes it, governance by ruling down “insults the citizenry” and “creates perverse incentives” in the sense that “it suddenly becomes an act of honor to defy stupid institutional arrangements, and a necessity for survival as well.” As already established in chapters 2 and 3, the problem with this approach to governance is that it fails to promote equity on four dimensions: “institutional equity”, “endowment equity”, “political equity” and “economic equity” (Béné and Neiland 2006, p.45). This results in the imbecility of new institutions.

Peretti (1998; 2010) advanced a hypothesis that the South African policy and scientific processes of the 1980s, beginning with the establishment of the Task Group for Invasive Biota (TGIB) in 1980, were a reflection of the spirit of eco-nationalism/green apartheid. He likened the TGIB’s research programme to “[s]trict biological nativism,” by which “[i]deologically, politically, and ecologically, the Nazis sought to prevent mixing” and “to purify nation and nature, by eliminating people and biota that were supposedly not native” (Peretti 1998, p.188). He observed four circumstantial conditions that correlated positively with strict biological nativism in South Africa.

First, South African biological scientists were “instrumental in preparing the project proposal” (Peretti 1998, p.188) for the SCOPE research programme on biological invasions. Second, the SCOPE had become an authoritative voice in biological invasion science and

South African scientists had had, and still have, a hegemonic influence over the SCOPE project. Thirdly, South African scientists have been disproportionately participating in SCOPE international forums and publishing volumes of work on biological invasions. He then asks, “Why are scientists from South Africa especially concerned with biological invasion (Peretti 1998, p.188)?” To answer this question, he draws on a fourth correlation – the similarity of the predispositions of Nazism and Apartheid. He therefore concludes that “Like Nazism, apartheid thinking is concerned with separating the pure from the impure... It is not surprising that *SCOPE’S hard-line biological nativism has roots in South Africa,*” (Peretti 1998, p.188-189; 2010, p.33, emphasis added).

Between the TGIB’s research programme and the NEM:BA enactment process, which one does the green apartheid hypothesis characterise more accurately? In light of TGIB’s evidently long-term anthropocentric framework with a relative proclivity towards consequentialism as already reviewed, Peretti’s (1998; 2010) hypothesis seems to be a mischaracterisation of the 1980’s. The provision for sustainable utilisation of invasive aliens through creation of spatial property and use rights systems (zonal/demarcated areas) can hardly pass for strict biological nativism and eco-Nazism. His characterisation seems to fit the NEM:BA enactment process rather than the formative years of, and at most a decade and half after the establishment of, the TGIB in the 1980s. It seems he mistook correlation for causation.

The greater participation of invasion biologists from South Africa, who happen to research mostly terrestrial ecosystems, is because the Fynbos Biome of South Africa (a unique floral kingdom with high endemism) is under threat and major transformations have been underway for some centuries (Kruger *et al.* 1989, Macdonald and Jarman 1985, Richardson 2011, Van Wilgen *et al.* 2001). Such a unique ecosystem attracts the attention of large numbers of conservation/invasion biologists and, therefore, their research output tends to be higher. However, the volume of the research output hardly has anything to do with apartheid habitual ways of thought.

There is, however, a measure of truth in Peretti’s (1998; 2010) hypothesis. Ferrar and Kruger (1983, p.5) discuss how botanical societies began to depopulate gardens of any alien species and re-populate them with indigenous plant species. The strong anti-invasive alien plant

groundswell did not differentiate between economically useful and non-economically useful species. In this case, the green apartheid hypothesis partly holds. Similarly, Peretti's (1998) hypothesis is a relevant explanation given the TGIB's focus on politically alien species in its research programme (Bruton and Merron 1985, De Moor and Bruton 1988). Further, the triumph of propaganda campaigns against invasive aliens that led to conservation 'wars' in the media and academic forums in the 1980's (Brown 2013, Crass 1986b, Ferrar and Kruger 1983, Skelton and Davies 1986) suggests that environmental creationism managed to deflect the sustainable path that the TGIB had advocated. Botanical societies, in the 1980s, were at the forefront of propaganda campaigns against alien species and continued to be so in the NEM:BA enactment processes, to the extent of considering the NEM:BA to be porous even with its anti-alien stance that required eradication of harmless alien species and harmful alien species alike.

## **6.5. Conclusion**

Chapter 6 sought to reconstruct the ideologies and discourses that shaped the NEM:BA to be the controversial piece of legislation that it subsequently became. A number of conclusions followed. First, an ideology of eco-nationalism whose seeds dated back to the 1980s strengthened over the decades leading up to the NEM:BA enactment process. In that respect, the hypothesis of a green apartheid system seemed a reasonable characterisation of the policy processes of the NEM:BA era.

Secondly, elements of fundamentalism in conservation ideology were shown to be at the core of the strict biological nativism that became characteristic of the NEM:BA. To the extent that the pre-enactment views on utilisation of invasive species correlated with submissions of interested and affected parties during the enactment process, the explanation for strict biological nativism in the NEM:BA inferably has to be administrative in nature. It seems reasonable to hypothesise that administrative preferences of the then directorate of the DEA shaped the content of the NEM:BA. This conclusion is a new insight into the emergence of new institutions which suggests that much of the national legislation is not made by legislatures, but by the directorates of governmental agencies. The legislature discusses and sanctifies the will of these authoritative administrative agents.

Thirdly, ceremonial interests of invasion biologists in the employ of the DEA at that time and botanical societies seem to have shaped the content of the NEM:BA. They encapsulated any emerging or existing knowledge fund that would have facilitated a progressive biodiversity governance framework. Insofar as a dominant epistemological system marginalised alternative interpretations of environmental realities, the role of epistemic violence in engendering ceremonial encapsulation of the knowledge fund is an inescapable explanation. Although participation of interested and affected parties was promoted, the existence of a dominant epistemological system effectively reduced the realm of reasons to a limited access policymaking order, which undermined the emergence of reasonable legislation. The fifth chapter of the NEM:BA, thus qualifies as an imbecile institution.

The legislative historical analysis established that the NEM:BA foreshadowed the problem of institutional isolation since the drafting process began and that the ceremonial adequacy standard of administrative preferences shaped the Act. Chapters 7 and 8 provide in-depth analyses of institutional isolation during the regulatory/implementation phase using the case study of trout. Chapter 7 presents econometric estimates obtained from online survey data. Chapter 8 presents semiotic analysis of the NEM:BA process, which provides a dynamic qualitative explanation of how institutions become.

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### Perceptions about the reasonableness of the 2014 draft AIS regulations

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*“The reasonable man adapts himself to the world: the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man,”*  
– Shaw (1946, p.343).

#### 7.0. Introduction

The extent to which institutional adjustment succeeds depends on the perceptions and reactions of the polity that bears the burden of the adjustment. Institutional adjustment reconfigures the legal foundations of an economy and concomitantly, the legal entitlements of social agents resulting in redistribution of economic advantages. Consequently, recipients of a policy instrument react to it differently.

The draft AIS regulations published in February 2014 for public comment had three distinguishing features. Firstly, brown trout (*Salmo Trutta*) and rainbow trout (*Oncorhynchus mykiss*) were classified as invasive species in special conservation areas, which meant that they were to be utilised under a permitting arrangement (DEA 2014b). However, outside these areas, trout were not listed as invasive (DEA 2014b). Secondly, nearly all of what were formerly mapped as trout waters were now fish sanctuaries, hence trout were to declared invasive there. Thirdly, aquaculture facilities were restricted activities, which meant that one required a DEA permit in addition to permits from the Department of Agriculture, Forestry and Fisheries (DAFF) as well as the Department of Water Affairs to operate an aquaculture farm or a hatchery (DEA 2014b). Thus, there was, in a sense, a problem of overregulation.

Although the trout industry did not participate in any traceable way in the public hearings during the formulation of the NEM:BA in 2003, Chapter 6 established that the economic interests of represented sectors that utilise alien and invasive species were sidelined in the NEM:BA public hearing, drafting and enactment processes. Administrative and regulatory preferences of the DEA as well as the interests of anti-alien scientists and activists shaped the Act so that little or no provision was made for economic utilisation of traditionally

economically useful invasive alien species. This was a manifestation of sovereign power through the sanction of ignorance (epistemic violence).

### **7.1. Research method and objectives**

The quantitative component of the thesis was embedded in a larger qualitative analysis. The online survey instrument was distributed through the FOSAF website (Appendix 1). The objective was to evaluate the trout industry's perceptions about the reasonableness of the draft AIS regulations as published for public comment in February 2014. The other objective was to establish major factors that made the policy process controversial. The intensity of the perceptions was critical in guiding further qualitative integrative analysis of the reasons why the trout industry was insistent on some aspects of the controversy, thus leading to a potential explanation of the existence or non-existence of the perceived institutional isolation of sectors that utilise invasive alien species.

The method of analysis was explained in Chapter 4. A combination of techniques was used to analyse the data. First, descriptive analysis, relying mostly on graphs, was used to summarise the data. Reliability analysis using Cronbach's Alpha was carried out to assess the degree of internal consistency of the survey instrument (Tavakol and Dennick 2011, Maree 2013). The results from this quantitative component were crystallised with the results from the qualitative research (Maree 2013, Weaver-Hightower 2014). Maree (2013, p.40) defines crystallisation as "the practice of "validating" results by using multiple methods of data collection and analysis."

Exploratory factor analysis was used to reduce the large number of items to fewer variables (Boermans and Kattenberg 2011, DiStefano *et al.* 2009, Maree 2013, Williams *et al.* 2012). Since there were no *a priori* theoretical expectations about which items would measure the same construct, exploratory factor analysis was necessary (Gorsuch 1997). Maree (2013) argues that this technique allows the researcher to identify, through item analysis, items that may not be suitable for further use in the analysis. Exploratory factor analysis is the conventional approach by which a researcher is able "to determine which items "belong together" in the sense that they are answered similarly and therefore, measure the same dimension or factor" (Maree 2013, p.219). The factor loading matrix was then used to determine the items which belonged to a factor. The factors were assigned names based on

the nature of items comprising them. On the basis of the reduced number of variables, a binary response logistic model was estimated (following Equation 4-12). The algebraic representation of the factor analytic model is given by Equation 4-1.

The chapter is organised as follows. Section 7.2 provides descriptive results and section 7.3 explores factors that undermined emergence of a consensual solution. Section 7.4 and 7.5 present and analyse econometric results of the trout sector’s perceptions about the reasonableness of the AIS draft regulations and perceptions about the invasiveness of trout. Section 7.6 concludes the chapter.

## 7.2. Descriptive results

This section presents descriptive results of the online survey. It discusses demographics first and economic spending profiles. Second, it discusses the core aspect of the online survey, which was the NEM:BA regulatory reform controversy. It finally draws some inferences for crystallisation with qualitative findings.

### 7.2.1. Demographics

Table 7-1: Summary demographic statistics

Item	mean	Std. dev	median	min	max	Response rate	n
Are you a flyfisher? (yes = 1, no = 0)	0.91	0.28	1	0	1	100%	114
Are you a clubmember? (yes =1, no=0)	0.73	0.44	1	0	1	92.1%	105
Sex (female =1, male =0)	0.06	0.25	0	0	1	92.1%	105
Race (white = 1, other 0)	0.99	0.10	1	0	1	91.2%	104
Level of education (below matric = 1, postgraduate = 6)	4.78	1.44	5	1	6	91.2%	104
Percentage of friendships acquired through fly-fishing (Figure 7-3)	3.89	2.48	3	0	10	93%	106
Number of fly-fishing years	23.18	13.57	20	2	60	88.6%	101
Do you own a second home at your favourite fly-fishing destination?	0.14	0.34	0	0	1	90.4%	103
Salary (less than R10000/month=1, greater than R50000/month=6)	4.07	1.63	4	1	6	89.5%	102

Source: Author’s analysis

***a. Sex, race and second homeownership, education and income***

Response rates to questionnaire items varied between 89% and 100% (Table 7-1). Ninety-three percent of the respondents were males (Table 7-1). Approximately, 99% of the respondents were white. Based on the survey data, it seems that fly-fishing is predominantly a white male recreational activity. Both the average and median fly-fisher had spent over 2 decades in piscatorial pursuits (Table 7-1). This shows that respondents had long-term commitment to fly-fishing. In studies on the economic impact of trout in the Eastern Cape, Nicholson and Snowball (2014) reported 96% male white respondents in a sample of 52. Du Preez and Hosking (2011), Du Preez and Lee (2010a; 2010b) and Gatogang (2009) reported 98% white respondents and 93% male white respondents in a sample of 96. The closeness of the demographic statistics for the online survey to other studies suggests that the sample approximated the population reasonably well.

Nearly 14% of the respondents owned second homes in fly-fishing destinations. Hoogendoorn and Visser (2010) found that out of a population of 3,500 permanent residents of Dullstroom in Mpumalanga province, 4% owned second homes and were predominantly fly-fishing syndicates. In Rhodes Village, Hoogendoorn and Visser (2010) found that 16% of a population of 450 permanent residents were second home owners.

Approximately 91.2% of the respondents were fly-fishers (Table 7-1). Just over 73% of the respondents were members of fly-fishing clubs. Nearly 58% of the respondents reported that their fly-fishing clubs held leasehold rights to trout waters. Almost 42% of the respondents reported that their clubs owned trout waters. Since the survey link was distributed through the FOSAF website, it naturally follows that most respondents were club members. The level of private ownership and leaseholding of fly-fishing waters suggests that the sector might have some vested interests to protect against institutional change processes that seek to substantially reconfigure use and property rights structures.

***b. Education, income and occupation***

Figure 7-1 shows that 48% of the respondents held a postgraduate qualification. In aggregate terms, 63% were degreed. Nicholson and Snowball (2014) reported 67.3% degreed respondents. Du Preez and Hosking (2011), Du Preez and Lee (2010a; 2010b) and Gatogang (2009) found that 41% held a postgraduate qualification and 24% held an

undergraduate qualification, which means 65% were degreed. The present distribution conforms to patterns revealed by previous studies. Thus, the policy clientele was relatively highly educated.

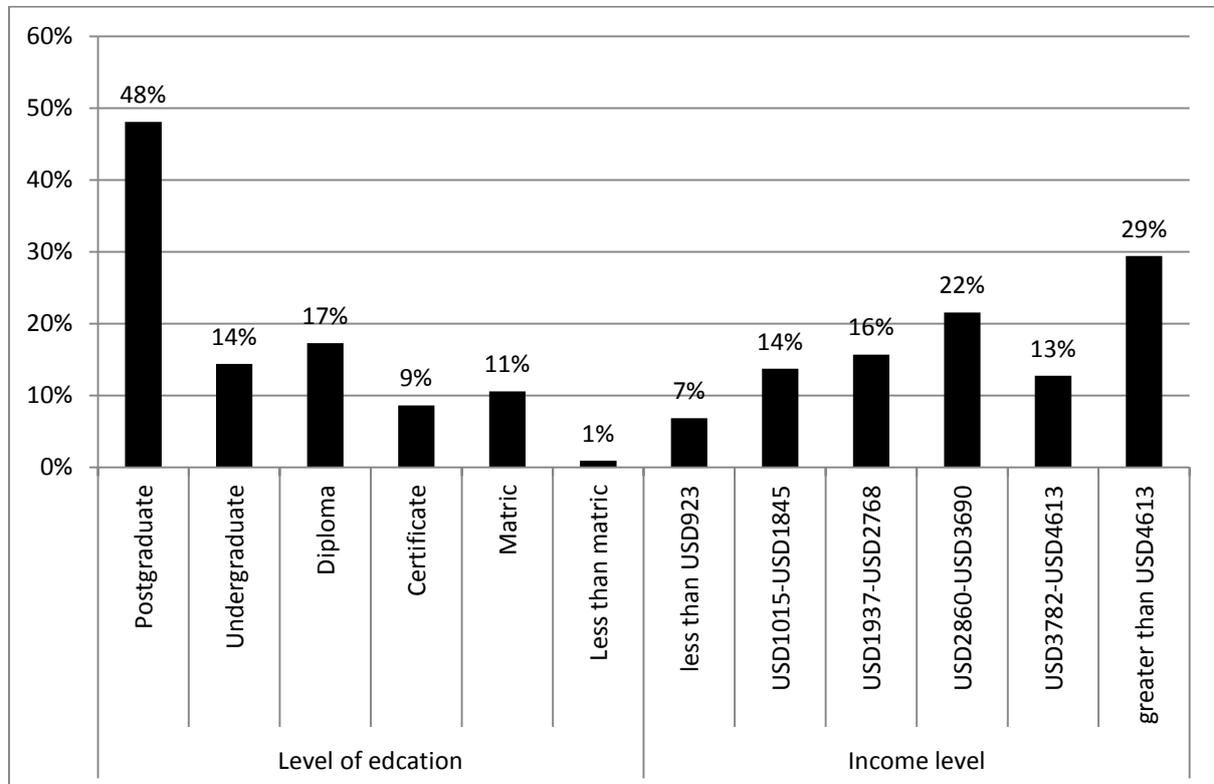


Figure 7-1: Education and income profiles of the respondents

Source: Author's analysis<sup>4</sup>

Reflective of the high education levels in the sample, the income profile also indicates that over 63% of the 102 respondents earned a monthly after-tax income in excess of USD 2,860. The modal income category was >USD 4,613, which was 29.4% of the respondents. The mean and median categories were USD 2, 860 – USD 3,690, which was 21.6% of the respondents (Table 7-1 and Figure 7-1). Du Preez and Hosking (2011), Du Preez and Lee (2010a; 2010b), Gatogang (2009), Nicholson and Snowball (2014) also found comparable patterns in their samples.

<sup>4</sup> The average annual exchange rate for 2014 was ZAR10.84 to USD 1.00

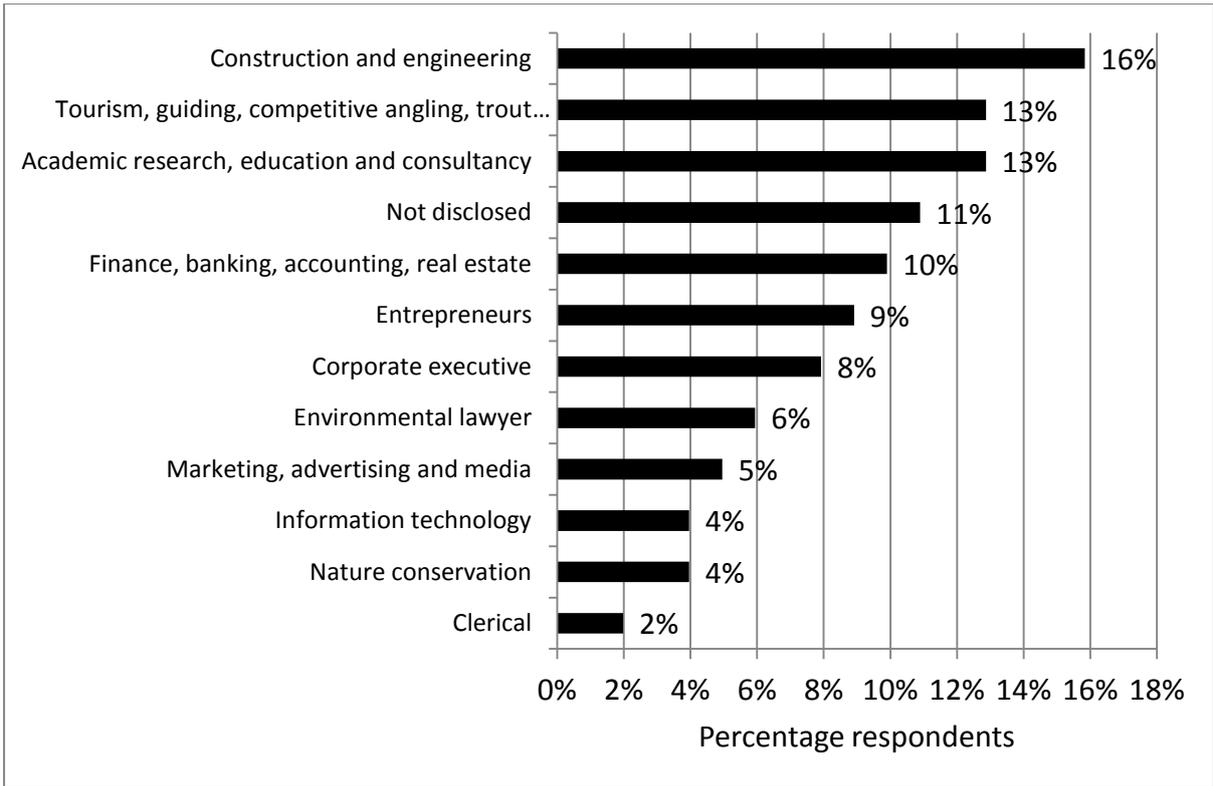


Figure 7-2: Occupations of the respondents

Source: Author's analysis

**c. Friendships and fly-fishing destinations**

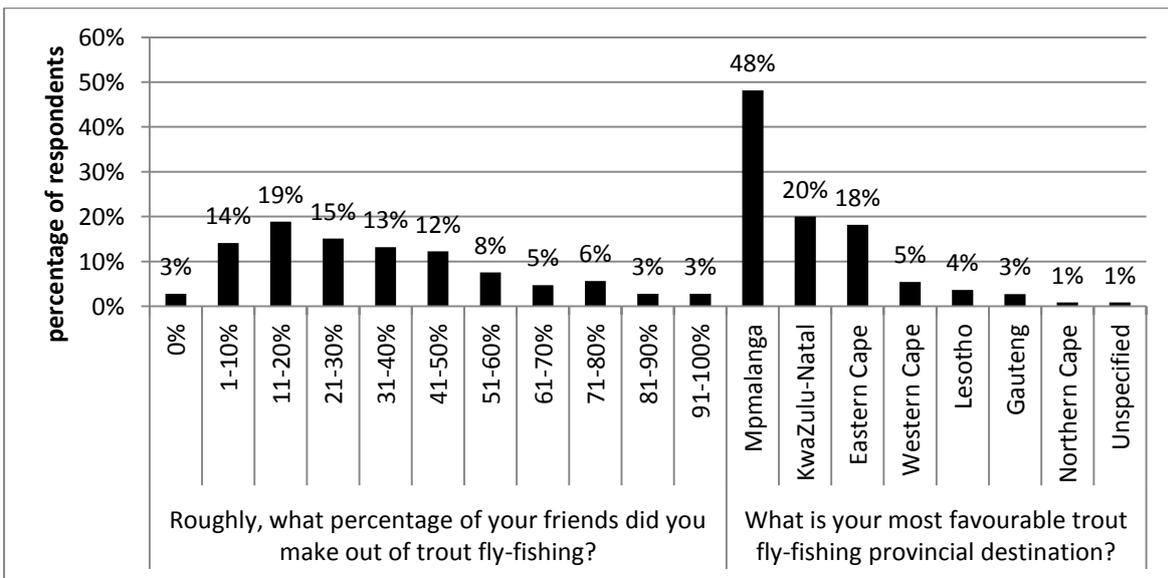


Figure 7-3: Friendships and fly-fishing destinations

Source: Author's analysis

Figure 7-2 shows that the largest number of respondents that disclosed their occupation was employed in the construction and engineering industry (16%), followed by 13% that were service providers in the trout industry and 13% that were from the education/research sector.

Trout fly-fishing was an important way of making friends for a cumulative 73% of respondents in the 1%-10% category to 41%-50% category (Figure 7-3). The modal category of friendships made from fly-fishing was 11%-20%. Theoretically, one would expect the importance of fly-fishing in the building of social capital to have a large influence on group attitudes and tastes for certain species as well as regulatory regimes (Veblen [1899] 2005). The more important an activity is in the building of social networks the greater the social power of the beneficiaries due to high solidarity levels.

Just over 48% of the sample preferred Mpumalanga province as a fly-fishing destination, which was greater than a combined 38% of the respondents who preferred KwaZulu-Natal and the Eastern Cape (Figure 7-3). Hoogendoorn and Visser (2010) reported fly-fishing as the most popular outdoor recreation activity among second homeowners in Mpumalanga in towns such as Dullstroom that are located in the Trout Triangle. In the first most comprehensive nationwide mapping of fly-fishing opportunities, Hoogendoorn (2014) also found a similar pattern although KwaZulu-Natal and Mpumalanga were about the same in terms of popularity for trout fly-fishing opportunities. However, Du Preez and Lee (2010b) and Gatogang (2009) found that Mpumalanga trout fly-fishing destinations were ranked fourth after Rhodes Village of the Eastern Cape (ranked first), Natal Midlands in KwaZulu-Natal (ranked second) and Cape streams (ranked third). The result obtained in the thesis suggests that the majority of online survey respondents were from Mpumalanga.

### **7.2.2. Economic spending profile for fly-fishers in 2013**

Table 7-2 shows information about fly-fishing trips in 2013. At least 95% of the respondents had a fly-fishing trip in 2013 and the average fly-fisher had eight fly-fishing trips in 2013, while the median fly-fisher had six trips in 2013. Nicholson and Snowball (2014) reported an average of nearly five trips per annum, but Du Preez and Hosking (2011), Du Preez and Lee (2010a; 2010b) and Gatogang (2009) reported a much lower average of nearly 2 trips per annum.

Table 7-2: Fly-fishing trips in 2013

Item	mean	Std. dev	median	Response rate	n
Did you take a fly-fishing trip in the last 12 months?	.95	.21	1	92.1%	105
How many trips did you take in the last 12 months?	7.75	7.1	6	89.5%	102

Source: Author's analysis

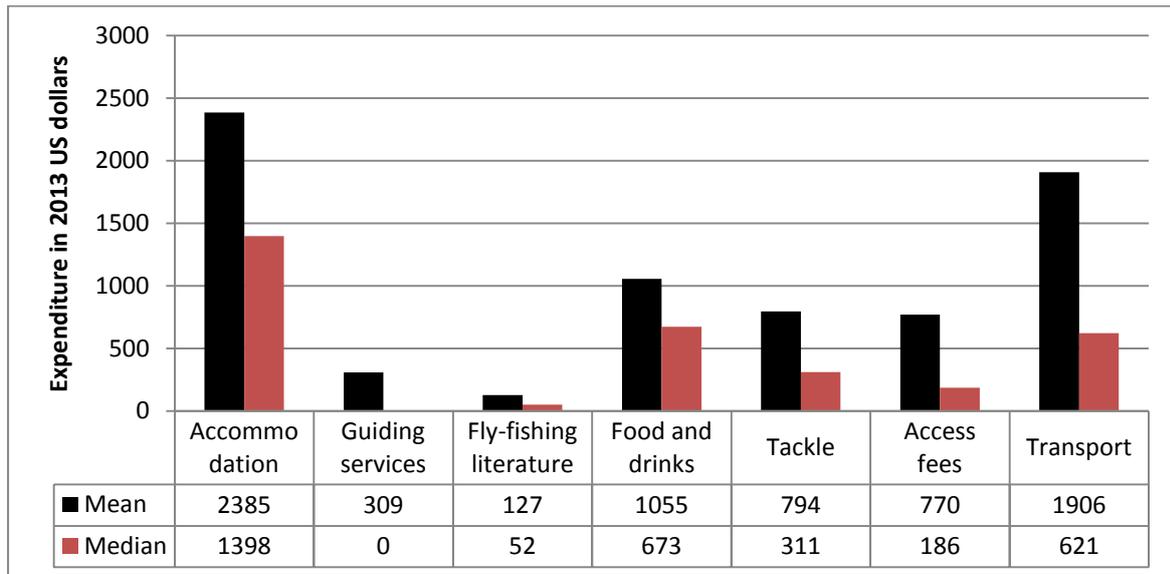


Figure 7-4: Mean and median spending profile per person in 2013 prices

Source: Author's analysis<sup>5</sup>

Figure 7-4 depicts spending profiles for the sample. The three most influential spending categories were accommodation (a mean of USD 2,400 per person per annum); transport (a mean of USD 1,900 per person per annum) and food and drinks (a mean of USD 1,100 per person per annum) (Figure 7-4). The aggregate spending for the 99 respondents was USD 0.71 million (an average of USD 7,200 per person per annum) in 2013 including transport expenditure in 2013 prices. The aggregate spending, excluding transport expenditure, for the 99 respondents was USD 0.52 million (an average of USD 5,300 per person per annum) in 2013 prices.

Leibold and van Zyl (2008) reported a total spending of USD 496.8 million in 2007 prices and an average of USD 11,000 per person per annum for 45,000 fly-fishers.<sup>6</sup> Du Preez and Lee

<sup>5</sup> The annual average exchange rate in 2013 was ZAR 9.66 to USD 1.00.

(2010b) estimated that the trout fly-fishing industry generated USD 0.77 million (or an average of USD 8,100 per person) per annum in the economy of Rhodes Village in the Eastern Cape of South Africa. Using negative binomial modelling, Du Preez and Hosking (2011) found that the economic contribution of trout fly-fishing to the economy of Rhodes Village in Eastern Cape South Africa was just over USD 2.48 million (or a mean of USD 26,000 per person) per annum. Using the travel cost method, Gatogang (2009) found that the economic contribution of trout in Rhodes Village was nearly USD 1.65 million (or an average of USD 17,000 per person) per annum. Nicholson and Snowball (2014) found that the economic impact of trout fly-fishing was between USD 0.4 million (or an average of USD 660 per visit) per annum and USD 0.48 million (or USD 790 per visit) per annum in the Eastern Cape.

The findings of the present study are within close range to findings of contemporary studies on the economic contribution of trout in various localities of South Africa except Du Preez and Hosking (2011) and Gatogang (2009). The magnitudes of the differences are sensitive to the estimation assumptions and methods used. In all these studies, accommodation and transport were the greatest spending categories just as the thesis also found. The spending profile, thus, reasonably approximated the population profile. This gave assurance of the reliability of the self-reported values in the survey.

### **7.2.3. NEM:BA AIS regulatory reform controversies**

As a way of understanding the intensity of the perceptions of the trout industry about the draft AIS regulations that were published for public comment in February 2014 and finally promulgated as law in August 2014, respondents were asked a wide range of questions about the reform process.

#### ***a. Self-reported legal comprehension***

The extent to which a policy clientele participates actively in a policy process depends on its intellectual capabilities on the policy issue in question. Nearly 93% of the respondents had heard about the NEM:BA and 95% of the respondents had heard about the 2014 AIS regulations previously (Table 7-3).

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<sup>6</sup> The annual average exchange rate was ZAR 7.05 to USD 1.00

Table 7-3: Heard about the NEM:BA process

Item	Yes	n
Have you ever heard about the National Environmental Management: Biodiversity Act (NEM:BA)?	93%	112
Have you ever heard about the Alien and Invasive species regulations of the National Environmental Management: Biodiversity Act?	95%	112

Source: Author's analysis

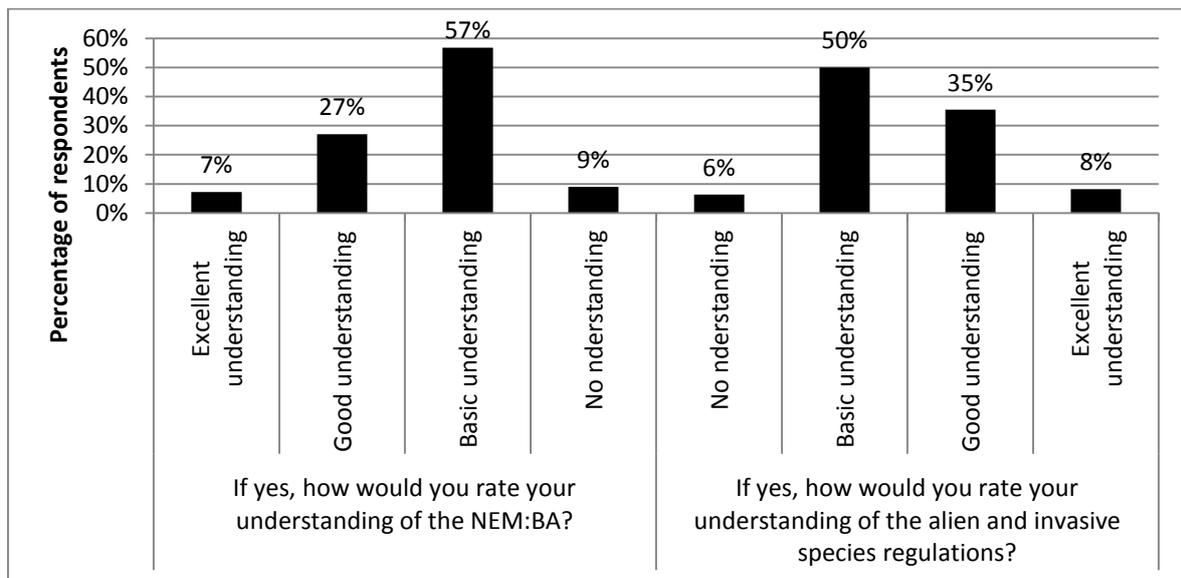


Figure 7-5: Legal comprehension of the NEM:BA and the 2014 AIS regulations

Source: Author's analysis

As Figure 7-5 depicts, the respondents self-reported a fair level of comprehension of the legislation governing the utilisation and conservation of biodiversity. Approximately 57% of the respondents reported a basic understanding of the NEM:BA, which was by far the largest category. Overall, almost 91% of the respondents had some degree of understanding of the NEM:BA. Similarly, 50% of the sample reported a basic understanding of the 2014 draft AIS regulations (Figure 7-5). In total, nearly 94% of the sample considered themselves to possess some level of understanding of the 2014 draft AIS regulations. Most fly-fishing websites and magazines had regular instalments from environmental lawyers interpreting the NEM:BA and the various iterations of the draft AIS regulations. Such high self-reported levels of legal comprehension were anticipated as a result. Therefore, high self-reported levels of legal comprehension add to the validity and reliability of subsequent responses

about the legislative process, which require respondents to possess some knowledge of the legislation.

**b. Science-driven AIS regulatory reform process**

Table 7-4A and Table 7-4B show the distribution of the perceptions of the trout sector. Almost 31% of the respondents strongly disagreed with the view that the DEA had followed a South African scientific research-driven implementation process (Table 7-4A). Overall, 47% of the respondents disagreed relative to 30% who agreed with the statement that the DEA was following a South African scientific research-driven process in implementing the NEM:BA.

Table 7-4A: AIS Regulatory reform process controversies

Questionnaire Item	% of respondents					n
	SD	D	N	A	SA	
In my opinion, a South African research-driven implementation of the NEM:BA has been at the forefront of the DEA's alien and invasive species management concerns	31	16	23	17	13	110
In my opinion, the DEA conclusively relied on international research evidence in order to decide the invasiveness of trout in South Africa	6	9	10	26	49	114
In my opinion, the Department of Environmental Affairs adequately researched on the nature of the threat posed by trout on indigenous species, habitats and ecosystems before listing them as invasive	68	19	2	4	8	113
I believe that the regulations strike a balance between biodiversity conservation and socio-economic utilisation of the trout	55	21	6	6	12	111
In my opinion, scientists in, or advising, the Department of Environmental Affairs developed the Alien and Invasive species regulations in consultation with interested and affected parties such as fly-fishers	54	21	9	5	11	114
In my opinion, the flyfishing public (and the Federation of Southern African Flyfishers (FOSAF) lack the specialised knowledge necessary to contribute towards alien and invasive species regulations	55	17	12	10	6	113
My trust in the Department of Environmental Affairs increased as a result of the National Environmental Management: Biodiversity Act decision process	58	22	10	7	4	114
The Department of Environmental Affairs justified to interested and affected parties the rationale for the listing of trout as invasive	74	14	4	5	3	114

Table 7-4B: AIS Regulatory reform process controversies

Questionnaire item	% of respondents					n
	SD	D	N	A	SA	
I think the Department of Environmental Affairs equally took responsibility of researching into the socioeconomic benefits of trout species as it also researched into the ecological cost of trout	71	17	4	2	6	114
In my opinion, trout should be listed as invasive IF it can be demonstrated that in a given catchment the net benefits of conserving indigenous is positive	18	13	14	26	29	114
I consider trout to be important cultural symbols in South African fly-fishing circles	0	2	4	25	69	106
Trout are still important social status symbols in South African fly-fishing circles	3	5	23	24	46	106
Trout fly-fishing is a way of getting intimate with nature	0	2	3	14	81	105
In my opinion, all species regardless of whether they are indigenous or alien, have a permanent place in the ecology and economy of South Africa	18	19	24	19	20	113
The alien and invasive species regulations adequately provide for my spiritual, cultural, social, physical, economic and development needs	58	19	14	2	7	106
Even if the regulations facilitate the conservation of indigenous fishes, their livelihood impact should not be neglected	11	20	17	27	24	103

Source: Online survey

Over 49% of the respondents strongly agreed with the view that the DEA had conclusively relied on international evidence to decide the invasiveness of trout. In summative terms, nearly 75% of the respondents agreed with the view that the DEA had relied on international evidence to decide the invasiveness of trout in South Africa (Table 7-4A). The policy clientele perceived the DEA to be relying on non-contextual evidence in arriving at its decisions. Since invasiveness of a species varies with climatic-biospheric conditions (Ellender and Weyl 2014, Van Rensburg *et al.* 2011), using evidence from a different climatic-biospheric setting led to contestable decisions.

The questionnaire had a set of statements that focused on trout specific research. As Table 7-4A shows, just over 68% of the respondents strongly disagreed with the view that the DEA had adequately researched the nature of the ecological threat posed by trout. In summative

terms, 87% disagreed with the view that the DEA had adequately researched the nature of the ecological threat posed by trout.

Table 7-5: Sufficient condition for listing a species as invasive

<b><i>In my opinion the sufficient condition for listing species as invasive is that:</i></b>	percentage of respondents	
[1] They must be alien and established outside their natural distribution range	9%	
[2] They must be alien and established outside their natural distribution range, and threaten or can potentially threaten ecosystems, habitats and species	16%	
[3] They must simultaneously be alien and established outside their natural distribution range; threaten or can potentially threaten ecosystems, habitats and species; and do cause economic, human health and environmental harm	75%	
	Yes	No
<b><i>Based on the sufficient condition for listing species as invasive, can trout possibly be classified as invasive?</i></b>	27%	73%

*Source: Author's analysis*

The study also intended to establish the criteria respondents believed the DEA should use to decide the listing of species as invasive. Approximately 75% of the 105 respondents believed criterion three was the sufficient condition for listing species as invasive (Table 7-5). Since criterion three was the most popular, it followed that a science-driven process that failed to engage in socio-economic aspects about trout (or any alien species) might encounter opposition. Table 7-5 also reveals that 27% perceived trout to be invasive based on their view of what the sufficient condition for listing species as invasive ought to be.

### ***c. Participatory policymaking***

The post-apartheid democratic constitutional dispensation has a distinct imperative for participatory natural resource governance. The survey, thus, solicited perceptions about the adequacy of the regulatory process from a participatory standpoint (Table 7-4A). Table 7-4A shows that nearly 54% of the respondents strongly disagreed with the view that scientists in the DEA charged with making the regulations consulted with interested and affected parties. In general, nearly 75% of the sample felt that their sector was being marginalised in the reform process. Nicholson and Snowball (2014) found that 69% of the fly-fishers in their sample felt that they were being excluded from the NEM:BA regulatory reform processes.

The phenomenon of institutional isolation buoyed by the sanction of ignorance (epistemic violence) seems to have been active in the policy process.

If consultation did not occur according to expectations, was it because the DEA regarded the FOSAF as not knowledgeable enough to contribute to the process? Approximately 55% of the respondents strongly disagreed with the view that the FOSAF lacked the necessary knowledge to be consulted (Table 7-4A). In summative terms, 72% of the sample disagreed with the view that the FOSAF was not knowledgeable enough not to be consulted. During interviews data collection, the researcher came across ichthyologists and conservation biologists who have been practising conservationists for the past six decades and are serving in the FOSAF's Environmental Committee. The FOSAF had knowledgeable members within its *decision-making* ranks.

Management of alien and invasive species, like any other policy issue, is a wicked problem and trust is central to the resolution of such problems (Balint *et al.* 2011, Rittel and Webber 1973). Table 7-4A shows that 58% of the respondents strongly disagreed with the statement that their level of trust in the DEA had increased as a result of the *decision-making* processes of the NEM:BA. The protracted controversy over the regulation of trout suggests that the DEA did not attend to trust building in the process. Nearly 80% of the sample seemed to be suspicious of the DEA's decisions.

The trout sector's lack of trust seemed to be confirmed by the strong perception that the DEA had not justified its decision criteria for listing trout as invasive (Table 7-4A). Nearly 74% of the respondents strongly disagreed with the statement that the DEA had justified the criteria it used to decide the listing of species as invasive. Thus, a combined 88% of the sample disagreed with the statement. As Brandom (1995, p.904) asserted, policymaking is "the game of giving and asking for reasons". It seemed that resource users asked questions, but reasons were not given.

#### ***d. Socio-economic aspects of the controversy***

As already established in Chapters 5 and 6, the overarching environmental management framework of South Africa is anthropocentric and consequentialist. The research also sought to establish the role of the socio-economic aspects of alien and invasive species in the controversies. Table 7-4B shows that 71% of the respondents strongly disagreed with the

view that the DEA had systematically researched the socio-economic aspects of trout as it had consistently and systematically invested in researching the ecological cost of trout. Thus, in aggregate terms, 88% of the sample disagreed with the view that the DEA had concerned itself with the socio-economic issues of the trout as much as it had been concerned with the ecological cost. Jentoft (2006, p.672) argued that the tendency in natural resource governance was to focus on natural science research, but he emphasised the need for an interdisciplinary framework in which “social and economic issues are examined as thoroughly and systematically as those of the natural systems.” Other scholars who similarly emphasised complex socio-ecological analysis in informing institutional design are Degnbol *et al.* (2006), Ostrom and Cox (2010) and Salmi (2012).

The questionnaire included some statements that focused on the balancing conservation of indigenous fishes and economic utilisation of trout as well as cost-benefit analysis, which the law demands the DEA carry out in order to inform its decisions (Table 7-4B). Table 7-4B shows that 29% of the respondents strongly agreed with the view that trout can be listed as invasive species if the net benefit of conserving indigenous fishes in the same locality was demonstrated to be positive. Overall, 55% of the sample agreed with the view that trout should be listed as invasive if the net benefits of conserving indigenous fishes can be demonstrated to exceed the economic contribution of trout. The result suggested that the trout industry supported conservation of indigenous fish species, but it expected cost-benefit analyses to inform the decisions rather than ecological cost analyses only. As such, a decision that missed the economic component, but had the ecological cost component right would be regarded as an incomplete cost benefit analysis.

On the issue of balancing conservation of indigenous fishes and utilisation of trout, nearly 55% of the respondents strongly disagreed with the statement that the draft AIS regulations had managed to strike balance between biodiversity conservation interests and trout utilisation interests (Table 7-4A). In summative terms, nearly 76% disagreed with the view that the DEA had managed to strike balance between conservation of indigenous fishes and economic utilisation of trout. The descriptive results suggest that the search for balance remains a key issue that needs to be addressed for resources users to buy-in into the DEA’s proposals.

### ***e. Socio-cultural aspects of the process***

Some species, such as trout, have a cultural history associated with them so much that they have a different meaning to those groups that hold them dear (Bennion 1920, Curtis 2005, Hoy 1913, Snyder 2007). The questionnaire had statements on the spiritual, cultural and status roles of trout. Table 7-4B shows that 69% of the respondents strongly agreed with the statement that trout was an important cultural symbol in South African fly-fishing circles. Overall, 94% of the sample regarded trout as a cultural symbol. Consistent with the postulation of the Veblenian Dichotomy that some species play an honorific role and ceremonial interests deepen the conviction and taste for such species (Veblen [1899] 2005), 46% of the respondents strongly agreed with the statement that trout was an important status symbol in South African fly-fishing circles (Table 7-4B). In summative terms, 70% of the sample agreed with the statement that trout was a status symbol in South African fly-fishing circles. These observations suggest the existence of an emotional, cultural and spiritual attachment to trout. Table 7-4B also reveals that 81% of the respondents strongly agreed with the statement that trout fly-fishing was a way of getting intimate with nature. In aggregate terms, 95% of the sample regarded trout fly-fishing as a way of getting intimate with nature.

Since trout played spiritual, cultural and status roles, it was likely that South Africans interested in trout fly-fishing would view trout as a permanent component of the South African biota. Bruton (1986) and De Moor and Bruton (1988) argued that trout had a permanent place in the economy and ecology of South Africa. However, there was a mixed response to the statement that all species regardless of whether they are indigenous or alien have a permanent place in the ecology and economy of South Africa. In aggregate terms, 39% of the respondents agreed with the statement, while 37% disagreed with it (Table 7-4B). Of all the items on the controversies, this item had the most evenly spread responses. It shows that within the trout sector, there were some who would not grant permanent ecological citizenship to species just because they served pecuniary interests.

Section 2(2) of the NEMA summaries the anthropocentrism of the South African environmental governance framework which provides that “[e]nvironmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.” The questionnaire

solicited opinions to assess if the trout industry perceived the AIS regulatory reform process to be addressing the NEMA Section 2(2) provision. Just over 58% of the respondents strongly disagreed with the statement that the AIS regulations addressed the NEMA Section 2(2) provision (Table 7-4B). In summative terms, 77% of the sample disagreed with statement that the DEA had adequately addressed the NEMA Section 2(2) needs through the draft regulations.

Table 7-4B also shows that, in aggregate terms, 51% of the respondents agreed with the view that the livelihood impact of regulations should not be neglected even if they facilitated conservation of indigenous fishes. The perceptions about this item seemed to reflect the high income and occupation profiles reviewed in the demographics implying that many respondents' livelihoods did not directly depend on trout. Still, the intuition is relatively firm and agrees with Siegfried and Davies' (1982, p.11) conclusion that the "ultimate problem... is almost always related to development policy and the long-range use of natural resources and, although such ultimate problems require most attention, they are the most neglected." The essence of their argument was that conservation is all about people and for the benefit of people. Thus, conservation initiatives and policies that achieved their conservation goals, but failed to address other developmental needs could be regarded as unreasonable policies by their recipients.

### **7.3. Hindrances to consensual solutions**

The general pattern emerging from Figure 7-6 is that the majority of the factors with the highest percentage of respondents electing them as fundamental problems that were hindering consensus mostly had to do with participatory policymaking and institutional power. The most overwhelming view (78% of the respondents) was that the consultative process followed by the DEA had been ineffective. The present result does not seem to object to the fact that there were consultative meetings, but it queries the quality (effectiveness) of the consultative meetings. Probably, they were power over (ruling down) rather than power with (co-management/co-governance) processes (Degnbol *et al.* 2006, Hiedanpää and Bromley 2011). Béné and Neiland (2006, p.45) argue that democratic policymaking facilitates "economic equity" ("equity in rent redistribution"), "institutional equity" (fair burden of transaction costs imposed by the regulatory framework), "political equity" ("equity of participation in decision-making process") and "endowment equity"

(“equity of access” to environmental resources). These factors largely relate to administrative due process in the processes of institutional change.

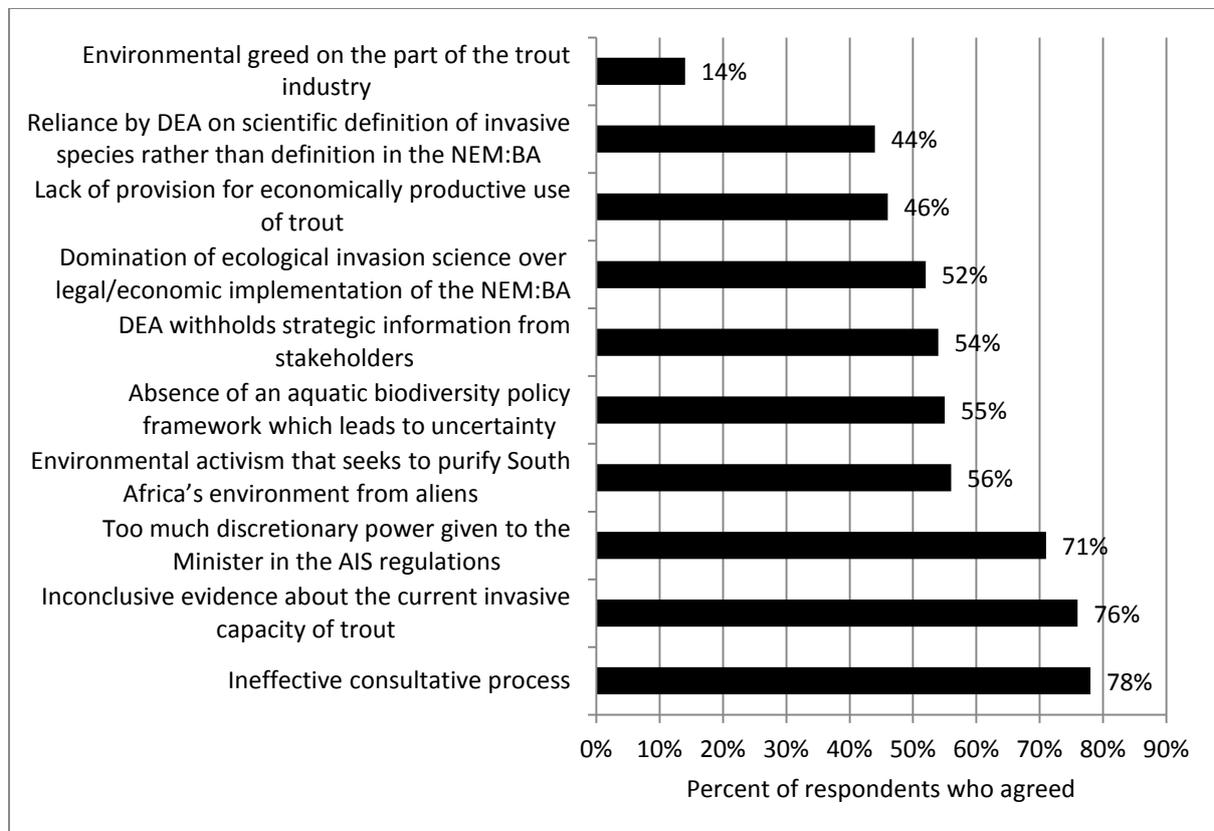


Figure 7-6: Factors hindering consensus in the AIS regulatory reform process

Source: Author's analysis

In spite of the perceived inconclusiveness of the scientific evidence regarding the invasiveness of trout, 76% of respondents felt that the DEA had proceeded with absoluteness of conviction to list trout as invasive. For example, during interviews the senior official of the DEA stated:

“[B]ut then we said with that specific one [that is, trout] *we have absolutely no doubt that our position is the correct one* and we will go ahead and we would regulate on the basis of that and *people could take us to court...*, but *it's simply that we are actually convinced that we are correct* and that if something is invasive then we are obliged to list it” (Expert 1 2014, *pers comm*, emphasis added).

The statement reveals that the DEA felt that it had sufficient evidence, hence the claim that its position on the invasiveness of trout was *absolutely* correct. The conviction that the DEA

was correct was revealed in the suggestion that “people could take us to court”, but the DEA would not compromise on its decision. However, some leading aquatic scientists acknowledged that the AIS reform process was constrained by data-poverty on alien fish invasions (Ellender and Weyl 2014, Van Rensburg *et al.* 2011) because alien fish invasion research was in its “infancy” in South Africa (Ellender and Weyl 2014, p.125).

Respondents also felt that the regulatory text gave the Minister too much discretionary power (71% of the respondents), which in a sense undermined certainty because no one knew with any degree of certainty what the Minister’s probable course of action would be (Figure 7-6). In addition, users of alien and invasive species might have felt uncomfortable with a text that granted the Minister too much discretionary power because it opened opportunities for other interest groups (such as environmental activists) to lobby the Minister to list a species or remove it from one favourable category to a more stringent one. A more stringent regulatory regime would raise the transaction costs of compliance since the regulatory burden might be large and asymmetrical, which would undermine institutional equity.

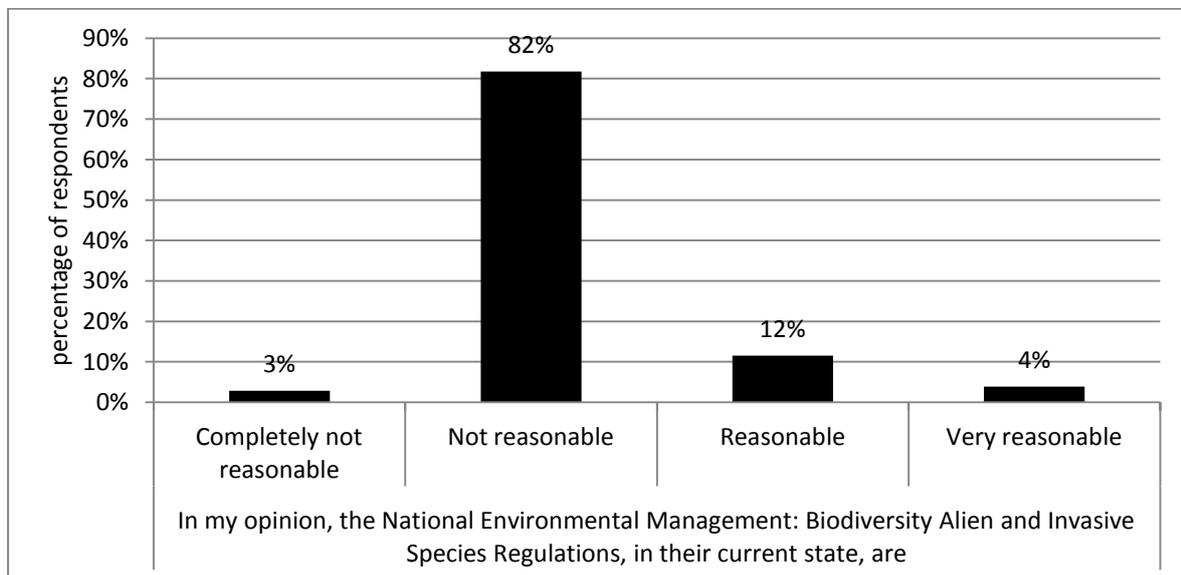


Figure 7-7: Reasonableness of the NEM:BA AIS regulations as in February 2014

Source: Author’s analysis

Given the foregoing descriptive analysis, were the 2014 draft AIS regulations reasonable? As Figure 7-7 depicts, 85% of the respondents perceived the draft AIS regulations not to be reasonable, in aggregate terms. In conclusion, the descriptive results suggested that the

controversies in the regulatory process were driven by governance-related failures. The DEA seemed to have failed to give sufficient reasons when the trout sector asked for some. As a result, the DEA lost the trust of the trout industry. This had potentially important implications because wicked problems demand robust trust relationships to be able to resolve them. There were indications that the regulatory reform process was a limited access policymaking order at the regulatory phase.

#### **7.4. Probability of perceiving AIS regulations as reasonable**

The section presents and interprets the quantitative results. The descriptive analysis revealed that the trout industry largely perceived the regulations to be unreasonable. Further, inferential analysis into the factors that might have been the most important drivers of the controversy, as well as those that deserved the attention of sovereign agents in their decision-making processes, was carried out.

##### **7.4.1. Cronbach's Alpha**

Table 7-6 presents the results of the reliability analysis. Since the items were measured on different scales, the estimation standardised the scale (Gliem and Gliem 2003). A Cronbach's alpha of 0.73 was obtained. Eight items (italicised and emboldened in Table 7-6) had to be excluded from the quantitative analysis since the Cronbach's alpha increased when they were left out.

After excluding the eight items the Cronbach's alpha increased from 0.73 to 0.80 (Table 7-7). According to Gliem and Gliem (2003, p.87), "an alpha of .8 is probably a reasonable goal", but an alpha exceeding 0.6 is also acceptable (Gliem and Gliem 2003, Maree 2013, Tavakol and Dennick 2011). The Cronbach's alpha presumes unidimensionality of the latent variable, which the case may not be (Boermans and Kattenberg 2011, Gorsuch 1997). The correlation between the revised scale and the underlying factor was  $\sqrt{0.8049} = 0.897$  which was reasonably high. The amount of measurement error in the instrument is given by  $1 - \alpha^2 = 1 - 0.8049^2 = 0.352$ . Thus, the measurement error was 35.2%. The error was high suggesting that adding more items that measured the same latent factor to the questionnaire would have reduced the level of the measurement error (Tavakol and Dennick 2011).

Table 7-6: Reliability test – Cronbach’s alpha

Item	n	Sign	item-test correlation	item-rest correlation	interitem covariance	alpha
Is trout invasive	113	+	0.4485	0.3428	0.1120	0.7162
Heard AIS regulations	112	-	0.2131	0.0909	0.1211	<b>0.7338</b>
Understand NEM:BA	111	-	0.2545	0.1347	0.1189	<b>0.7296</b>
Understand AIS regulations	110	-	0.2425	0.1213	0.1192	<b>0.7302</b>
Net conservation benefits >0 list trout as invasive	114	-	0.1525	0.0301	0.1242	<b>0.7393</b>
DEA followed science driven process in AIS regulations	110	+	0.5442	0.4502	0.1071	0.7059
DEA relied on international evidence to list trout	114	-	0.3431	0.2274	0.1168	0.7256
DEA researched nature of threat posed by trout to indigenous fish	113	+	0.5203	0.4198	0.1090	0.7099
DEA researched socioeconomics of trout	114	+	0.5343	0.4363	0.1080	0.7078
DEA consulted when drafting AIS regulations	114	+	0.5837	0.4929	0.1051	0.7015
FOSAF lack specialised knowledge	113	+	0.6019	0.5146	0.1046	0.7002
Trust in DEA increased	114	+	0.6811	0.6044	0.1015	0.6932
DEA justified rationale for listing trout as invasive	114	+	0.7001	0.6255	0.1007	0.6913
AIS regulations strike balance between conservation and economic utilisation	111	+	0.5613	0.4691	0.1072	0.7060
AIS regulations meet NEMA2.2	106	+	0.4231	0.3092	0.1129	0.7179
Even if regulations promote conservation of indigenous fish, their livelihood impact should not be neglected	103	+	0.4143	0.3008	0.1135	0.7191
All species have permanent place in South Africa	113	+	0.1408	0.0189	0.1248	<b>0.7403</b>
Sufficient condition for listing species as invasive	105	-	0.3907	0.2791	0.1138	0.7197
Trout flyfishing way of intimacy with nature	105	-	0.2222	0.0981	0.1209	<b>0.7335</b>
Trout is a cultural symbol	106	-	0.2393	0.1139	0.1207	<b>0.7330</b>
Trout is a status symbol	106	+	0.0736	-0.0536	0.1275	<b>0.7451</b>
Test scale					0.1138	0.7295

Source: Author’s analysis

Table 7-7: Cronbach’s alpha after excluding irrelevant items

Item	n	Sign	item-test correlation	item-rest correlation	interitem covariance	alpha
Is trout invasive	113	+	0.4984	0.3819	0.2468	0.7972
DEA followed science driven process in AIS regulations	110	+	0.5392	0.4284	0.2409	0.7920
DEA relied on international evidence to list trout	114	-	0.3640	0.2312	0.2624	0.8102
DEA researched nature of threat posed by trout to indigenous fish	113	+	0.5873	0.4828	0.2372	0.7887
DEA researched socioeconomics of trout	114	+	0.6088	0.5066	0.2342	0.7859
DEA consulted when drafting AIS regulations	114	+	0.5987	0.4955	0.2344	0.7861
FOSAF lack specialised knowledge	113	+	0.5855	0.4812	0.2360	0.7876
Trust in DEA increased	114	+	0.7084	0.6247	0.2233	0.7752
DEA justified rationale for listing trout as invasive	114	+	0.7309	0.6525	0.2212	0.7731
AIS regulations strike balance between conservation and economic utilisation	111	+	0.5751	0.4702	0.2387	0.7900
AIS regulations meet NEMA2.2	106	+	0.4794	0.3422	0.2513	0.8011
Even if regulations promote conservation of indigenous fish, their livelihood should not be neglected	103	+	0.4475	0.3092	0.2545	0.8038
Sufficient condition for listing species as invasive	105	-	0.4437	0.3210	0.2510	0.8008
Test scale					0.2410	0.8049

Source: Author’s analysis

Some items entered the scale negatively (reversed), while others entered positively, hence the column labelled sign (+/-) (Table 7-7). The item-test column gives the correlation between the item and the standardised overall scale variable that controls for the varying scales on which items were measured. The higher the item-test correlation, the more relevant an item is to the measurement of reliability. For example, the most relevant items were: “Trust in DEA increased” (a correlation to the all-items scale of 0.708) and “DEA justified rationale for listing trout as invasive” (correlation to the all-items scale of 0.731).

The item-rest column (Table 7-7) measures the correlation between an item and the scale formed by the rest of the items (Gliem and Gliem 2003) and is less misleading than item-test correlation (Gorsuch 1997). The higher the item-rest correlation, the more important an item is in the reliability scale. For example, the correlation between the item “Is trout invasive?” and the sum of the rest of the items was 0.382 (Table 7-7).

The column interitem covariance (Table 7-7) measures the effect of excluding an item on the average interitem correlation, thus items that do not correlate well with others have higher interitem covariances associated with them. For example, excluding “DEA relied on international evidence to list trout” increased the interitem covariance from an average of 0.241 to 0.262 (Table 7-7). Similarly, excluding “Regulations meet NEMA 2.2 needs” increased the interitem covariance from 0.241 to 0.251. On the other hand, excluding, for example, “DEA researched the nature of threat posed by trout on indigenous fish” reduced the interitem covariance from 0.241 to 0.237 (Table 7-7).

The most important column in Table 7-7 is the column labelled alpha because it reveals the effect on the Cronbach’s alpha of excluding an item. Items for which the alpha was lower than the test scale (alpha = 0.805) were relevant because excluding them lowered the reliability. For example, excluding the item “Are trout invasive?” reduced the alpha from 0.805 to 0.797, but excluding the item “DEA relied on international evidence to list trout” marginally increased the alpha from 0.805 to 0.81. For theoretical interest in this item however, it was retained.

#### **7.4.2. Correlation analysis**

Table 7-8A and Table 7-8B present correlation coefficients for items that were retained after reliability analysis, which were significant at the 10% level of significance. Blanks imply insignificance at the 10% level of significance. The strongest reported positive correlations were between “Trust in DEA increased” and the scale variable (0.7) and between “DEA justified rationale for listing trout” and the scale variable (0.7). There was a moderate negative correlation between the item “DEA relied on international evidence to list trout” and the scale variable (-0.4). Other correlations were small despite being statistically significant.

Table 7-8A: Correlation analysis

	Item	1	2	3	4	5	6	7
1	Scale variable	1						
2	Is trout invasive	.5***	1					
3	DEA followed science driven process in AIS regulations	.5***		1				
4	DEA relied on international evidence to list trout	-.4***	-.2**		1			
5	DEA researched nature of threat posed by trout to indigenous fish	.6***	.2**	.2*	-.2**	1		
6	DEA researched socioeconomics of trout	.6***	.3**	.2*		.4***	1	
7	DEA consulted when drafting AIS regulations	.6***		.4***		.1*	.3***	1
8	FOSAF lack specialised knowledge	.6***	.2***	.2**		.3***	.3***	.3***
9	Trust in DEA increased	.7***	.2**	.3***		.4***	.4***	.5***
10	DEA justified rationale for listing trout as invasive	.7***	.3**	.3***	-.2**	.4***	.4***	.4***
11	AIS regulations strike balance of conservation-economic activities	.6***	.3***	.2**		.3***	.4***	.4***
12	AIS regulations meet NEMA2.2	.5***		.2**		.3***		.3***
13	Even if regulations promote conservation of indigenous fish, their livelihood impact should not be neglected	.4***		.3***		.2*	.2*	
14	Sufficient condition for listing species as invasive	-.4***	-.3***	-.2**		-.2*	-.2**	-.2**

\*\*\* means significant at 1%; \*\* means significant at 5% and \* means significant at 10%; blanks mean insignificant correlations.

Source: Author's analysis

Table 7-8B: Correlation analysis

	Item	8	9	10	11	12	13	14
8	FOSAF lack specialised knowledge	1						
9	Trust in DEA increased	.5***	1					
10	DEA justified rationale for listing trout as invasive	.4***	.6***	1				
11	AIS regulations strike balance of conservation-economic activities	.3***	.5***	.5***	1			
12	AIS regulations meet NEMA2.2	.2**	.2**	.2**		1		
13	Even if regulations promote conservation of indigenous fish, their livelihood impact should not be neglected		.2*			.3***	1	
14	Sufficient condition for listing species as invasive			-.3***			-.2**	1

\*\*\* means significant at 1%; \*\* means significant at 5% and \* means significant at 10%; blanks mean insignificant correlations.

*Source: Author's analysis*

Some very significant positive correlations were those between “Trust in DEA increased” and “DEA justified rationale for listing trout” (0.6); “Regulations strike balance between conservation of indigenous species and economic utilisation of trout” and “DEA justified rationale for listing trout as invasive” (0.5) (Table 7-8B). Other unexpectedly low positive correlations occurred between “AIS regulations meet NEMA2.2 needs” and “Trust increased in DEA” (0.2) (Table 7-8B). The most outstanding pattern was the clustering of items that related to democratic policymaking such as consultation, trust, justification of decisions and balancing of competing interests (Table 7-8A and Table 7-8B). This suggested that these clusters of items might have been measuring the same latent variable, hence justifying exploratory factor analysis (Gliem and Gliem 2003).

#### **7.4.3. Sample adequacy**

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used (Table 7-9). The KMO is a measure of appropriateness of factor analysis for a given set of items. It determines the proportion of variance amongst the items that represents the common variance. The rules of thumb are that a KMO of 0 – 0.49 is unacceptable; 0.50 – 0.59 is

miserable; 0.60 – 0.69 is mediocre; 0.70 – 0.79 is middling; 0.80 – 0.89 is meritorious and 0.90 – 1.0 is marvellous (Dziuban and Shirkey 1974).

Table 7-9: Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

Variable	KMO
DEA researched socioeconomics of trout	0.7729
DEA consulted in developing AIS regulations	0.7427
Fosaf lack specialised knowledge to contribute to AIS regulations	0.7414
Trust in DEA increased due to AIS regulations process	0.7854
DEA justified rationale for listing trout as invasive	0.8261
AIS regulations strike balance between conservation of indigenous fishes and economic utilisation of trout	0.6758
Is trout invasive?	0.6190
DEA relied on international evidence to list trout	0.6468
What is sufficient criterion for listing a species as invasive?	0.5683
DEA researched the nature of ecological threat posed by trout	0.8090
AIS regulations NEMA 2.2 needs	0.6873
Even if regulations promote conservation of indigenous fish, their livelihood should not be neglected	0.5325
DEA followed a science driven process in AIS regulations	0.7192
Overall	0.7304

*Source: Author’s analysis*

While the rest of the items had a KMO measure of sample adequacy in the middling to meritorious categories (Table 7-9), four items had a KMO in the mediocre category and two items had a KMO in the miserable category. The poor sample adequacy for some items illustrated the limitations of relying on items rather than scaled factors in further analysis (Gliem and Gliem 2003, Maree 2013). Nevertheless, the all-items KMO of 0.73 suggested that the sample was adequate (Table 7-9).

#### **7.4.4. Exploratory factor analysis**

After testing the reliability of the instrument, exploratory factor analysis was used to reduce the data to a few theoretical constructs. Following Maree (2013, p.219), “the “bad” items” identified during reliability analysis were removed, thus the researcher excluded the eight items identified in Table 7-6. Oblique rotation was used to assess the underlying pattern for the latent variable such that correlated factors were produced (Gorsuch 1997). DiStefano *et al.* (2009, p.3) argue that “the cut-off value to use is an arbitrary decision.” A factor loading

cut-off value of 0.4, which was above the minimum recommended cut-off value of 0.3, was chosen (DiStefano *et al.* 2009).

Table 7-10: Extracted factors by oblique rotation

Variable	Participatory	Evidence for listing	Anthropocentric	Contextualise	Uniqueness
DEA researched socioeconomics of trout	0.4374				0.5710
DEA consulted in developing AIS regulations	0.5440			0.4967	0.3966
Fosaf lack specialised knowledge to contribute to AIS regulations	0.7602				0.4138
Trust in DEA increased due NEM:BA decision processes	0.7696				0.2834
DEA justified rationale for listing trout as invasive	0.7604				0.3349
AIS regulations strike balance between conservation and economic utilisation	0.6440		-0.4443		0.4195
Is trout invasive?		-0.7665			0.3843
DEA relied on international evidence to list trout		0.5456		0.5437	0.4468
What is sufficient criterion for listing a species as invasive?		0.7252			0.3696
DEA researched the nature of ecological threat posed by trout			0.6577		0.4313
AIS regulations NEMA 2.2 needs			0.7204		0.3978
Even if regulations promote conservation of indigenous fish, their livelihood impact should not be neglected				0.4421	0.4705
DEA followed a science driven process in AIS regulations				0.7222	0.3768

Note: Factors with loadings <0.4 excluded

*Source: Author's analysis*

All factors with Eigen values that were at least unity were considered so as to retain a broader set of factors of theoretical interest that had emerged from descriptive and earlier

qualitative analysis (Boermans and Kattenberg 2011, Williams *et al.* 2012). The principal component factoring results are in Appendix 7. Williams *et al.* (2012, p.9) emphasise that the “labelling of factors is a subjective, theoretical, and inductive process.” Backed with the pattern that emerged during descriptive analysis, labels that aligned with the study’s “theoretical and conceptual intent” were chosen (Williams *et al.* 2012, p.9).

Four groups of items comprised the four extracted factors (Table 7-10). The factor loading coefficients in Table 7-10 are Bartlett coefficients used to estimate the individual scores (per case/row). The column labelled “Uniqueness” measures the variance that is peculiar to a variable because it is not shared with other variables in the factor model. Variables with large uniqueness values were less relevant in the factor model because they had less in common with other variables. For example, 57% of the variance in “DEA researched socioeconomics of trout” was not shared with other variables in the factor model. Thus, “The DEA researched socioeconomics of trout” was not quite relevant in the factor model.

The first factor, labelled Participatory, comprised six democratic policymaking related items such as “The DEA *consulted* when developing the AIS regulations”; “The DEA *justified* the rationale for listing trout as invasive”; and “*Trust* in DEA increased as a result of the decision processes of the NEM:BA” (Table 7-10). The weightiest items in this factor were trust in the DEA increased (factor loading of 0.770), justification of administrative decisions (a factor loading of 0.760), and “The FOSAF lacks expertise to contribute to the AIS regulatory reform process” (factor loading of 0.760). The importance of administrative due process and consensual policymaking was the central thrust of this factor. It is important to note that the four factors entailed participatory activities – trust building is an interactive process, justification is an interactive process of giving and asking for reasons, balancing/win-win solutions imply solving the puzzle consensually as is characteristic of wicked problems and messes and researching socioeconomics of trout calls for active interaction between the DEA and the sector.

Three items comprised the second factor, labelled “evidence for listing”: “Is trout invasive?”; “The DEA conclusively relied on international evidence to list trout as invasive” and the “Sufficient condition for listing species as invasive” (Table 7-10). The most important item of these three was “Is trout invasive?” (factor loading of -0.767). “Is trout invasive” entered the

factor negatively suggesting that as the DEA accumulated evidence of the ecological impact of trout, trout came to be regarded as invasive. Being regarded as invasive was associated with a negative connotation of being a public bad in some sense. Hence the increase in evidence for listing trout as invasive made it a less desirable species, especially in an ecological sense, hence the negative sign. “The sufficient condition for listing trout as invasive” (factor loading of 0.725) entered the factor positively because the sufficient condition if considered in its broadest sense required the gathering of evidence of ecological impact, human health impact, economic impact and environmental impact. A firm and broad evidence base positively related to the sufficient condition for listing a species as invasive.

The third factor, labelled “anthropocentric”, consisted of three items: “The DEA researched the nature of ecological threat posed by trout” (factor loading of 0.658); the “AIS regulations address the spiritual, cultural, economic, developmental, psychological and social needs of the policy clientele, that is, NEMA 2(2) needs” (a factor loading of 0.720); and finally, “The AIS regulations strike balance between conservation of indigenous fishes and economic utilisation of trout” (factor loading of -0.444) (Table 7-10). The negative influence of the variable “AIS regulations strike balance between conservation of indigenous fishes and economic utilisation of trout” suggested that a greater bias towards human welfare in the current generation lost the essence of long term anthropocentrism because it imposed costs on future generations. On the other hand, a greater bias towards conservation lost the essence of short term anthropocentrism in that it imposed costs on the present generation. The factor focused on the people-centeredness of environmental governance in South Africa. Addressing cultural, spiritual, developmental, social, economic and psychological needs was anthropocentrism at the core.

Lastly, the fourth factor, labelled “contextualising”, contained the items: “DEA followed a South African scientific research-driven process in implementing the NEM:BA” (a factor loading of 0.722); “DEA relied on international evidence to list trout as invasive” (a factor loading of 0.544); “DEA consulted with interested and affected parties in developing AIS regulations” (a factor loading of 0.497) and “even if the regulations facilitate conservation of indigenous species, their livelihood impact should not be neglected” (factor loading of 0.442) (Table 7-10). The most important variable in this factor was “DEA followed a South

African scientific research-driven process in implementing the NEM:BA” suggesting that *local* research was non-substitutable. It played an important role in shaping policy development and provided the framework for contextualising global evidence (Ellender and Weyl 2014, Van Rensburg *et al.* 2011). Thus, the factor emphasised the need to contextualise evidence when making regulatory decisions, because reality was socially and contextually constructed through participatory processes (Bromley 2012, Dawson 1994, Hiedanpää and Bromley 2011, Ostrom and Cox 2010). Applying evidence without contextualising it would, probably, be the genesis of wickedness of a policy problem. Livelihood interests indispensably defined the limits and rate of institutional adjustment.

#### **7.4.5. Logistic regression**

The four factors in Table 7-10 became the new regressors together with some demographic variables. An ordered logit model was estimated first since the dependent variable “Reasonableness of the 2014 draft AIS regulations” was ordered with four choices: completely not reasonable, not reasonable, reasonable and very reasonable. The proportionality of odds assumption was violated (Appendix 10), suggesting that an ordered logit regression could not be estimated (Long and Freese 2006). Thus, the researcher decided to merge categories of the reasonableness variable. Completely not reasonable and not reasonable were re-coded as “not reasonable = 0” and reasonable and very reasonable were re-coded as “reasonable = 1”. Since the variable became binary, a binary logistic model was estimated (Equation 4-12). All demographic variables perfectly predicted the outcome variable except education (Appendix 11), which was included in the final model. Table 7-11 presents the results of the final model.

The effective estimation sample was 86 (Table 7-11). The model was significant at less than the 1% level of significance with a Chi-squared statistic of 37.64. Thus, the null hypothesis that all estimated coefficients except the intercept were jointly zero was rejected. Judging by the pseudo  $R^2$ , the model was a good fit because with only five variables it explained over 57% of the total variation in the probability of perceiving the 2014 proposed AIS regulations to be reasonable. The estimated model made theoretical sense. Exact levels of significance were used to interpret statistical significance of estimates since they are non-arbitrarily determined (Gujarati 2004).

Table 7-11: Estimation results for logistic regression of Reasonableness of AIS regulations

	<b>Reasonableness of 2014 draft AIS regulations (0,1)</b>
<b>Participatory</b>	1.618***
Standard error	.614
P-value	0.008
<b>Evidence for listing</b>	2.837**
Standard error	1.175
P-value	0.016
<b>Anthropocentric</b>	1.934***
Standard error	.723
P-value	0.007
<b>Contextualising</b>	1.652**
Standard error	.695
P-value	0.017
<b>Education</b>	.277
Standard error	.520
P-value	0.594
<b>Constant</b>	-5.766
Standard error	3.187
P-value	0.070
Number of obs	86
Log likelihood	-14.066
LR chi <sup>2</sup> (5)	37.64
Prob > chi <sup>2</sup>	0.000
Pseudo R <sup>2</sup>	0.572

Note: \*\*\* means significant at 1%; \*\* means significant at 5%

Source: Author's analysis

Effective participation (“participatory”) had a positive effect on the probability of perceiving the 2014 draft AIS regulations to be reasonable. The effect was significant at an exact significance level of 0.8% (Table 7-11). Béné and Neiland (2006) emphasised that effective participation theoretically entailed four dimensions of equity: institutional equity, endowment equity, economic equity and political equity in the policy space. Similarly, the ability to address “anthropocentric” issues facilitated affirmative perceptions about the reasonableness of the regulations. The effect was significant at an exact significance level of 0.7% (Table 7-11).

An evidence-based (“evidence for listing” species) regulatory reform process increased the probability that the respondent would perceive the draft AIS regulations to be reasonable. This positive effect was significant at an exact significance level of 1.6% (Table 7-11). The

founding constitutional provision for environmental governance requires *reasonable legislative and other measures* to be implemented to facilitate progressive realisation of environmental rights (Republic of South Africa Constitution 1996, section 24). It was established in Chapter Five that the judiciary interpreted reasonable legislation/regulations to be that for which there is a rational and defensible causal link between the legislative/regulatory intent, public purpose and the scientific/other evidence available to the policymaker. Lastly, the ability to “contextualise” scientific or other evidence had a positive influence on the probability of the respondent perceiving the draft AIS regulations to be reasonable. The effect was significant at an exact significance level of 1.7% (Table 7-11).

Table 7-12: Goodness of fit test for estimated logistic regression model

Classified	True		Total
	Regulations are reasonable =1	Regulations are not reasonable =0	
+	6	3	9
-	5	72	77
Total	11	75	86
Percent correctly classified = 90.7 %			

*Source: Author’s analysis*

The model correctly predicted 90.7% of the perceptions about the reasonableness of the 2014 draft AIS regulations (Table 7-12). The estimated model was a good fit. Table 7-13 presents transformed results derived from Table 7-11 for ease of interpretation. Only significant variables were reported.

Table 7-13: Odds of perceiving the AIS draft regulations to be reasonable

Reasonableness of 2014 draft AIS regulations (0,1)	Coeff	z	P> z	% change in odds for a unit increase in X	% change in odds for SD increase in X	Standard deviation of X
Participatory	1.618	2.633	0.008	404.3	410.4	1.0075
Evidence for listing	2.837	2.415	0.016	1606.4	1644.5	1.0078
Anthropocentric	1.934	2.675	0.007	592.0	600.0	1.0059
Contextualising	1.652	2.377	0.017	421.6	414.6	0.9918

*Source: Author’s analysis*

***a. Participation and reasonableness of emergent institutions***

For a unity increase in “participatory”, the odds of perceiving the regulations to be reasonable increased by over 404%, holding other factors fixed at their means (Table 7-13). Similarly, for a one standard deviation increase in “participatory”, the odds of perceiving the regulations to be reasonable increased by just over 410%, all variables centred on their means (Table 7-13). This result suggests that satisfying democratic environmental policymaking requirements has a strong positive influence on the polity’s perceptions of the reasonableness of the proposed institutional arrangement.

The lack of effective participatory governance was a major weakness of the NEM:BA process. Strategic informants highlighted the problem of epistemic violence. For example, Expert 6 (2014, *pers comm*) remarked that “the DEA are not doing it correctly. Why are they not listening to scientists? If they are, then they are not listening to the right ones”. (Expert 6 2014, *pers comm*) added that although “the DEA claimed that the whole process was scientifically based, it is flawed... Yet, there are teams and teams of experts, scientists and lawyers, employed by government”. Expert 3 (2014, *pers comm*) also reiterated that the DEA leadership were “biased towards the input from scientists who are mainly their own. They don’t like listening to independent scientific opinions”. The most important point raised by Expert 3 and Expert 6 was that the DEA had its own elite group of scientists and lawyers whose epistemic claims really mattered in the design of institutions. The absence of inclusive discourse in the regulatory reform process implied that participation was ineffective.

***b. Evidence for listing species and reasonableness of emergent institutions***

A one unit increase in the factor “Evidence for listing” species increased the odds of perceiving the regulations to be reasonable by over 1606%, holding other factors fixed at their means (Table 7-13). The odds of perceiving the regulations to be reasonable increased by nearly 1645% for a one standard deviation increase in the variable “Evidence for listing” species, centring all variables on their means. Thus, the factor “Evidence for listing” species was the most critical in shaping the perceptions of the reasonableness of the regulations because its effect on the magnitude of the change in the odds of perceiving the regulations to be reasonable was at least 2.5 times the effects of changes in the other factors.

The implication is that a regulatory reform process that is perceived to be evidence-driven, subject to the inclusiveness of the evidence-generating process, qualified for a reasonable process of institutional change. The theory of institutional change reviewed in Chapter Two postulated that a progressive process of change was characterised by the instrumental application of knowledge and instrumental growth of relevant knowledge to resolve societal problems (Atkinson and Reed 1990, Bush 1987, Hayden 2006, Tool 1994). One informant queried the credibility of the evidence used.

“When I write to them and I say please give me the Minister’s reasons for listing trout as invasive... they sent me a list of articles, which they said they relied upon in coming to the decision. That’s not good enough to me... You must say to me what aspects of those articles have you considered... And what weight have you given it in relation to what other considerations. And what is the reasoning, therefore, that allows you to make this conclusion” (Expert 5 2014, *pers comm*).

Commons (2009, p.690) asserted that reasonable valuation is the “process of weighing” contending claims in “light of changing conditions and conflicting habitual assumptions.” Thus, reasonable value ultimately is “the consensual idealism” of those concerned with the issue at hand (Commons 2009, p.743). Expert 5 rightly demanded the “weight” assigned to aspects of the peer reviewed articles in light of other contextual facts. Expert 3 (2014, *pers comm*) also remarked that “so many species are listed as invasive for administrative convenience.” The failure of the bureaucracy to justify its reliance on certain peer reviewed articles and what aspects thereof it relied upon undermined the credibility of the evidence.

The present findings suggest that there are increasing returns to investment in aquatic alien fish invasion research because the resultant evidence has the potential to create positive perceptions about the reasonableness of regulatory change proposals, which in turn would minimise transaction costs of environmental policy (Coggan *et al.* 2010, Marshall 2013, McCann 2013, McCann *et al.* 2005, Mettepenningen *et al.* 2011). Usually, transaction costs of environmental policy are magnified by controversy-driven vicious planning cycles (the planning curse) that fail to resolve the problem, which, often, are contestations over evidence used to make decisions. Repeated planning cycles involve resources such as time, personnel, funds and hiring of consultants, among others. Evidence is crucial for consensus

building, which is a sure way of addressing wicked problems (Balint *et al.* 2011, Rittel and Webber 1973). Similarly, evidence-based institutional change enables policymakers to give reasons and justify actions satisfactorily to private agents (Brandom 1995, Bromley 2006, Davidson 1963).

Reviewing the state of South African knowledge about freshwater alien fish invasions, Ellender and Weyl (2014, p.125) drew attention to the fact that alien fish invasion research was “in its infancy” and that implementation of the DEA’s AIS regulatory framework required a “strong information base” (Ellender and Weyl 2014, p.128) that was regionally sensitive. However, they found that “South Africa is *data-poor* with regard to understanding non-native fish invasions” (Ellender and Weyl 2014, p.128, emphasis added).

“Part of the criticism against our decision has also been how invasive trout is. Is trout invasive in all areas? So, it’s a valid question... So, it’s true we haven’t done enough research on the invasiveness of trout or other species, but where we have done research there is no question that trout are invasive,” (Expert 1 2014, *pers comm*).

“Policy decisions are being made in a policy vacuum. Policy decisions are being made in the absence of credible information. Policy decisions are being made in the absence of credible scientific knowledge” (Expert 5 2014, *pers comm*).

Expert 1’s response confirmed the infancy of research into alien fish invasions and that not enough research had yet been carried out. However, with reference to Karssing (2010), Karssing *et al.* (2012), Rivers-Moore *et al.* (2013), Shelton (2013), Shelton *et al.* (2014), the senior official was confident that enough knowledge had been gathered to inform policy despite the focus of these studies on one dimension of the invasion process. A common feature of these studies is that they focus on the impact of trout in the invaded area, but they do not examine other dimensions of invasion such as availability of potentially colonisable habitat and the species’ historic and innate rate of range extension, which scholars such as Macdonald and Jarman (1985) and Richardson and Van Wilgen (2004) consider to be the most important. Ellender and Weyl (2014, p.128) also emphasise this knowledge gap stating that “relatively little research has been done on their ... *spread*” (emphasis added). Expert 5’s view demonstrates how perceptions that undermine

reasonableness of new institutions easily emerge when regulated sectors have doubts about the credibility of the evidence used in public decision making process.

***c. Anthropocentrism and reasonableness of emergent institutions***

Attending to the needs and interests of people equitably and putting them at the forefront of policy processes for managing the environment defines the core of the anthropocentric South African constitutionalism. A unit increase in the factor “anthropocentric” increased the odds of perceiving the regulations to be reasonable by 592%, holding other factors fixed at their means (Table 7-13). For a one standard deviation increase in the factor “anthropocentric”, the odds of perceiving the AIS regulations to be reasonable increased by 600%, all variables centred on their means (Table 7-13). This result was interesting in the sense that the definition of an invasive species in the NEM:BA had an ecological threat component as well as harm to human health, economic harm and environmental harm components. Thus, to list trout as invasive without demonstrating its threat to the human condition or liveability of the environment necessarily generated objections.

In Chapter 5, the study established that the constitutional/NEMA environmental governance frameworks were consequentialist, which logically was human-centeredness. Thus, the positive effect of “anthropocentric” on the probability of perceiving the regulations to be reasonable corroborated the findings in Chapter 5 that in a consequentialist environmental governance framework, it was not enough to say that a species had an ecological impact; the impact had to be of such a magnitude that it jeopardised human wellbeing (Maier 2012, Simberloff *et al.* 2013).

***d. Contextualising evidence and reasonableness of emergent institutions***

The results revealed that the odds of perceiving the regulations to be reasonable increased by nearly 422% for a unit increase in the variable “contextualising”, holding other variables fixed at their means (Table 7-13). A one standard deviation increase in “contextualising” also increased the odds of perceiving the regulations to be reasonable by nearly 415%, all variables centred on their means. This was an enormous influence, which was dominated by the item “the DEA followed a South African scientific research-driven process in implementing the NEM:BA” (factor loading of 0.72), and suggested that scientific evidence was a necessary condition for a new institution to be perceived to be reasonable.

The extent to which regulations were perceived to be reasonable depended on the extent to which the DEA contextualised to South Africa bio-climatic conditions the scientific evidence used to decide the listing of species. The foregoing conclusion follows given the presence in “contextualising” of factors such as international evidence, consulting interested and affected parties in developing regulations and livelihood impact of regulations. All these items not only defined and shaped the context within which scientific claims are transformed into new institutions, but also determine the extent and speed of institutional adjustment. Informants were divided over the source of the evidence that should be used. Some invasion biologists maintained that international evidence was sufficient, while the trout sector argued for local research evidence.

“Published GLOBAL scientific literature has been through a *scientific peer review* whereas the *opinions* of many trout anglers have been through a ‘*pub review*’ system which seems to reinforce what they say because they have heard it so many times BUT *no actual facts!*,” (Expert 7 2014, *email comm*, capitalization in original, italics added).

“I fish for trout in the Bushman’s river, about 100km from here. I catch yellowfish, and I catch brown trout. They co-exist. They are both present in the system. I know of no other environmental harm that happens there. So, what is the imperative for conservation in that context? You see, it’s easy to use assumptions!” (Expert 5 2014, *pers comm*).

“In my hometown ... we also have indigenous minnows living with trout.... I keep on telling the officials to come and look... I have got records that I have kept to prove it” (Expert 6 2014, *pers comm*).

“Coexistence is not a sufficient condition to deny that trout are invasive.” (Expert 2 2014, *pers comm*).

The four quotations suggest that invasion biologists and resource users disagree sharply over the invasiveness of trout. To Expert 5 and Expert 6, prolonged coexistence of trout and indigenous species implied no environmental harm existed, but Expert 1 (2014, *pers comm*) pointed out that the trout industry only looked at the “impact of trout on indigenous fish

and [not] impacts across the taxa.” Anecdotal evidence of co-existence of trout contradicted generalisation of the invasiveness of trout in the entire country. Expert 2 (2014, *pers comm*) maintained that “Science is a natural thing same with economics. You build a case around a pattern. And you extend what you know into certain areas.” His argument implied generalisation from specific cases. What seemed surprising, however, was that an inductive framework used to generalise invasion from a specific case to the rest of the country was ruled out for generalising from specific cases the coexistence of trout and indigenous species to the rest of the country.

Expert 7, however, regarded global evidence as truth and observational claims as non-truth and non-factual because they had not been scientifically reviewed. They lacked the truth content because they were outcomes of a “pub review system”, which, in his view, was incapable of producing facts. Hayek (1945, p.521), however, argues that today “it is almost heresy to suggest that scientific knowledge is not the sum of all knowledge”, yet “beyond question a body of very important but unorganized knowledge which cannot possibly be called scientific in the sense of knowledge of general rules” exists. Scholars in fisheries governance, however, discuss the disappearance of anecdotal knowledge, which they believe fills in the knowledge gaps in scientific models that often suffer from the shifting baselines syndrome (Jackson and Alexander 2011, Pauly 1995, Sheppard 1995, Sumaila and Pauly 2011).

The anecdotes facilitate a process of “stochastic belief updating” (Bromley 2008d, p.6). The South African environmental governance framework enjoins governmental agencies to “take into account the interests, needs and values of all interested and affected parties, and this includes *recognizing all forms of knowledge, including traditional and ordinary knowledge* (NEMA, section 4(g), emphasis added). Thus, the dismissal of observational evidence under the label “pub reviewed” demonstrates that a hegemonic epistemological system engendered epistemic violence and undermines emergence of reasonable institutions.

#### **7.4.6. Assessing discrete changes in probability**

The probability of perceiving the regulations to be “not reasonable” was 98.8%, all factors held at their means (Table 7-14). Table 7-14 reveals that as “participatory” increased from

its minimum to its maximum, the probability of perceiving the regulations to be reasonable increased by 0.9032 (or  $\frac{0.9032}{0.0011} \times 100 = 82,109\%$ ), holding other variables at their means.<sup>7</sup> Conversely, this result implied that as participatory changed from its maximum to its minimum, the probability of perceiving the regulations to be reasonable declined by 99.9%. Thus, the probability of perceiving the regulations to be reasonable was very sensitive to the state of participation of resource users in environmental governance as the level of participation increased from its minimum (limited access policymaking order) to its maximum (open access policymaking order).

Table 7-14: Discrete changes in probabilities of perceiving the regulations to be reasonable

	from	to	diff	from	to	diff	mfx
	X=min	X=max	Min->Max	x-0.5sd	X+05sd	-+0.5sd	
Participatory	0.0011	0.9043	0.9032	0.0055	0.0276	0.0220	0.0198
Evidence for listing	0.0000	0.2658	0.2658	0.0030	0.0498	0.0468	0.0347
Anthropocentric	0.0001	0.8914	0.8913	0.0047	0.0321	0.0274	0.0237
Contextualising	0.0004	0.6101	0.6098	0.0055	0.0277	0.0222	0.0202
Probability that February 2014 AIS regulations were not reasonable							0.988
Probability that February 2014 AIS regulations were reasonable							0.012

Source: Author's analysis

The probability of perceiving the regulations to be reasonable was also very sensitive to the manner in which anthropocentric issues were addressed because it increased by 0.8913 (or 891,300%) as “anthropocentric” switched from its minimum to its maximum, holding other factors at their means (Table 7-14). Similarly, the probability of perceiving the regulations to be reasonable was sensitive to the increase in “contextualising” from its minimum to its maximum (increasing by 0.6 or 152,450%), holding other variables at their means. As “Evidence for listing” species increased from its minimum to its maximum, the probability of perceiving the regulations to be reasonable increased by 0.3 (or nearly infinite percent) holding other variables at their means, which was a very large influence.

The marginal effect of a small increase in “participatory” on the probability of perceiving the regulations to be reasonable was 2% (Table 7-14). The marginal effect of a small increase in

<sup>7</sup> %change =  $\left( \frac{\text{probability at maximum} - \text{probability at minimum}}{\text{probability at minimum}} \right) \times 100$

“evidence for listing” species on the probability of perceiving the regulations to be reasonable was 3.5% (Table 7-14). The marginal effect of a small increase in “anthropocentric” on the probability of perceiving the regulations to be reasonable was 2.4% (Table 7-14). The marginal effect of a small increase in “contextualising” on the probability of perceiving the regulations to be reasonable was 2% (Table 7-14). Overall, all the factors had huge influences on the changes in the probability of perceiving the regulations to be reasonable and even the marginal effects were substantially large.

### **7.5. Perceptions about invasiveness of trout**

Since the controversy was driven by disagreements over the invasiveness of trout, the study carried out an analysis of the probability of perceiving trout to be an invasive species. Likert-scale variables with categories (strongly disagree, disagree, neutral, agree and strongly agree) were used as already reviewed under descriptive analysis. The challenge in utilising such data was how to best deal with Likert-scale predictors. One view is that they are qualitative variables and as such, the distance between the categories is non-equal (Agresti 2002). It would be spurious to ignore that fact and proceed to estimate the model using the categories as quantitative data. The second view is that the categories are quantitative (Agresti 2002, Long and Freese 2006, Maree 2013).

A factorial logistic model that treated the categories as qualitative predictors was estimated (Equation 4-11). The estimated factorial logistic model is reported in Appendix 12; its goodness of fit is reported in Appendix 13; and its odds ratios are presented in Appendix 14. Secondly, a simple logistic model that treated the categories as quantitative predictors was estimated based on Equation 4-12. The alternative formulation increased degrees of freedom by interpreting the categorical predictors as quantitative (Table 7-15). In order to assess the suitability of treating the categorical predictors quantitatively rather than qualitatively, the contrast between the factorial logistic model and the simple logistic model was tested (Appendix 15). The null hypothesis was that the simple logit model was nested in the factorial logit model. The likelihood ratio test returned a chi-squared statistic of 16.22 which was statistically insignificant, with a p-value of 18% (Table 7-15). Since the null hypothesis that the simple logistic model was nested in the factorial logistic model could not be rejected, the study proceeded to utilise the simple logistic framework.

The simple logistic model was estimated including two items (“trout is a cultural symbol” and “trout fly-fishing is a way of getting intimate with nature”) that were excluded from the factorial logistic model because of collinearity and perfect prediction of the outcome variable. The results are reported in Table 7-15. Using the likelihood ratio test, the model was statistically significant, with a chi-squared statistic of 26.94, which was significant at an exact significance level of 0.5%. The model correctly classified 79.8 % of the outcomes of the response variable, which is a good fit (Table 7-16).

The signs of the estimated coefficients in Table 7-15 conformed to those of the factorial logit model (Appendix 12). The variables, “trout is a cultural symbol” and “trout fly-fishing is a way of getting intimate with nature,” had theoretically consistent signs although they were statistically insignificant. Table 7-17 presents results for statistically significant variables transformed from Table 7-15.

### 7.5.1. Probability of perceiving trout as invasive

Table 7-15: Simple logit model including socio-cultural factors

Logistic regression	Number of observations	= 79		
	LR chi <sup>2</sup> (11)	= 26.94		
	Prob > chi <sup>2</sup>	= 0.0047		
	Pseudo R <sup>2</sup>	= 0.3090		
Log likelihood = -30.1130				
Is trout invasive?	Coefficient	Std. Err.	z	P> z
Sufficient condition for listing trout as invasive	-1.675***	0.6060	-2.76	0.006
Level of understanding of AIS regulations	-0.886	0.5390	-1.64	0.100
List trout as invasive if net benefits of conserving indigenous species are positive in a given locality	0.578***	0.2840	2.03	0.0042
All species regardless of origin have a permanent place in the ecology and economy of South Africa	-0.870**	0.3408	-2.55	0.011
Even if AIS regulations facilitate conservation of indigenous fishes, their livelihood impact should not be neglected	-0.042	0.2597	-0.16	0.871
Trout fly-fishing is a way of getting intimate with nature	-0.636	0.4811	-1.32	0.186
Trout is a cultural symbol in South Africa	-0.261	0.4833	-0.54	0.589
Percentage of friendships gained from trout flyfishing	0.132	0.1646	0.80	0.424
Level of education	-0.534*	0.2806	-1.90	0.057
Salary	-0.088	0.2433	-0.36	0.719
Log of years of fly-fishing	-1.287*	0.6838	-1.88	0.060
Constant	16.1304	5.4988	2.93	0.003

Note: \*\*\* means significant at 1%; \*\* means significant at 5% and \* means significant at 10%

Table 7-16: Goodness of fit test for simple logistic model

Classified	True		Total
	Trout is invasive =1	Trout is not invasive =0	
+	9	6	15
-	10	54	64
Total	19	60	79
Percent correctly classified = 79.75%			

Source: Author's analysis

Table 7-17: Transformation of simple logit results for significant variables only

Is trout invasive? (0,1)	b	z	P> z	% change in odds for a unit increase in X	% change in odds for SD increase in X	SDofX
Sufficient condition for listing trout as invasive	-1.675	-2.76	0.006	-81.3	-63.0	0.5929
List trout as invasive if net benefits of conserving indigenous species are positive in a given locality	0.578	2.03	0.042	78.2	130.9	1.4488
All species regardless of origin have a permanent place in the ecology and economy of South Africa	-0.870	-2.55	0.011	-58.1	-69.8	1.3774
Level of education	-0.534	-1.90	0.057	-41.4	-49.8	1.2910
Log of years of fly-fishing	-1.287	-1.88	0.060	-72.4	-55.3	0.6262

Source: Author's analysis

**a. Sufficient condition for listing species as invasive**

To assess the trout sector's understanding of the criteria for evaluating invasiveness, the questionnaire included the statement: "In my opinion the sufficient condition for listing trout as invasive is that [1] they must be alien and established outside their natural distribution range [2] they must be alien and established outside their natural distribution range, and threaten or can potentially threaten ecosystems, habitats and species [3] they must simultaneously be alien and established outside their natural distribution range;

threaten or can potentially threaten ecosystems, habitats and species; and do cause economic harm, human health harm and environmental harm”.

For a unit increase in this item, the odds of perceiving trout to be invasive decreased by 81.3%, holding other variables fixed at their means (Table 7-17). Alternatively, a one standard deviation increase in the sufficient condition for listing trout as invasive, centring other variables at their means, reduced the odds of perceiving trout to be invasive by 63% (Table 7-17). The result, which was significant at an exact significance level of 0.6%, suggested that the sufficient condition for listing trout as invasive was a critical policy variable that might explain the presence of controversy in the NEM:BA regulatory reform process. Focusing on alienness only as a criterion for listing species was the strictest test of invasiveness because it implied that every non-indigenous species was invasive.

The definition of an invasive species has been a sticky policy issue since 2007 and strategic informants were divided amongst themselves on how invasiveness should be determined.

“[The] definition can be seen in three parts: (i) A factual/scientific enquiry as whether the species in question is established or spread outside its natural distribution range; (ii) The factual/scientific enquiry into threats whether they be real or potential, to species, ecosystems or habitats; AND (iii) A human rights based enquiry into the impact of those threats (harm) on human health and wellbeing and the economy” (FOSAF and Trout SA 2014a, p.41, capitalisation in original).

“So, to think that you have got a Biodiversity Act and you are going to make sure that you cannot protect biodiversity by saying a species is only invasive if it also has negative economic impact and negative human health impact and *they both have to be satisfied, then it's absurd*” (Expert 1 2014, *pers comm*, emphasis added).

“[W]hy the definition includes such things [economic harm and human health harm]... is because many invasive organisms including fungi and the like species directly harm human health... It does not say and does not intend to say, even if it is in that clause, that every alien invasive organism is directly impacting human health per se... *The scientific perspective on invasiveness of trout is unequivocal!*” (Expert 2 2014, *pers comm*, emphasis in audio).

“They are not looking at the developmental side. They are not looking at the economic side of this policy... The debate is centred on invasiveness where they haven’t actually talked about the economics” (Expert 4 2014, *pers comm*)

“[I]n the areas where they have self-sustaining populations, they have established. They can’t be invasive; they have invaded. It’s past. They are naturalised now” (Expert 3 2014, *pers comm*)

The FOSAF and Trout SA (2014a, p.43) maintained that “[a]ll three elements of the test must be satisfied in order for a species to be classified as invasive.” The DEA, however, maintained that “the trout species are invasive in an ecological sense” (DEA 2014c, not paged). Thus, the assertion that invasiveness must be defined ecologically only, it seems, served DEA’s own administrative interests, thus satisfying the possession of power test and the sanction of ignorance (epistemic violence). Although fungi were to be controlled rigidly because of the socio-economic harm that they cause, they were all listed as category 1b species in the 2014 AIS regulations, List 11, which means the DEA had no immediate intention to eradicate them. If Expert 2’s argument follows, then *the DEA’s invasive species lists misclassified fungi or mis-prioritised eradication interventions*. Expert 3’s basic argument was that policymakers and scientists have to conceptualise invasion temporally to determine if a species had “invaded”, “is invading”, or “may invade”. By applying the time dimension to the invasion process, he argued, a sufficient framework for deciding invasiveness could be designed.

As Figure 7-6 illustrated, more than half (56%) of the respondents perceived environmental activism that sought to purify South Africa of anything alien as one of the hindrances to the attainment of a consensual regulatory framework. The alien test was a blanket approach to listing species because it did not consider invasiveness, but only focused on the origin of a species. It was established in Chapter 6 that during the NEM:BA enactment process some economic interests, and surprisingly, zoocentrists such as Friends of the Tahr and Animal Welfare Community, criticised the Biodiversity Bill as *purist* and driven by a *strict biological nativism ideology*. Some scholars of biological invasions and biogeography of invasions have also recently argued that judging species by their invasive impact, rather than their origin,

was the most appropriate course of action to take (Chew and Hamilton 2011, Davis *et al.* 2011, Sagoff 2009, Warren 2007).

**b. Cost-benefit analysis**

The odds of perceiving trout to be invasive increased by 78.2% for a unit increase in the perception that trout could be listed as invasive if the net benefit of conserving indigenous species was positive in a given locality, *ceteris paribus*. Alternatively, for a one standard deviation increase in the perception that trout could be listed as invasive if the net benefit of conserving indigenous species was positive, the odds of perceiving trout as invasive increased by 130.9%, centring other variables at their means (Table 7-17). The magnitude of the effect was statistically significant at an exact significance level of 4.2%. The intuition behind this finding was that respondents, 91% of whom were trout fly-fishers, supported conservation of indigenous fishes on condition that the DEA demonstrated that the regulatory intervention of conserving indigenous species by controlling trout created a socio-environmental surplus in a given locality. This result, despite differences in the magnitudes of the estimated odds, tells the same story as does the large odds ratios in Appendix 14 for the factorial logistic model estimates.

Gatogang (2009) attempted a proxy cost benefit analysis using the contingent valuation method by determining the willingness to pay for rehabilitation of trout streams (habitat) and willingness to pay for eradication of trout in Rhodes Village in the Eastern Cape. He found that trout fly-fishers were willing to pay nearly R200,000 per annum for rehabilitation of trout habitats, while they were willing to pay R29,000 per annum for eradication of trout. Du Preez and Lee (2010a) also found that trout fly-fishers were willing to pay nearly R172,000 per annum for rehabilitation of trout streams. Alternatively, Gatogang's (2009) results suggested that fly-fishers in their sample were 6.9 times (590%) more willing to invest in the quality of trout habitats than in the conservation of indigenous species.<sup>8</sup>

**c. Permanent place in the economy and ecology of South Africa**

Table 7-17 also reveals that a unit increase in the perception that all species have a permanent place in the economy and ecology of South Africa regardless of their origin reduced the odds of perceiving trout to be invasive by 58%, *ceteris paribus*. A one standard

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<sup>8</sup> Calculated as  $\left(\frac{200,000}{29,000} - 1\right) * 100 = 589.7\%$ .

deviation increase in the perception that all species have a permanent place in the economy and ecology of South Africa reduced the odds of perceiving trout to be invasive by 69.8%, centring other variables on their means. The effect was statistically significant at an exact significance level of 1.1%. The logical conclusion from this result was that socio-economically useful species were likely to be perceived as having a permanent place in a society especially if they fulfilled cultural purposes in addition to commercial purposes (De Moor and Bruton 1988).

The results suggested that with growing usage of a species, habituation tended to indigenise the species so much so that people tended to accept the species as having a permanent place in the ecology and economy of the country (Bruton 1986, Chew and Hamilton 2011, De Moor and Bruton 1988, Wylie 2008). Thus, the power of habit to valorise species seemed a reasonable conclusion from the results (Snyder 2007, Taylor 2007). By deduction, it was evident that managing such species for which people have strong spiritual/socio-cultural attachments demanded a balancing act between scientific opinion and democratic/social valuation. Failing to balance out these factors seemed to have transformed the management of trout in South Africa into a wicked problem.

#### ***d. Effect of education and years of fly-fishing***

A unit (one level) increase in the level of education reduced the odds of perceiving trout to be invasive by 41.4%, other variables fixed at their means (Table 7-17). A one standard deviation increase in the level of education reduced the odds of perceiving trout to be invasive by 49.8%, centring other variables on their means (Table 7-17). The effect was large and significant at an exact significance level of 5.7%.

Lastly, an additional year of fly-fishing, fixing other variables at their means, reduced the odds of perceiving trout to be invasive by 72.4%. A one standard deviation increase in years of fly-fishing reduced the odds of perceiving trout as invasive by 55.3 %. The effect was statistically significant at an exact significance level of 6%. The more time one spent in fly-fishing pursuits the less likely they were to perceive trout to be invasive.

#### **7.5.2. Discrete changes in the probability of perceiving trout to be invasive**

The standard approach to evaluating the effects of changes in a variable on the probability of observing an outcome is to compute marginal effects. However, given non-linearities

associated with models of binary response variables, discrete changes in the predicted probabilities for a given change in an independent variable make more intuitive analysis possible (Long and Freese 2006). Table 7-18 shows discrete changes in the probability of perceiving trout to be invasive assessed from three different angles, namely when a predictor changed from its minimum to its maximum; when a predictor changed by one standard deviation (+/- 0.5sd) and the marginal effects. The probability of perceiving trout to be invasive was predicted to be 14.3%, holding all other variables fixed at their means (Table 7-18). Variables that caused large discrete changes in the probability of perceiving trout to be invasive are likely to be the most important policy variables that have to be addressed to contain the wickedness of the policy problem.

Table 7-18: Discrete changes in probability of perceiving trout as invasive

	from	to	diff	from	to	diff	mfx
	X=min	X=max	Min->Max	x-0.5sd	X+0.5sd	-+0.5sd	
Sufficient condition for listing trout as invasive	.753	.097	-.657	.216	.092	-.123	-.206
List trout as invasive if net benefits of conserving indigenous species are positive in a given locality	.038	.287	.249	.099	.203	.104	.071
All species regardless of origin have a permanent place in the ecology and economy of South Africa	.464	.026	-.438	.234	.084	-.149	-.107
Level of education	.586	.089	-.497	.191	.106	-.085	-.066
Log of years of fly-fishing	.654	.038	-.615	.200	.101	-.100	-.158
Probability of perceiving trout to be non-invasive							.857
Probability of perceiving trout to be invasive							.143

Source: Author's analysis

**a. Level of education and years of fly-fishing**

A change in the log of years of fly-fishing from its minimum to its maximum reduced the probability of perceiving trout to be invasive by 0.62 (or 94%) (Table 7-18). The marginal effects of a very small increase in the log of years of fly-fishing on the probability of perceiving trout to be invasive was -16%. The result suggested that the length of the lifetime

spent in pursuit of trout fly-fishing created a habitual/cultural attachment to the species, which made it less likely that long established fly-fishers would perceive trout to be invasive.

As the “level of education” increased from below matric/high school (minimum) to postgraduate (maximum), the probability of perceiving trout to be invasive decreased by 0.50 (or 85%), other variables held at their means (Table 7-18).<sup>9</sup> A one standard deviation increase in the level of education reduced the probability of perceiving trout to be invasive by 45%. The marginal effects of a very small increase in the level of education on the probability of perceiving trout to be invasive was -7%. The overall observation was that as the level of education increased, the tendency was to perceive trout to be non-invasive. Theoretically, as education increases, ecological knowledge is expected to increase and understanding of invasions is expected to increase (Richardson 2011). Thus, the result is unexpected.

There are two possibilities that can explain the surprising outcome. The first possibility is that the more educated fly-fishers might have been able to engage critically with the literature on alien fish invasions in their evaluation of the decisions of the DEA and might have found the decisions scientifically unsound. However, this possibility fails to pass scrutiny since all the literature reviewed so far concluded that trout was invasive, at least in an ecological sense (Barnard 1938, Cambray 1997; 2000, 2003a; 2003b, Cambray and Bianco 1998, Ellender and Weyl 2014, Karssing *et al.* 2012, Kleynhans 1996; 1999, Rivers-Moore *et al.* 2013, Shelton 2013, Shelton *et al.* 2014, Skelton 2000).

There is only one scholar, who was a fly-fisher himself, who claimed that unsustainable land uses rather than trout were responsible for the loss of indigenous fishes in the Natal province (Crass 1969; 1986a; 1986b). There is only one non-peer reviewed official manual of the Department of Water Affairs used for studying river quality that attributed 8% of instream habitat destruction to exotic aquatic faunal species (trout included). The weight of major land uses such as water abstraction was 14%; bed modification was 13%; flow modification was 13%; and channel modification was 13% (Kemper 1999).

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<sup>9</sup> The percentage change is given by  $\left(\frac{\text{probability at maximum} - \text{probability at minimum}}{\text{probability at minimum}}\right) * 100$

Cambray (2003a, p.64), however, provided evidence to the effect that “in the Dullstroom area there are now 1 500 trout dams, these having a major impact on the proper functioning of the Crocodile river” Thus, if Kemper’s (1999) framework is used, trout is implicated twice – firstly, directly through trophic cascades and secondly, indirectly through damming of rivers to create exclusive trout fisheries – making the overall weight 61% (water abstraction (14%) + flow modification (13%) + bed modification (13%) + channel modification (13%) + direct exotic aquatic faunal impact (8%)). Cambray (2003a, p.64) further stated that as a result of damming “the underwater world in this area [was now] an ‘aquatic desert’ due to the impact of trout on aquatic biodiversity.” Even pro-trout scholars noted the ecological impact of trout (De Moor and Bruton 1988, Hey 1926a; 1926b; 2006).

The second possibility is that it might have been a manifestation of the Veblenian pecuniary culture (Veblen [1899] 2005). The Veblenian pecuniary culture hypothesis has explanatory power given that places such as the Dullstroom in the Trout Triangle are popular second home investment destinations usually for rich urbanites who establish fly-fishing syndicates both for attractive financial gains and exclusive leisure (Hoogendoorn 2014, Hoogendoorn and Visser 2010). The supposition is that as education increases, so does the income level. For interest in the *surprise* that an increase in the level of education reduced the probability of perceiving trout to be invasive, and the supposition that it might be a manifestation of the Veblenian pecuniary culture, a “quick” estimation of the salary-education relationship was carried out (Table 7-19).<sup>10</sup> The ordered logit model estimated is expressed by Equation 4-16.

The estimated model in Table 7-19 was significant at an exact level of significance of 0.4%, with a chi-squared statistic of 8.19. Worth noting from Table 7-19 is that education level positively influenced salary level (a coefficient of 0.352). The probability of observing a respondent that earned less than USD923 was 6.3%, evaluated at the mean education level. The probability of observing a respondent that earned greater than USD4,613 was 27.9% evaluated at the mean education level, and >USD4,613 was the modal income category in the sample.

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<sup>10</sup> It was a “quick” estimation in that it was non-rigorous but merely sought to establish the causal relationship.

Table 7-19: Salary-education relationship

Ordered logistic regression

Number of obs = 101  
 LR chi<sup>2</sup> (1) = 8.19  
 Prob > chi<sup>2</sup> = 0.004  
 Pseudo R<sup>2</sup> = 0.024

Log likelihood = -168.104

Salary	Coefficient	Std. Error	z	p> z
Education	.352	.125	2.83	0.005
/cut1	-1.01	.675		
/cut2	.304	.623		
/cut3	1.127	.625		
/cut4	2.049	.641		
/cut5	2.648	.659		
<b>Predicted probabilities and marginal effects of education on salary, (mean education level = 4.8 = undergraduate)</b>				
Salary category	Marginal effects	Predicted Probability		
< USD 923	-.021**	0.063		
USD1015-USD1845	-.035**	0.136		
USD1937-USD2768	-.025**	0.162		
USD2860-USD3690	-.004	0.226		
USD3782-USD4613	.015*	0.134		
>USD4613	.071***	0.279		

Note: \*\*\* means significant at 1%; \*\* means significant at 5% and \* means significant at 10%

Source: Author's analysis

The marginal effects were all significant except for the USD2860-USD3690 category. The marginal effects of small increases in the level of education on the probabilities of earning salaries below USD2,768 were negative. For example, the marginal effect of a small increase in the level of education on the probability of earning less than USD923 was -2.1% and -3.5% for earning USD1,015-USD1,845 implying that major improvements in education constituted an exit strategy from low income brackets. However, as the level of education continued to increase, the marginal effects on the probability of earning >USD4,613 were 7.1%. Thus, the inference that the highly educated were the high income classes was substantiated and the Veblenian pecuniary culture hypothesis became a reasonable explanation of the *surprise* result that higher education levels were associated with lower probabilities of perceiving trout to be invasive. All studies reviewed in the descriptive analysis concluded that the fly-fishing fraternity was generally a high income and highly educated one (du Preez and

Hosking 2011, Du Preez and Lee 2010a; 2010b, Gatogang 2009, Nicholson and Snowball 2014).

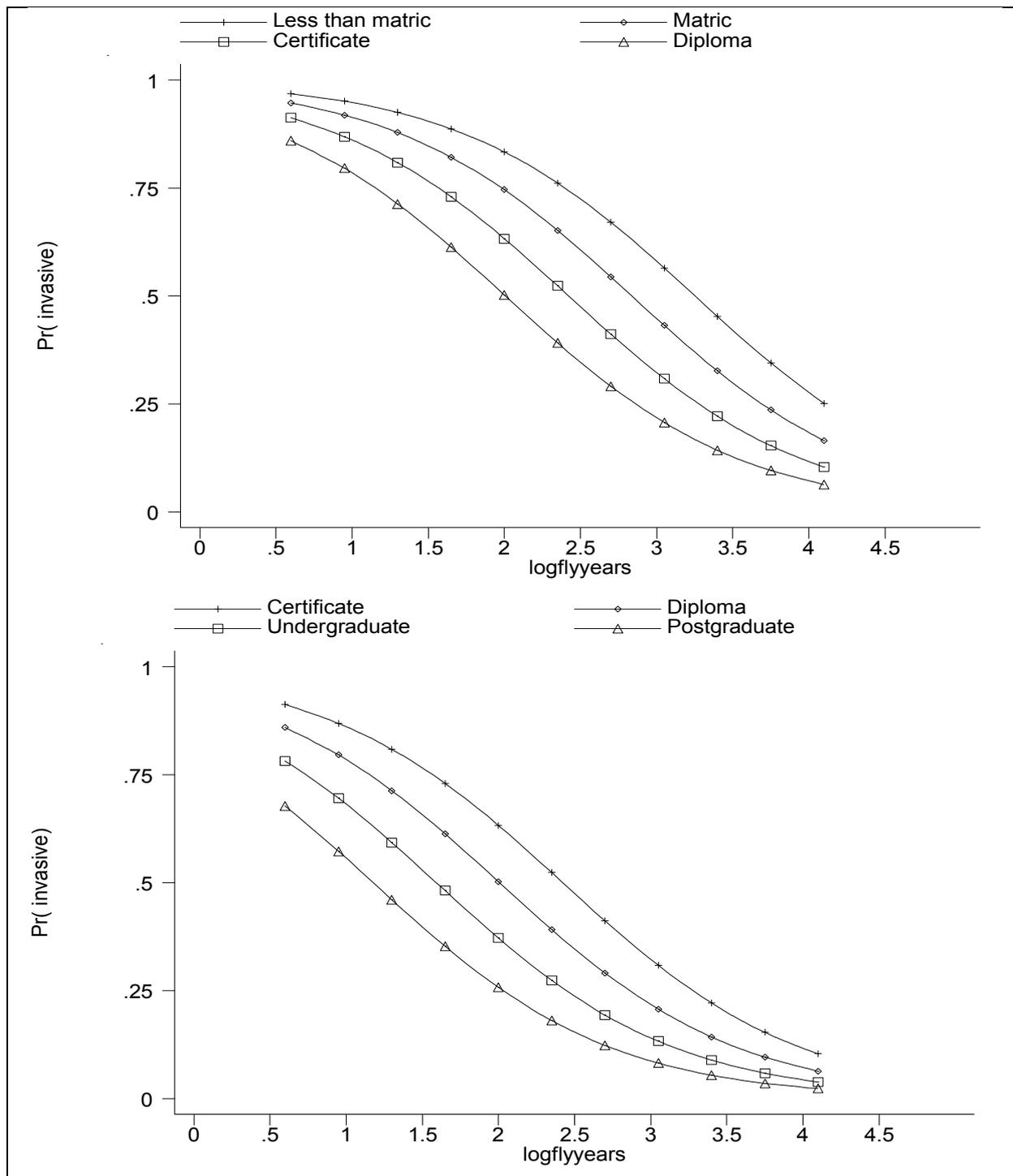


Figure 7-8: Joint effect of the log of years of fly-fishing and education on the probability of perceiving trout as invasive

Source: Author's analysis

Figure 7-8 illustrates the joint effect of the level of education and the number of years of fly-fishing on the probability that a respondent who was average on all other attributes perceived trout to be invasive. The probability curves revealed non-linearities in the relationships. Similarly, the effect of the log of flyfishing years on the probability of perceiving trout to be invasive declined with the level of education. The differences in the height of the curves depict the differences in the effect of the various levels of education on the probability of perceiving trout to be invasive.

**b. Sufficient condition for listing trout as invasive**

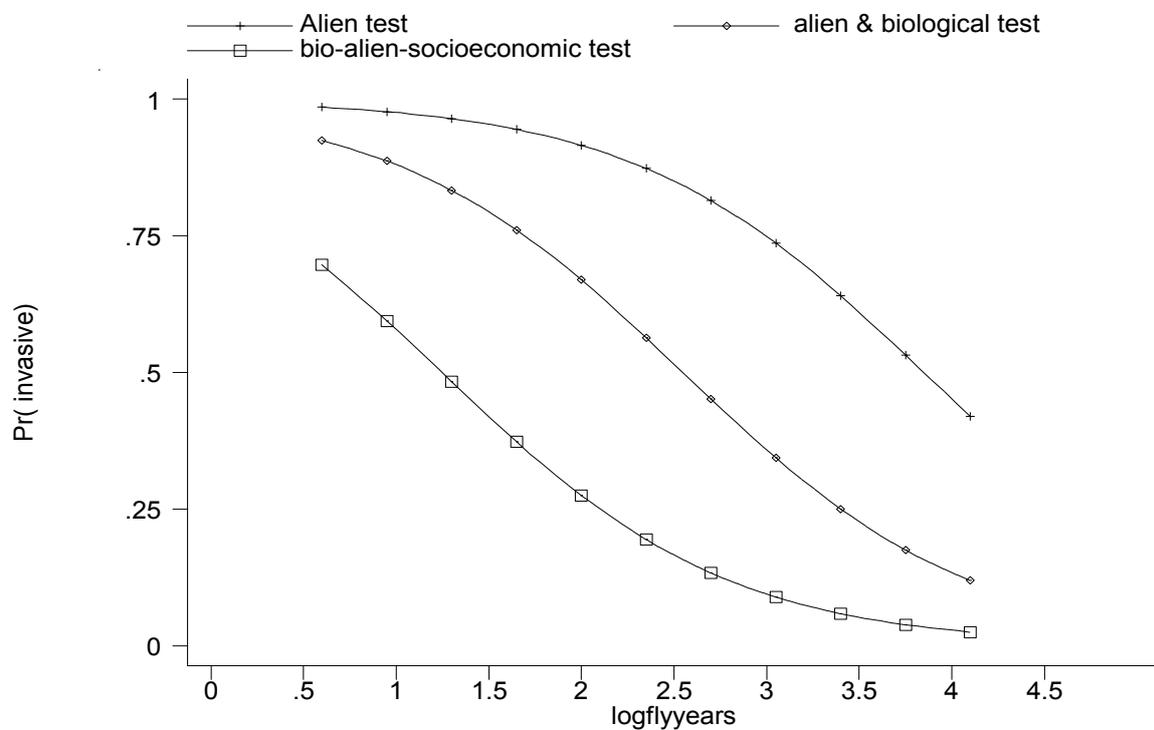


Figure 7-9: Joint influence of the sufficient condition of listing trout as invasive and log of years of flyfishing on probability of perceiving trout as invasive

Source: Author's analysis

As the sufficient condition for listing trout as invasive species changed from its minimum (=1=aliennes only) to its maximum (=3= inclusive and broad criteria), the probability of perceiving trout to be invasive decreased by 0.66 (or 87%), holding other variables at their means (Table 7-18). The effect was large. This suggested that as the criteria of listing species as invasive became more inclusive (of origin, biological criteria and socio-economic criteria),

the likelihood of respondents perceiving trout to be invasive decreased sharply. The marginal effect of a very small increase in the sufficient condition for listing trout as invasive on the probability of perceiving trout to be invasive was -21%, which was very large. The magnitude of these marginal effects illustrated that the criteria used to decide invasiveness was a critical public policy variable that if handled properly might have helped in resolving some of the controversies.

Figure 7-9 depicts the joint influence of both the sufficient condition of listing trout as invasive and the log of years of fly-fishing on the probability that a respondent, who was average on all other attributes, perceived trout to be invasive. The probability of perceiving trout to be invasive was non-linear for the three categories over the range of the log of years of fly-fishing. Figure 7-9 reveals that the probability of perceiving trout to be invasive *disproportionately* increased as the sufficient condition for listing trout as invasive changed from the inclusive criterion (conjunctive test) to the strictest criterion (alienness test) over the entire range of the log of years of fly-fishing, holding all other variables at their means. While in all the three cases the probability fell over the entire range of the log of years of fly-fishing, it initially fell most slowly in the case of the restrictive criterion (alienness only) for respondents who had fewer years of fly-fishing.

Figure 7-9 reveals that the probability of perceiving trout to be invasive fell sharply especially in the case of the inclusive criteria when the log of years of fly-fishing was at most 2.25 (that is, 9.5 years of fly-fishing). Committed fly-fishers were less likely to perceive trout to be invasive regardless of the length of time they had spent in piscatorial pursuits. For respondents who believed that trout had to be listed as invasive just because it was alien, the probability of perceiving trout to be invasive fell steeply once the log of years of fly-fishing exceeded 2.25. However, the probability of perceiving trout to be invasive remained high (at least 0.4) for the strictest criterion even when years of fly-fishing were as high as 60. Those who held on to the strictest criterion were likely to insist that trout were invasive regardless of any other considerations, such as environmental damage or socio-economic factors (Figure 7-9).

It was established in Chapter 6 that the Task Group for Invasive Biota for South Africa developed a model for assessing invasiveness that considered dimensions such as rate of

range extension, propagule pressure, impact in invaded area and costliness of control as well as availability of potentially colonisable habitat (De Moor and Bruton 1988, Macdonald and Jarman 1985, Richardson and Van Wilgen 2004). Thus, the focus went beyond mere alienness. Recent debates in invasion ecology have also emphasised that a focus on alienness (origin) has led to a misjudgement of species and economically wasteful eradication programmes (Chew and Hamilton 2011, Davis *et al.* 2011, Larson 2007, Sagoff 2005; 2009, Warren 2007).

**c. List trout if net benefits of conservation are positive**

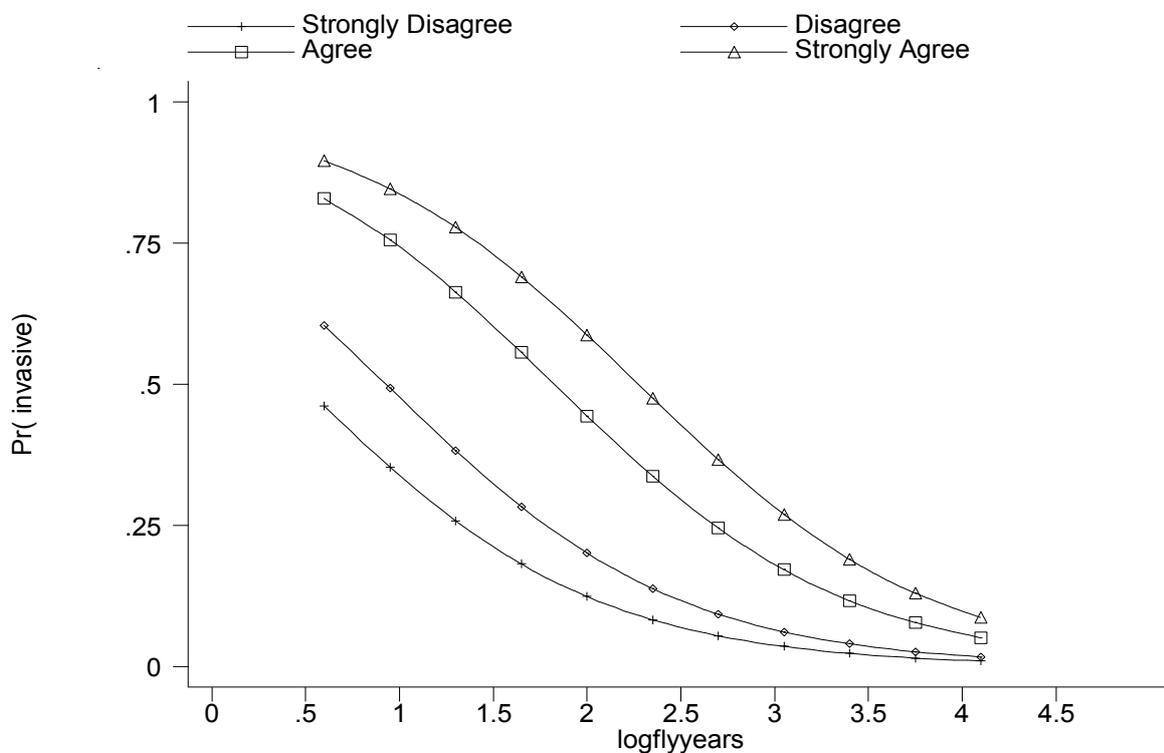


Figure 7-10: Joint effect of the log of years of fly-fishing and the perception of that trout could be listed as invasive if net benefits of conserving indigenous fishes are positive on the probability of perceiving trout as invasive

Source: Author's analysis

The probability of perceiving trout to be invasive increased by 0.25 (or 655%) as the perception that trout could be listed as invasive if the net benefit of conserving indigenous fishes in the same locality increased from its minimum (or strongly disagree=1) to its maximum (strongly agree=5), holding other factors at their means (Table 7-18). The

marginal effects of a small increase in the variable, “list trout as invasive if net benefits of conserving indigenous species are positive in a given locality”, on the probability of perceiving trout to be invasive was 7%. Thus, the probability of perceiving trout as invasive was quite sensitive to the provision of cost benefit analysis evidence.

Figure 7-10 illustrates the joint effect of the perception that trout could be listed as invasive so long as the net benefits of conserving indigenous fishes in the same locality was positive and the log of years of fly-fishing on the probability of perceiving trout to be invasive for an individual who was average on all other factors. Overall, the result suggested that providing results of credible cost benefit analyses was a potential solution to the controversies to the extent that the trout sector was willing to trade-off utilisation of trout for conservation of indigenous fishes and/or to pay conservation levies (compensation) to conservation agencies.

**d. All species have a permanent place in the economy and ecology of South Africa**

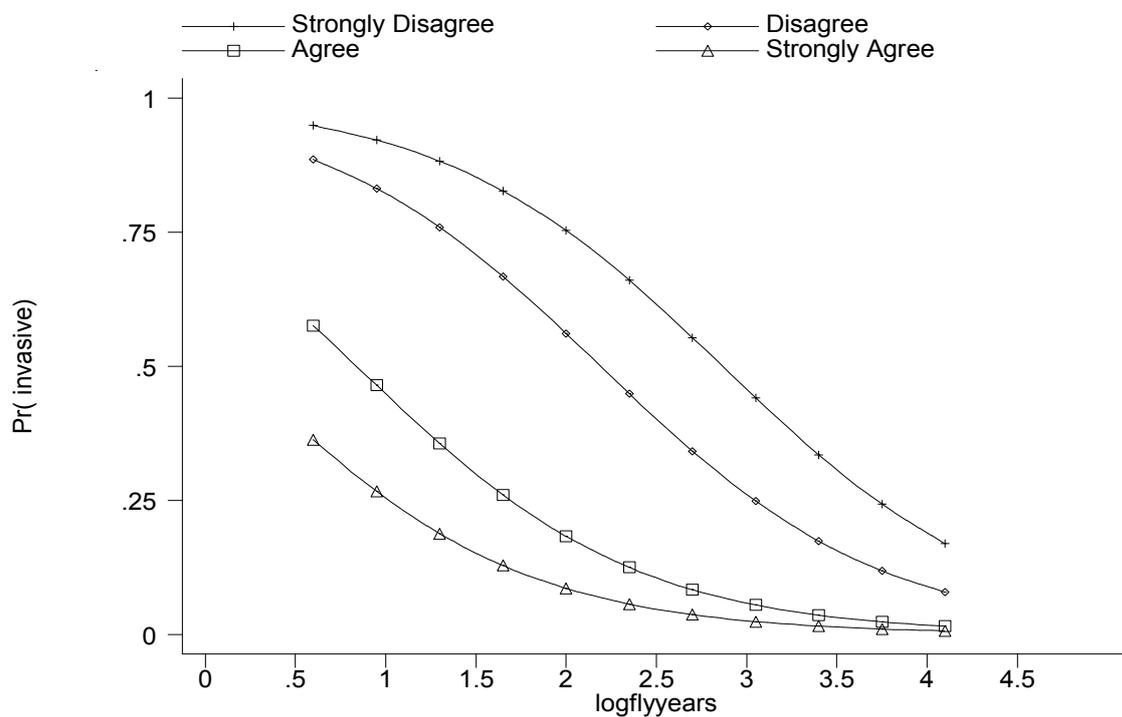


Figure 7-11: The joint effect of the log of years of fly-fishing and the perception that all species have a permanent place in the economy and ecology of South Africa on the probability of perceiving trout as invasive

Source: Author’s analysis

The probability of perceiving trout to be invasive fell by 0.44 (or 94%) as the variable “all species have a permanent place in the economy and ecology of South Africa” increased from its minimum (or strongly disagree=1) to its maximum (or strongly agree=5), other factors fixed at their mean values (Table 7-18). The marginal effects of a small increase in the variable, “all species have a permanent place in the economy and ecology of South Africa”, on the probability of perceiving trout to be invasive was -11%. The magnitude of these effects is large suggesting that invasiveness cannot be determined by biological factors only, socio-cultural factors also count (Chew and Hamilton 2011).

Figure 7-11 illustrates the joint effect of the perception that “all species have a permanent place in the economy and ecology of South Africa” and the number of years of fly-fishing on the probability that a respondent who was average in all other variables perceived trout to be invasive.<sup>11</sup> The effect of the log of flyfishing years on the probability of perceiving trout as invasive declined as a respondent’s response to the statement on the permanency of economic and ecological place for all species swung from strongly disagree to strongly agree.

To the extent that habitual use of a species in leisure or livelihoods grants it socially created “rights of occupancy” (Chew and Hamilton 2011, p.41), the results suggested that the prioritisation of species to list for eradication has to take into account socio-economic criteria in addition to ecological criteria in order to satisfy due process of law. Habit has the power to valorise species (Veblen [1899] 2005). Veblen ([1899] 2005, p.85) argues that there is a paradox in that it “frequently happens that an article which serves the honorific purpose of conspicuous waste is at the same time a beautiful object.” Waste does not carry the ordinary derogatory meaning in Veblen’s theory of the leisure class. Rather, conspicuous waste, to Veblen, means expenditure which is not based on the instinct of workmanship and the canon of instrumental efficiency since these two canons help advance the broader societal human life process.

The argument is that the leisure class, by the ceremonial code of decorum, highly regards certain game species because they might be ferocious/predatory, beautiful and challenging to hunt and, by habituation, monopolises and valorises the species as exclusive and

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<sup>11</sup> The probability space can only display four curves at once, thus, the category neutral was excluded but technically the curve lies between the disagree and agree curves.

permanent articles of leisure. Veblen ([1899] 2005, p.93) discusses the manifestation of the “canon of taste” by which “pecuniary repute is traceable in the prevalent standards of beauty in animals.” Veblen ([1899] 2005, p.87-94) characterises such species as follows:

“these objects are beautiful and have a utility as such; they are valuable on this account if they can be appropriated or monopolized; they are, therefore, coveted as valuable possessions, and their exclusive enjoyment gratifies the possessor’s sense of pecuniary superiority at the same time that their contemplation gratifies his sense of beauty...This class of animals are conventionally admired by the body of the upper classes ... [by] drawing a hard and fast line of pecuniary demarcation between the beautiful and the ugly.”

Conspicuous waste is invidious expenditure that results in social differentiation (Wisman 2011). In effect, the law of conspicuous waste is a Darwinian selection mechanism that explains “the persistence of such forms [of institutions and articles of leisure] as are fit to survive under its dominance. It acts to conserve the fit, not to originate the acceptable” (Veblen [1899] 2005, p.111). Thus, the persistence of certain institutions of leisure and the species that serve honorific roles implies that they survived the Darwinian selection criterion of ceremonial adequacy evident in the law of conspicuous waste.

## **7.6. Conclusions**

The results, firstly, suggested that for the NEM:BA draft AIS regulations to pass democratic muster, the DEA has to attend to making right participatory environmental governance. The roles of trust-building, reason-giving to questions asked by the policy clientele and striking win-win solutions as well as taking into account socio-economics of trout were relevant dimensions. Addressing these matters would satisfy administrative due process, which would result in reasonable value and social utility.

Secondly, implementing the regulations within the confines of anthropocentrism would grant the regulations the licence of reasonableness. Thirdly, contextualising scientific evidence, which entails taking into account livelihood impact and the impact of a species on the liveability of the environment, created conditions for affirmative perceptions to the regulatory intent. Lastly, the decision to list trout as invasive demanded an explicit framework that clearly singled out the criteria for doing so. The results suggest that the

sufficient condition for listing trout (as any other alien and invasive species) needed to be defined more rigorously beyond reference to predatory impacts of a species and it had to be inclusive of ecological and socio-economic criteria.

Taken together, these four conclusions suggested a practical framework within which democratic imperatives, human wellbeing as well as the social and cultural context define the limits and speed of institutional adjustment in biodiversity management. While scientists might prefer a shock therapy approach that is ecocentric or biocentric, dialectic forces would be unleashed by anthropocentric forces that almost always ceremonially encapsulate any scientific claims for which the political community does not find sufficient reasons to act upon. These conclusions corroborate the major finding in Chapter 6, which established and contextually validated the green apartheid hypothesis. It was shown that fundamentalism in scientific thought shaped the NEM:BA to be the controversial legislation that it came to be insofar as management of alien and invasive species was concerned. Economic sectors were isolated during the formative years of the NEM:BA, while a strong biological nativism defined the configuration of the new institution (the NEM:BA) and pre-ordained its implementation (regulatory phase) as such.

The findings, however, have also revealed the role of the Veblenian pecuniary culture in shaping the controversies. Even if the DEA had failed on a number of democratic policymaking fronts, the trout sector also had a ceremonial system of interests. Firstly, as the education level increased, contrary to theoretical expectations, trout fly-fishers were more likely to perceive trout to be non-invasive. It was also shown that there was a general perception that trout had a permanent place in the economy and ecology of South Africa and that this perception could be explained in terms of culture, social status and most of all the Veblenian pecuniary culture. The trout sector, nonetheless, supported the conservation of indigenous fishes so long as the DEA demonstrated that the net benefit of conserving such species in traditional trout habitats generated a net socio-environmental surplus.

Chapter 8 presents an evolutionary analysis of the AIS regulatory reforms from a semiotic perspective. It provides a grand overview. Since the quantitative analysis carried out in Chapter 7 is based on self-reported data, an independent type of data is required to triangulate the quantitative findings.

### Implementation of the NEM:BA deal – evolutionary analysis

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*“Perhaps, when the new Bible of Science is written, one may read of man as the prodigal son of Mother Nature, flouting for a time her admonition and her wisdom, spending his heritage in riotous living; but at last reduced to the husks upon a barren waste of his own making, he crawls back to his Old Mother's fire-side and listens obediently to the story of a certain wise man whose name was Ecology,” (Wissler 1924, p.317)*

*“If you are a man of authority,  
Be patient when you are listening to the words of a petitioner;  
Do not dismiss him until he has completely unburdened himself  
Of what he had planned/to say to you  
A man who has been wronged desires to express his frustrations  
Even more than the accomplishment of the (justice) for which he came,  
But concerning him who dismisses petitions  
Men say, ‘Why ever did he reject it?’  
Not everything about which he has petitioned will be done,  
But a sympathetic hearing is a means of calming the heart.”*

*The Maxims of Ptahhotep, not dated*

#### **8.0. Introduction**

The process of creating new legislation is a process of negotiating economic deals at its core (Beard [1935] 2012, Bromley 1997; 2008a). It is a flow of rationing transactions. The goal of the negotiation is to address problems that motivated the need for the new legislation. The regulatory phase is a process of implementing the negotiated deals by devising rules that clarify and operationalise the legislation (Hiedanpää and Bromley 2011). However, there could be institutional failure whenever the process of developing regulations becomes more prolonged and contested than the process of creating the primary legislation. Some plausible hypotheses might explain the failure when it exists.

Chapters 5 and 6, firstly, confirmed that the deal negotiation process might have been prematurely closed before a real deal was struck. Secondly, Chapters 5 and 6 confirmed that

the negotiation of the deal has been exclusive (limited access policymaking order) such that the once marginalised groups, for the first time, have been negotiating institutional spaces to have the deal modified at the regulatory phase. Chapter 8, thirdly, confirms the hypothesis that the executors of the deal (implementing governmental agencies) might have been failing to comprehend the essence of the deal properly. This miscomprehension opened the deal implementation process to the sanction of ignorance (epistemic violence), which ultimately led the governmental agency to redefine administratively the legal entitlements that the legislature has already redefined. The administrative redefinition of the opportunity sets became the origin of the phenomenon of institutional isolation. The plausibility of the third hypothesis as an explanation of the contested institutional adjustment process for biodiversity governance and its implications for institutional isolation using the trout industry as a case study was evaluated.

Contrary to the Department of Environmental Affairs' (DEA's) claim that before amendment the NEM:BA was so disabling that comprehensive AIS regulations could not be developed and implemented (Bashoff 2013a; 2013b, Minister of Environmental Affairs 2012), the chapter demonstrates that the administrative process of developing regulations actually disabled the NEM:BA to a large extent. Section 8.1 briefly outlines the method of semiosis and the data sources that were used. Section 8.2 provides a historical analysis of the evolution of the pecuniary system in trout fisheries. Section 8.3 discusses the historical determination of environmental entitlements that partly underpin the problem for biodiversity governance today. Section 8.4 extends Bush's (1987) model on institutional spaces and ceremonial encapsulation. Section 8.5 to 8.9 present analysis of the 2004-2014 NEM:BA regulatory reform process. Section 8.10 concludes the chapter.

### **8.1. Method of analysis – semiosis**

The trichotomy – emotional, energetic and logical interpretants – as discussed in Chapter 4 was utilised. It was within this analytical method that components of the working integrated institutionalist paradigm (Figure 3-2) were applied to the South African case study. The negotiational psychology, of which epistemic violence is a special case, is a semiotic process in that the commands, the coercions and argumentations are flows of signs capable of being interpreted by intelligible agents. Semiotics is a sociocognitive analysis of how institutions

evolve and it illuminates the open access and limited access policymaking orders, which provide an ontological framework for Commons' negotiational psychology.

Major events, processes, the main actors, and the non-linearities that the process assumed over the decade (2004-2014) were identified. Every major event or process and the responses it attracted from the policy clientele or policymaker was classified into the Peircean trichotomy of interpretants. The objective was to identify the sources, forms and extent of institutional isolation as the process evolved over time.

For data, the study utilised the trout industry's submissions to the Department of Environmental Affairs (DEA) since 2005 and the DEA's responses. The major actors since that time were the Federation of South African Flyfishers (FOSAF), the Trout Interest Group (TIG) as well as a coalition of the FOSAF and Trout South Africa (Trout SA). Court papers for the *Kloof Conservancy v. Republic of South Africa*, 2014 case were obtained, and access to information that would usually be difficult to obtain, even through interviews was gained. The data from these court papers provided a means for triangulating the views expressed by the senior government official in the interview. The papers were in the public domain, thus posing no ethical issues.

## **8.2. Evolution of a pecuniary system in trout fisheries**

To undertake a brief reconstruction of the pecuniary system that underpins the historic development of trout fisheries in South Africa, section 8.2 briefly reviews and applies Veblen's ([1899] 2005) *Theory of the Leisure Class*. Veblen (1898a, p.393) asserts that economics has to be a science of the "process of cultural growth". In the *Theory of the Leisure Class*, Veblen ([1899] 2005) argues that as the process of cultural growth takes place complex institutions of leisure consistent with the stage of economic development also evolve. The leisure class theory characterises the evolution of a culture of economic and environmental greed entrenched in inequality and regressive institutional development (Veblen ([1899] 2005, Wisman 2011).

In the emergence of the leisure class, there is an associated development of a ceremonial code of decorum (Veblen [1899] 2005). Decorum prescribes behaviour that is consistent with good taste. The code of decorum, as an example, defines how one differentiates between noble and ignoble, ferocious and docile, as well as between beautiful and

unappealing fly-fishing species. Some species are non-ferocious and ignoble, hence their replacement in the ecosystem with *suitable* species that pass the ceremonial adequacy test, as demanded by the code of decorum, becomes a 'justified' action of the leisure class. The suitable species have to be imported and acclimatised.

The ceremonial code of decorum is a status preservative inasmuch as it guides the ceremonial differentiation of articles of leisure. Veblen ([1899] 2005) argues that species that serve honorific ends are monopolised by the leisure class. The leisure class lobbies for the design of pecuniary institutions to safeguard its "social standing," "social claims," and "social assets" (Polanyi [1957] 2001, p.48), and these can be laws and policies that secure such pecuniary motives. Monopolisation, in turn, finds expression in the institution of private property. Protective laws might be enacted and enforced, and exclusive usage of the species for honorific ends legally certified. The leisure class becomes the most powerful class that determines why, how, and to what extent institutional adjustment can take place insofar as the adjustment interferes with the class' interests.

### **8.3. Conceptual model for characterising institutional adjustment for trout fisheries**

Bush's (1987) concept of institutional spaces, which was reviewed in Chapter 2, represents various mechanisms of ceremonial encapsulation and institutional change dynamics. Section 8.3 extends it. As it stands, it views society in a dichotomous way, whereby one social group has ceremonial interests and another has instrumental interests. However, it can be argued that each participant/group has both ceremonial and instrumental interests. The interests only differ in terms of relative dominance in that particular individual/group. In any given policymaking context, there necessarily are pro- and anti-policy groups. Each group has four (rather than two) possible behavioural strategies. A policy change proposal can be ceremonially feasible, instrumentally feasible, ceremonially non-feasible, and instrumentally non-feasible. With this reorganisation of the Bushian institutional space concept, as depicted in Table 8-1, the story of trout in South Africa can be re-interpreted dynamically. Table 8-1 summarises the entire history of the introduction of trout and the associated institutional (re)adjustment processes to the present day.

Table 8-1: Augmented conceptual model of institutional spaces

		Trout industry and pro-trout scientists				
		Feasible		Non-feasible		
		Ceremonial	Instrumental	Ceremonial	Instrumental	
Government and anti-trout scientists /biological invasion scientists	Feasible	Ceremonial	Instrumental	Ceremonial	Instrumental	
		<b>Lysenkoan I</b> – Convergence of ideological egos and interests all satisfied; Trout introduction in 1867-1985; law promulgated in 1867 to support introduction and protection of trout as livestock ; trout protective legislation; government subsidies	<b>Ceremonial encapsulation II</b> – 2014 AIS draft regulations - institutional hegemony through the sanction of ignorance	<b>Lysenkoan V</b> –wicked problem; non-convergent values and beliefs; DEA says trout are invasive by ecological definition (2005-2014), trout industry objects; Trout SA formed; propaganda begins	<b>Lysenkoan VI</b> – Wicked problem; 2007 AIS regulations; July 2013 interim regulations; trout deliberately misclassified without credible justification	
	Instrumental	<b>Ceremonial encapsulation I</b> –Leisure and pecuniary interests largely prevail as fly-fishers dominated the policy space (1986 compromise to the trout wars)	<b>Instrumental Consensus</b> Democratic constitutional imperative = open access order in all dimensions (Trout regulation 2014, compromise solution); 2009 draft AIS regulations nearly reached this solution	<b>Instrumental embodiment II</b> – Anti-trout interests prevail since wider society supports conservation– 1986 trout wars (initial position); 2005/6 AIS regulations position; FOSAF accede to listing of trout 2009	<b>Lysenkoan VII</b> – wicked problem; Need negotiation or no action; Both sides have instrumental solutions, but it’s about whose knowledge matters.	
	Non-feasible	Ceremonial	<b>Lysenkoan II</b> – Wicked problem; non-convergent values and beliefs; conservation authorities mid 80s started propaganda campaigns; FOSAF says trout not invasive (2005-2014) but DEA disagrees by ecological definition;	<b>Instrumental embodiment I</b> – Leisure and pecuniary interests prevail because wider society prefers trout to other species (National development plan; National aquaculture policy) 2014 forward	Status quo by default – Let nature take its course	Status quo by default – Let nature take its course
		Instrumental	<b>Lysenkoan III</b> – wicked problems; leisure and pecuniary interests prevail; demand in 1986 by trout sector for trout to remain protected as livestock.	<b>Lysenkoan IV</b> – Wicked problems; No action major action besides stopping funding subsidising trout fishing; trout sector continues to expand (1986-2003)	Status quo by default – Let nature take its course	Status quo by default -Let nature take its course

Source: Author’s extension of Bush’s (1987, p.1092) institutional spaces

Table 8-1 illustrates that only two stable institutional equilibria could resolve the wickedness of the trout regulation problem: the convergence of ceremonial interests and the convergence of instrumental interests. Tables 8-2A – 8.2C, which are discussed in section

8.5, semiotically analyse some of the negotiational processes that shaped the institutional adjustment processes of the regulatory reform process depicted in Table 8-1. Sociocognitive processes and social imaginaries that influenced the ideas that shaped the processes are captured by the semiotic codes in Table 8-2A – 8.2C.

#### **8.4. Environmental entitlements and propagation of trout in South Africa**

The first stable institutional equilibrium, by default, was non-controversial because it was an era of convergence of ceremonial interests in having trout propagated and acclimatised in South African waters (Table 8-1). Policymakers, politicians, scientists and fly-fishers argued for trout introduction. *News* of successful introduction of trout species in Australia, Tasmania, and New Zealand in 1864 motivated individuals with piscatorial interests to start importing trout from Europe and North America since 1875, but the acclimatisation success rate was mixed (Crass 1986b).

The dominant argument was that there was *no suitable* indigenous species for fly-fishing (Hey 1926a; 1926b; 1928). Nicolls and Eglington (1892, p.134) argued that there was “*little opportunity* for displaying *his skill* with rod or line, as the varieties inhabiting the [South] African rivers are few in number and afford *little interest* to the sportsman or naturalist” (emphasis added). Bennion (1920, p.viii) also claimed that “all that was needed to make that spacious land [of South Africa] perfect was some trout fishing”. Jackson (1986, p.7) also stated that “the argument that no indigenous fish species served the same purpose as well as the introduced alien [fishes] still holds good.” The ceremonial code of decorum seemed to dictate the taste for non-indigenous species, especially ferocious game fish.

The Cape Colony legislature passed the Fish Introduction Act of 1867. The Act had one purpose: “For *Encouraging* the Introduction in the Waters of this Colony of Fishes *not native* to such Waters...,” (Fish Introduction Act 1867, p.1061, emphasis added). The Act created an incentive system to encourage private initiative to introduce alien fishes. Different private agents that were willing to introduce alien fish had the legal aid of the State, which “provided by law means for the *protecting* of the same fish, spawn and fry,” (Fish Introduction Act 1867, p.1061, emphasis added).

The Act was so generous that an individual only needed to “apply in writing to the Governor” for permission, and specify in the application the type of fish to be introduced,

and the number of rivers/catchments into which the fish would be introduced and to “state in such application what degree and nature of protection... the applicant requires for such fish” (Fish Introduction Act 1867, p.1061). The protection was for “securing the propagation, or *fair chance of propagation*, of the fish” (Fish Introduction Act 1867, p.1061, emphasis added). Subsequently the Governor promulgated a proclamation “having the force and effect of law” to protect the stocked waters (Fish Introduction Act 1867, p.1062).

The process of allocating environmental entitlements and privatisation of the aquatic commons began with the Act. The incentive system was of the land enclosure-type movement, such as “the enclosure movement in South Africa,” (Bromley 1994, p.358), although the 1867 Fish Introduction Act created an aquatic enclosure movement. The Act, therefore, encouraged indiscriminate introduction of fishes and Cambray (2003a, p.65) states that the “majority of the problems created by the indiscriminate distribution of alien fishes many years ago remain with us today.”

Celebrating the successful introduction of trout, Hoy (1913, p.5) commented that “the South African angler [had] now reached the highest pinnacle of bliss” because of “careful game laws and stocking.” Crass (1986b, p.125) also emphasised that “Ever since trout were first introduced to South Africa an interminable succession of legislative provisions has been brought into effect to protect the [trout] fish...” Expressing the same view, Curtis (2005, p.19) indicated that “[t]rout were ... strictly under the protection of the Crown”. A strong pecuniary system was slowly developing. Provincial Nature Conservation Authorities, too, were charged with propagating, stocking, and conserving trout at the expense of indigenous fishes (Skelton 2000, Skelton and Davies 1986). In effect, leisure-augmentation influenced the design of various pieces of legislation that were all targeted at preserving the honorific status of trout and other alien fish. Thus, trout became institutionalised both in law and culture in the South African context.

Discussions on ceremonially warranted behaviours assume away the possibility of future-bound ceremonial systems. “*In all its manifestations the ceremonial system is past-binding,*” Ayres (1996, not paged, emphasis added) argued, but it can also be future-bound if an envisaged institutional adjustment adequately serves ceremonial interests of the leisure class irrespective of its instrumental non-feasibility (a typical case of a Lysenkoan

institutional adjustment (Table 2-1). This argument seems plausible considering that the impetus for the introduction of trout was the *news* about successful introduction of trout in other countries (Crass 1986b). Aquaculture development was only considered three decades after recreational fisheries were successfully established (Hey 1926a; 1926b). Ceremonial interest, therefore, made efforts to introduce trout into South African waters — that is, to realise a future they had been imagining (Bromley 2004b, Dawson 1994).

Figure 8-1 and Figure 8-2 show that the distribution of trout species in the period before, and up to, the 1980s is the same as the present-day distribution of trout. Figure 8-1 demonstrates that trout fisheries mostly were developed in upper catchments (watersheds), where environmental conditions were more suitable for trout to breed. However, aquatic scientists argue that such upper catchments are refuges for endangered indigenous fish species. Cambray (2003b, p.221) also emphasised: “Private syndicates are developed that purchase mountain catchment areas to create exclusive waters for alien trout angling.” Cambray and Bianco (1998, p.349), for example, also argue that “Rainbow trout are usually introduced into those very upper catchment areas where we should have the best chance of conserving sections of aquatic ecosystems.”

By creating an autopoietic (self-referential) pecuniary system (Valentinov 2015), the environmental entitlements created by the 1867 Act have become the source of institutional path dependence (Table 8-1). Such a system evaluates every proposed institutional change only in terms of its ceremonial adequacy standard. Trying to reclaim trout waters for indigenous fishes redistributes economic advantages. The trout sector is likely to resist change because the system of environmental entitlements created by the 1867 Act and subsequent legal instruments favoured the sector. Thus, the autopoietic pecuniary system determines the extent and rate of institutional adjustment.

The result of convergence of ceremonial interests was a *Lysenkoan* / institutional adjustment that did not carefully weigh all the aquatic evidence in the Inland Fisheries Surveys of 1925-1928, but justified nationwide and large scale species introduction. A nascent body of knowledge of the invasiveness of trout was existent, and was acknowledged in the fisheries survey reports of the 1920s (Barnard 1938, Hey 1926a; 1926b, Skelton 2000). A number of institutional outcomes can be identified: privatisation of the

commons through the aquatic enclosure movement with a systematic catchment approach (Figure 8-1 and Figure 8-2), and leisure augmentation by controlling as much environmental resources as possible.

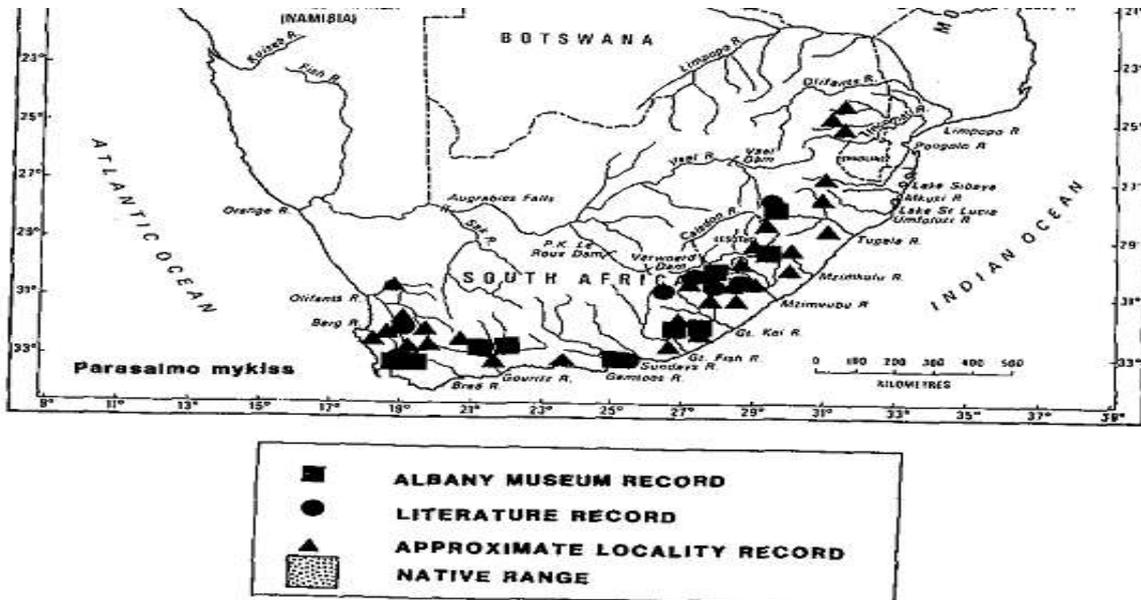


Figure 8-1: Historic distribution of rainbow trout

Source: De Moor and Bruton (1988, p.79): *Atlas of alien and translocated indigenous species aquatic animals in Southern Africa.*



Figure 8-2: Present distribution of rainbow trout

Source: Shelton (2013, p.11): *Impacts of non-native rainbow trout on stream food webs in the Cape Floristic Region, South Africa: integrating evidence from surveys and experiments.*

The Commonsian theory of institutional change gives an interesting account of the introduction of trout. First, the *news* of successful acclimatisation of trout in Australia, Tasmania and New Zealand came as a *surprise*, which set in motion an inquiry process (Dawson 1994). Second, the emerging expression was that South African rivers were species-poor (principle of scarcity). The ceremonial code of decorum created the perceived scarcity. The imagining was that well-stocked trout waters were also possible in South Africa (principle of futurity). To realise that future, a series of strategic transactions were set in motion starting with the design of the 1867 Fish Introduction Act and other supportive policy instruments (principle of working rules) designed by the Cape Colony government (principle of sovereignty).

By 1985, Provincial Nature Conservation Departments, which for the past 80 years had been conserving alien fish, changed their conservation ideology and attitudes (Ferrar and Kruger 1983, Skelton 2000). As established in Chapter 6, in 1980, invasion biology research was institutionalised in South Africa, and South African biological invasion scientists began to lead global invasion research processes (De Moor and Bruton 1988, Ferrar and Kruger 1983, Peretti 1998). In the early 1980s, botanists and Provincial Nature Conservation Authorities started anti-alien species propaganda campaigns (Ferrar and Kruger 1983). Conservation authorities proposed removal of protection from trout and advocated for conservation of indigenous species. To the government, this was instrumentally feasible, but to the leisure class, this was an assault on their social standing and social assets. Thus, *trout wars* began. In the *instrumental embodiment II* configuration (Table 8-1), conservation interests were determined to reverse the institutional perversity that nearly a century of policymaking and legislation since the late 1860s had created (Crass 1986b).

Trout fly-fishers, however, demanded that the protection of trout be maintained and that the government had to continue to fiscally support the sport (Skelton and Davies 1986). This position was *Lysenkoan III* (Table 8-1). The provincial authorities could not agree with fly-fishers because their argument was that trout was imposing an unnecessary fiscal burden on society and driving indigenous species to extinction (Skelton and Davies 1986). It can be seen that the authorities' initial position of *instrumental embodiment II* and the trout fly-fishing sector's initial position of *Lysenkoan III* were quite disparate. Consequently,

protracted negotiational processes and media wars eventually led to a compromise, as depicted by *ceremonial encapsulation I* (Table 8-1).

Trout fly-fishers demanded a compromise solution in which “trout responsibility, valuable infrastructure, laws, and law enforcement systems, [were to be] *transferred where necessary into private management* in as orderly and least harmful a manner as possible,” (Jackson 1986, p.8, emphasis added). Fly-fishers were interested in the continuation of that pecuniary system even if it meant privatisation of trout fisheries management and legislative enforcement powers. The Cape Department of Nature and Environmental Conservation, however, explained its institutional adjustment proposal, which was to demarcate “sensitive waters” and “non-sensitive waters” so that “*the status quo regarding trout fishing will for practical purposes remain as it is,*” (Hamman 1986, p.10, emphasis added).

The status quo did not change because major catchments that were prime trout waters remained in the control of trout fly-fishers (Figure 8-1). Conservation policy was ceremonially encapsulated. Thus, the configuration labelled ‘*ceremonial encapsulation I*’ managed to preserve the status quo nearly intact. Sections 8.5 to 8.9 discuss the contemporary institutional adjustment problem under the NEM:BA.

### **8.5. Limited access policymaking order: 2004-2007**

The semiotic analysis of the regulatory reforms in the governance of alien and invasive species (AIS) had its genesis in the statutory injunction that the Minister was constitutionally bound to publish AIS regulations and a national list of invasive species within two years after the NEM:BA, on 1 September 2004, became law (NEM:BA section 70(1)(a)). In compliance, the Minister of Environmental Affairs and Tourism set up a task team to draft the regulations and to develop the list of invasive species. The task team comprised top-level taxonomists in the country (Henderson 2013), who had to work on both the listing of invasive species (a scientific domain) and drafting of regulations (a socio-economic domain). Macleod (2006, p.13, emphasis added) interviewed leaders of the task team who emphasised that “just about *every scientist in this field* here agreed the draft regulations we drew up were a good thing.”

The task team that dealt with aquatic alien species comprised invasion biologists, some of whom had led anti-trout campaigns in various peer-reviewed and non-peer reviewed publications since 1997 (Table 8-2A). The appointment of such scientists onto the task team served as a sign of possible marginalisation of the interests of the trout industry in the entire regulatory process. Table 8-2A indicates that “the underlying dilemma structure of interaction [kept] *on living* below the surface of the existing institution and remain[ed] latently present” after the 1986 institutional solution (Petrick and Pies 2007, p.258, emphasis in original). The end of trout wars in 1986 appeared to have resolved the ecocentric-anthropocentric dilemma, but it had not. The conflict was latent, and was resurrected by “academic scribblers” as Ayres (1996, not paged) would call them.

For example, one leading anti-trout researcher, and a member of the task team, recommended to “South African environmental policy-makers [that]... [w]e have just passed through a period of political terrorism: let us now move away from eco-terrorism, even if it means the *end of trout*,” (Cambray 1997, p.27, emphasis added). Calling trout fisheries expansion eco-terrorism and likening it to political terrorism, generated outrage among fly-fishers in the media (Brown 2013). The recommendation to end trout seemed to threaten an entire industry. Cambray (2003b, p.225) extended his argument to what signified potential marginalisation of economic activities utilising alien species emphasising that “Policy makers opt for a *rationalist response of sustainable development*”, which perpetuates domination of nature by humankind. He, thus, recommended that there “should be total eradication of the aliens in rivers and lakes” (Cambray 2003b, p.226).

In his argument, Cambray demonstrates his belief that the search for win-win solutions had failed to resolve ecological problems. To him, sustainable development was part of the problem. Since past policies had advanced anthropocentrism, now it was time for policies to advance biocentrism and/or ecocentrism as a solution to the problem of alien and invasive species. He, thus, advocated for a win-lose framework. Since trout fisheries comprised feral and domesticated stocks, the recommendation for total eradication was a sufficient sign that appointment of scientists sharing Cambray’s ideology to decide the fate of industries relying on alien and invasive species was a survival and viability threat to them (Table 8-2A).

Table 8-2A: Semiotic codes for the NEM:BA regulatory reform process

Period	Sign	Object	Interpretant
1986-2003	Anti-trout scientists recommend complete eradication of trout from inland waters and label trout fisheries development eco-terrorism	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Fly-fishers outraged (emotional);</li> <li>• Fly-fishers respond through media campaigns (energetic)</li> </ul>
2005-2006	Minister appoints some members of the anti-trout lobby to the task team charged with listing invasive species and drafting AIS regulations	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Fear that trout sector would be marginalised (emotional);</li> <li>• FOSAF (2005) responds with a trout position paper offering institutional innovations (energetic);</li> <li>• Trout sector mobilises to lobby national decision makers (energetic)</li> </ul>
2005-2006	Task team classifies trout as species to be regulated through a zonal approach (logical); Trout sector proposal in the position paper adopted (logical)	Industry is now secure	<ul style="list-style-type: none"> <li>• Trout sector consulted (energetic);</li> <li>• Trout sector supports the regulations and list of invasive species (logical, that is symbol recognition)</li> </ul>
2005-2006	DEA rejects the 2005/2006 species lists and regulations; Task team dismissed	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Trout sector outraged (emotional);</li> <li>• Original task team frustrated (emotional);</li> <li>• Experts criticise the DEA (energetic)</li> </ul>
2006-2007	DEA hastily publishes draft AIS regulations and invasive species lists	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Original task team criticises the species lists because of many inadequacies (energetic);</li> <li>• Trout sector outraged (emotional);</li> <li>• Trout sector responds with a censuring letter (energetic);</li> <li>• Trout sector makes critical comments and proposes policy innovations (energetic)</li> </ul>
2008-2010	DEA makes major revisions to the 2007 draft regulations and publishes the 2009 draft that reverted to the 2005/2006 regulatory system	Industry is now secure	<ul style="list-style-type: none"> <li>• Trout sector welcomes the 2009 draft (emotional)</li> <li>• Trout sector provides more constructive comments (energetic)</li> <li>• Trout sector accedes to the listing of trout as invasive (logical, symbol recognition)</li> </ul>

Table 8-2B: Semiotic codes for the NEM:BA regulatory reform process

Period	Sign	Object	Interpretant
2008-2010	DEA commissions the SANBI to consult with the trout sector to discuss the principles and methodology for mapping trout waters and SANBI holds workshop and collaboration with the trout sector begins	Willingness to consult	<ul style="list-style-type: none"> <li>• Trout sector disappointed with the DEA's disengagement in the process (emotional)</li> <li>• FOSAF's mapping principles and mapping methodology adopted fully (logical, symbol recognition)</li> </ul>
2008-2010	SANBI contracts the SAIAB to map trout waters and SAIAB in collaboration with the trout sector maps trout waters	Willingness to consult	<ul style="list-style-type: none"> <li>• Disagreements with SAIAB over the mapping (emotional)</li> <li>• Disengagement (energetic)</li> <li>• Re-engagement (energetic)</li> </ul>
2008-2010	Chief State Law Advisor shows that the 2009 draft regulations could not pass legal muster because the NEMBA disallowed the DEA's regulatory intensions	Regulations failed constitutionality and legality test	<ul style="list-style-type: none"> <li>• DEA revises the 2009 regulations (energetic)</li> <li>• DEA begins to amend the NEM:BA (energetic)</li> </ul>
2008-2010	DEA rejects trout maps and SAIAB consultant resigns because of the NEM:BA process	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Trout sector frustrated (emotional)</li> </ul>
2011-2013	DEA promulgates 2013 interim regulations with two categories of invasive species, with trout species requiring compulsory control, but the DEA failed to give reasons for, and to justify, the listing	Regulatory process comes short of administrative due process requirements	<ul style="list-style-type: none"> <li>• FOSAF demands justification for the listing of trout in 2013 (energetic)</li> <li>• FOSAF mobilises for litigation (energetic)</li> <li>• FOSAF demands the DEA's audience (energetic)</li> </ul>
2011-2013	DEA responds with a letter of assurance to the FOSAF emphasising that trout would not be eradicated, and the DEA persists with its regulatory reform proposal	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Trout sector forms a lobby group called Trout South Africa (energetic)</li> <li>• Trout South Africa pledges to fight for the delisting of trout under the DAFF and to oppose every decision about trout that the DEA makes (emotional)</li> </ul>

Table 8-2C: Semiotic codes for the NEM:BA regulatory reform process

Period	Sign	Object	Interpretant
2013-2014	DEA promulgates the NEM:BA amendment (NEMLA) in 2013, revisits the 2009 draft regulations and republishes them as 2014 draft AIS regulations. DEA unilaterally declares fish sanctuaries.	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Trout sector outraged by the fish sanctuaries (emotional)</li> <li>• Trout South Africa mounts road shows, media campaigns, propaganda campaigns and mobilises for litigation (energetic)</li> </ul>
2013-2014	DEA responds with media releases and televised addresses correcting misrepresentations of the trout sector	Survival and viability threat to the trout industry	<ul style="list-style-type: none"> <li>• Trout South Africa continues to mount road shows, media campaigns and mobilisation for litigation (energetic)</li> <li>• Kloof conservancy litigates against the DEA for failure to implement Chapter 5 of the NEMBA (energetic);</li> <li>• Court ruling in Kloof Conservancy v. Government of South Africa is in favour of Kloof Conservancy, and encourages trout sector to pursue litigation (logical)</li> </ul>
2013-2014	Negotiation between trout sector and the DEA	Willingness	Memorandum of understanding on how to regulate trout (energetic)
2013-2014	The presidency declares aquaculture development a major strategy of the Ocean Economy vision; Aquaculture Labs summons the DEA and orders it to reach consensus with trout sector and to design regulations that facilitate aquaculture growth	Industry is now secure	<ul style="list-style-type: none"> <li>• In compliance to the order, and in collaboration with the trout sector and Provincial Nature Conservation Authorities, the DEA developed trout-specific regulations (logical)</li> <li>• DEA announces that promulgated AIS regulations and species lists of 2014, will be amended to incorporate trout specific regulations (logical)</li> <li>• Long-term integrated permits now offered (logical)</li> <li>• Plan to map aquaculture development zones (energetic)</li> </ul>

Source: Author's analysis

### 8.5.1. Institutional entrepreneur proposes institutional innovations

In response to the views of the anti-trout lobby, Bainbridge and Lax (2005, p.1, emphasis added), on behalf of the FOSAF, argued that in the design of “sound conservation

management policies..., many social, economic and environmental factors must also be taken into account, *not only* the interactions between the indigenous and alien biota” (Table 8-2A). Bainbridge and Lax’s (2005) view agreed with Bromley’s (2012, p.19) view that “it is *not just* the *physical* characteristics of an ecosystem”, but it is also “the *social construction* of that ecosystem that will be decisive in terms of institutional arrangements” for resolving environmental problems (emphasis added). Effective institutional arrangements for environmental governance take into account both human dimensions and natural systems (Hirokawa 2014, Max-Neef 2005).

The FOSAF began to mobilise and raise awareness among fly-fishers so that “the views of all anglers are articulated to decision makers, [since] the decisions that are taken may not be in our favour” (Bainbridge and Lax 2005, p.4). The FOSAF published a position paper in 2005 proposing a regulatory framework for trout with the hope of influencing the content and thrust of the invasive species lists and the AIS regulations (Table 8-2A). Four governance principles underpinned the FOSAF’s proposition: “sustainable development”, “sustainable fisheries resource management”, integrated environmental management and “Integrated Catchment Management” (Bainbridge *et al.* 2005, p.11).

The position paper raised three major issues that would operationalise the four-pillar governance framework if implemented. Firstly, Bainbridge *et al.* (2005, p.i) proposed that the regulatory framework had to provide for the “*maintenance* of both indigenous as well as alien species” (emphasis added). Secondly, Bainbridge *et al.* (2005, p.i) strongly proposed “the establishment of a zoning system.” The central thrust of this proposition was to create a system of spatial property and use rights systems (zonal systems) that would protect the industry and maintain the status quo, while conserving biodiversity. Thirdly, Bainbridge *et al.* (2005, p.i) advocated the “development of a policy framework and management guidelines for control, conservation and management of aquatic biodiversity resources.” Thus, the role of an institutional entrepreneur was unfolding, which had already begun in 1986 during the trout wars (Brown 2013, Crass 1986b).

### **8.5.2. The DEA rejects the 2005/2006 draft regulations**

While scientists and various sectors were pleased that they had *consensually* developed regulations that would facilitate conservation of biodiversity without “restricting economic

development unnecessarily, and ensuring that such development is sustainable” (Biodiversity Policy 1997, p.23), the DEA rejected the regulations (Table 8-2A). The “regulations were *rejected* by the Department of Environmental Affairs and the task team was *dismissed*. No reasons for the rejection or dismissal were communicated” (Henderson 2013, paragraph 5, emphasis added). Macleod (2006, p.13) reported the incident stating that “[l]eading scientists who spent years developing a national system to prevent invasions by alien species are dismayed that [the regulatory system] had been dismissed by the department of environmental affairs and tourism.” An important point here was that the DEA failed on reason giving as “no further formal communication ... [as] to why the department had dismissed their proposed regulations...” was given (Macleod 2006, p.13).

The DEA only hinted that the regulations were “work in progress” and “opinions and perspectives” were bound to differ (Macleod 2006, p.13). Insofar as the DEA had delegated authority to the task team to develop the regulations consultatively, it remained unclear whose opinion it was that differed when the generality of sectors and scientists had established reasonable value. Macleod (2006, p.13) reported that the development of the regulatory system “involved broad consultation, including workshops with diverse sectors such as aquaculture [trout industry included], game farmers, nurseries and pet traders” (Table 8-2A). The administrative preferences of the DEA, but not the nature of the problem as consensually determined through consultative processes, defined the institutional adjustment path. Expert 1 (2014, *pers comm*) commented on the rejection of the regulations by the DEA:

“Part of it was that [the process] was taking a very *multi-departmental approach* to it. I think they were uncomfortable with that... We had state law advisors and other [legal] opinions on everything we did. And the opinions at the time were that what we were doing ... was possible” (emphasis added).

Ironically, the NEMA demanded inter-departmental harmonisation of policies, but here disharmony between economic-oriented departments and the DEA seemed to play a major

role in defining the institutional adjustment path.<sup>12</sup> The rejection of the regulations on grounds that they were taking a multi-departmental approach suggested that the NEM:BA AIS regulatory process was a limited access policymaking order in which the DEA was the only sovereign agent deciding what had to be done. This inevitably implied that the rationing transactions in this period failed to pass the reasonableness/instrumentality test since democratic valuation at the inter-departmental level was undermined. Thus, the conclusion was that a phenomenon of administrative coercion and epistemic violence through the negotiational psychology of coercion as well as command and obedience was slowly evolving in the regulatory reform process. In a limited access policymaking order, the negotiational psychology of persuasion is ruled out and ceremonially warranted assertions, which are the instituted social imaginary, prevail.

### **8.5.3. Design of imbecile regulatory instruments: 2006-2007**

The original task team, government departments with economic mandates as well as other interested and affected parties regarded the 2007 draft AIS regulations as disappointing (Henderson 2013) (Table 8-2A). The 2007 draft regulations and species lists “*were heavily criticised by members of the 2004 to 2006 task team*. The invasive species list... was inadequate and contained several material omissions of species that are known to be invasive” (Henderson 2013, not paged, emphasis added).

The species list also clashed with economic interests because it concentrated on economically useful species and delisted invasive species that were of no economic use. Bashoff (2013b, p.12-13), a Director of Policy Development in the DEA, also reported that the Department of Agriculture, the Department of Trade and Industry, and the Department of Water Affairs and Forestry indicated that “they did not support the revised draft AIS Regulations that was different from what had been developed by the original task team”. Looking at the three departments that objected to the regulations, one can conclude that economic interests were institutionally isolated in the 2007 draft AIS regulations. The three departments have economic mandates to promote industrial development, agricultural and forestry development, food security, employment creation and poverty alleviation, among

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<sup>12</sup> To provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state (NEMA 1998, Preamble) and “There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment (NEMA 1998, section 2(4) (l)).

others. The 2005/2006 species listing scheme recognised economically useful invasive species and prescribed a zonation system to facilitate economic utilisation without necessarily harming biodiversity.

Species that least qualified for listing as invasive were also listed in the 2007 list. In an interdepartmental review meeting, the Department of Water Affairs and Forestry (DWAF) commented that given the strictness of the NEM:BA on invasiveness, the DEA would do well by listing “ONLY those [species] that need to be controlled and eradicated... The better option is to regulate species that could be invasive but that should not necessarily be eradicated under the alien provisions,” (DEA 2008, not paged, capitalisation in original). This statement reveals that the DEA, up to that time, but excluding the 2005/2006 iteration, had followed a blanket listing approach that was not guided by criteria such as the relative degree of threat posed by a species, hence the emphasis “list ONLY” those that need to be eradicated. The recommendation to regulate economically useful invasive species as non-listed species under strictly enforced permit conditions agreed with the position of the trout industry (Bainbridge *et al.* 2005, FOSAF 2007; 2009a; 2009b; 2013, FOSAF and Trout SA 2014a; 2014b, Trout Interest Group (TIG) 2008).

The FOSAF (2007, not paged) reacted to the 2007 draft AIS regulations with a letter addressed to the Minister of Environmental Affairs and Tourism “to express ... extreme disappointment at the many inadequacies, errors and incongruities that were brought to light in our review of the document.” The Minister had assured stakeholders that the DEA would prepare “regulations that were credible, practical, widely supported, and which would not be expensive or onerous to implement” (FOSAF 2007, not paged), but the draft regulations achieved the contrary. In terms of Table 8-1, this process is the *Lysenkoan VI* transitional phase. The views that the anti-trout lobby had expressed earlier were finding their way into the regulations (Table 8-2A). The phenomenon of institutional isolation engendered by hegemonic epistemologies was slowly becoming apparent in public policy.

The economic incentive structure was not credible to the trout sector and the regulations implied a large transaction cost burden on the regulated players. The absence of provisions to facilitate, rather than inhibit, economic utilisation of alien species that traditionally served socio-economic purposes was not only an unacceptable threat to economic and

social rights, but also constitutional rights to a livelihood (Table 8-2A). The FOSAF (2007, not paged) warned that the regulatory framework “risks bringing you and your Department into significant disrepute and into contest with a major sector of our agricultural and tourism industry” because players in the trout sector were “very vocal in their outrage at the lack of provision in the regulations of alien fish with significant economic and social value.” Thus, the sector threatened “to open this debate in television and in the popular media as well as in Parliament” (FOSAF 2007, not paged). The emotional interpretant of outrage was to engender energetic interpretants such as media campaigns and lobbying the legislature.

The FOSAF (2007, not paged) felt that the “draft regulations lack[ed] cohesion and logic precisely because of the absence of ... a policy framework with regard to aquatic biodiversity and ecosystems.” The essence of having the aquatic biodiversity policy framework was to provide “the basis, criteria and parameters to distinguish between relative threats and advantages and thus would have provided for different mechanisms, strategies and treatment of the various species,” (FOSAF 2007, not paged). The FOSAF (2007, not paged) felt that the DEA listed species “in a general and theoretical sense based on scientific information from abroad or taken out of context”, but if policy criteria were in place the DEA would have listed species “on a practical case by case, locality basis that takes account of local conditions, species and consequences” (FOSAF 2007, not paged). The FOSAF’s argument confirms the large estimated odds in Chapter 7 which showed that a one standard deviation increase in the use of contextually relevant evidence increased the odds of perceiving the regulations to be reasonable by 415% (Table 7-13).

#### **8.6. Transitional phase in policymaking orders: 2008-2010**

The energetic interpretants that the 2007 draft AIS regulations and species lists attracted forced the DEA to make major revisions to the regulations (Bashoff 2013a). The 2009 draft AIS regulations incorporated some of the proposals that the FOSAF had made previously (Table 8-2A). In an affirmative energetic interpretant, the FOSAF (2009b, p.3) acknowledged that “there appear to be many positive aspects to the draft regulations”.

Two institutional innovations were introduced into the draft regulations. Firstly, the DEA proposed an integrated permitting system, which implied that an economic agent only needed a single risk assessment and application to obtain a water use licence, a trout

stocking licence and a licence to transport live specimens of an alien species, among other permissible activities. A trout farmer, without an integrated permitting arrangement, needed no less than nine permits to complete a single trout operation (Swartz, not dated). Transaction costs were large. Expert 1 (2014, *pers comm*) also remarked that “We had some things that were, probably, too fundamentalist themselves around permitting.” Thus, private transaction costs were bound to decline significantly with the institutional innovation. The FOSAF (2009a, not paged) welcomed “the principle of integration of permits as a positive step hopefully aimed at avoiding unnecessary duplication of administration of permits and costs.” This innovation was in line with the FOSAF’s proposal for an integrated environmental management and integrated catchment management framework (Table 8-2A).

Secondly, section 21(2) of the 2009 draft AIS regulations provided that a “species may be listed in different categories in different parts of the country.” The 2009 draft regulations created four categories of species: namely, species to be compulsorily eradicated; species to be controlled by an invasive species management programme; species to be regulated by area and species to be regulated by activity. The 2009 regulations re-introduced the first four categories of the 2005/2006 draft regulations. While this move was welcomed by the FOSAF, the FOSAF (2009a) still argued that the DEA had not carefully considered its recommendation since 2005. As an example, the FOSAF (2009b, p.1) maintained that “the categories in the draft regulations were prepared *unilaterally* by DEAT and its *advisors*” and no “*explanation* has been provided to stakeholders on the underlying rationale to the recently published classification system” (emphasis added).

Failing to give reasons and justifications was the biggest failure of the DEA since the process began in 2004. This theme of publicising the criteria used to determine the invasiveness of species recurred in every submission and letter that the FOSAF, and later its collaborators, submitted to the DEA (FOSAF 2007; 2009b; 2012; 2013; FOSAF and Trout SA 2014a; 2014b; Trout Interest Group (TIG) 2008). Two conclusions are possible. Firstly, governance failure, in the form of lack of administrative due process and regulatory unresponsiveness, characterised the reform process. Secondly, the DEA, it seems, had criteria that it perceived might not have passed democratic and scientific scrutiny. Expert 3 (2014, *pers comm*) remarked that “so many invasive species are listed as invasive for administrative

convenience.” Administrative convenience was a ceremonial adequacy standard upon which public policy was being decided.

In a spirit of compromise, the FOSAF (2009b, p.2) stated that it was of “the opinion that DEAT had little alternative but to list trout to be an invasive species.” The reason for the compromise (Table 8-2B) was that South Africa was a signatory to the Convention on Biological Diversity and that trout were listed in the top one hundred invasive species in the world. The FOSAF (2009b, p.2) made another major concession stating that “the pragmatic approach would be to concede the “invasive” potential of trout, as is defined by the Act, and thus to accept the listing.” The 2009 draft regulations had managed to bring a convergence of mental objectification about how to regulate trout because the FOSAF’s proposals about a zonal system had been taken on board (Table 8-2B). The dynamic process leading to this compromise was a phenomenon of *instrumental embodiment II*, which occurred when instrumental interests (sustainable biodiversity conservation) overpowered ceremonial interests (pecuniary interests, status quo and power) of the trout sector and the ceremonial interests of anti-alien species lobbyists (Table 8-1).

To strengthen participatory governance of natural resources, the DEA commissioned the South African National Biodiversity Institute (SANBI) to deliberate with the trout industry on the mapping of trout waters (SANBI 2009) (Table 8-2B). The SANBI-trout industry workshop deliberated on the mapping methodology (SANBI 2009) and the essence of the process was to gain “buy-in from anglers/angling bodies” (Swartz not dated, p.1). The most important point was that the FOSAF’s mapping methodology and principles were wholly adopted. It had devised this methodology and empirically tested it successfully in the mapping of trout waters in the KwaZulu-Natal province (Bainbridge *et al.* 2005). Thus, an institutional innovation that the FOSAF designed had become officially recognised, which semiotically implied symbol recognition (Table 8-2B). The institutional innovation passed the fitness test. The FOSAF had all the marks of an institutional entrepreneur who invested in knowledge and used it in strategic transactions to overcome limiting factors by influencing institutional change (Commons 2009, Dawson 1994, North 1990).

Two signs turned the trajectory of the nascent progressive institutional adjustment into a contested process again. The first was the Chief State Law Advisor’s comment that

questioned the legality of the proposed regulatory approach in the 2009 draft AIS regulations (Table 8-2B). The second sign was the rejection of the maps by the DEA without supplying reasons for the decision (Table 8-2B). The problem that had just been tamed became wicked again.

#### **8.6.1. Administrative redefinition of legal entitlements**

The questioning of the legality of the regulatory framework by the Chief State Law Advisor (CSLA) relates to the question of whether the NEM:BA was so disabling that the DEA could not develop a comprehensive set of enabling regulations or the DEA had disabled the NEM:BA to fit its regulatory preferences (administrative convenience). After reviewing the regulations and the species lists, the CSLA advised the DEA “that a number of provisions were *ultra vires*... due to *inadequate*, or in some cases, a *total lack* of enabling provisions in NEMBA” (Bashoff 2013a, p.8, italics in original).

The NEM:BA did not provide for the designation of species categories with different degrees of invasiveness for the purpose of management and control priorities. To the NEM:BA, a species was either listed as invasive or not listed. If a species were listed as invasive, the NEM:BA required its complete eradication and prevention of the re-emergence of the species in any form or shape. The intuition in the NEM:BA was that species were to be listed in terms of the degree of ecological damage which they posed (Davis *et al.* 2011). This entailed a ranking of species to prioritise which ones to eradicate and which ones not to (Macdonald and Jarman 1985). The former qualified for listing and the latter did not qualify. Thus, the administrative failure to supply criteria for determining the relative invasiveness of species on which basis to prioritise the listing, as the FOSAF had always insisted, had come back to occupy the DEA. It was a *Lysenkoan II* process (Table 8-1).

The CSLA clarified that “[c]ompulsory control and eradication are only requirements if the species are listed as invasive species” (Bashoff 2013a, p.9). The rationale in this view was that the default management strategy for non-listed invasive species was the same as that for alien species whose invasiveness had not yet been established or was negligible. Economically useful invasive species were the only species that provided a typical case of species that would have to be regulated as non-listed invasive species rather than listed invasive species. Similarly, the Department of Water Affairs and Forestry (DWAF)

recommended three options: “list ONLY those [species] that needs to be controlled and eradicated” or “amend the provisions to **allow for control without eradication**” or “regulate species that could be invasive but that should not necessarily be eradicated under the alien provisions,” (DEA 2008, not paged, capitalisation and emboldening in original). The DEA chose the second option, which was to amend the NEM:BA in order to “allow for control of invasive species without eradication” (Table 8-2B).

The administrative choice redefined the opportunity sets, which implied that the transaction cost burden of using species that now were listed as invasive was going to increase. The administrative choice effectively changed the rationale of the NEM:BA since control no longer meant eradication/combating, but could now also mean management. The Minister of Water and Environmental Affairs (2012, p.1) stated that the administrative regime for economically useful invasive species was

“to regulate those invasive species to be listed... in different categories... However, insufficient enabling provisions in NEMBA have posed a challenge as far as it related to the implementation of regulations of such a comprehensive nature.”

Because of the perceived statutory shortcomings of the NEM:BA “the DEA... initiated a process of proposing urgent amendments to NEMBA” (Minister of Water and Environmental Affairs 2012, p.1). Expert 1 (2014, *pers comm*) corroborated the ministerial view stating that “there was some very theoretical, impractical thinking in those who drafted this [NEM:BA] Act and it’s been a problem for us... So, the problem was that we had an Act that was not well drafted.” Expert 1 (2014, *pers comm*) drew attention to the fact that it was not only the drafting of the Act that was bad, but also “the science behind it was very fundamentalist, but we are trying to take a pragmatic approach to how we regulate against invasive species.” Fundamentalism in the scientific ideology that underpinned the NEM:BA was an instituted social imaginary, which Peretti (1998; 2010) hypothesised as a discernible residue of apartheid ideology in the anti-alien thinking in the South African invasion biological research.

### **8.6.2. Administrative discontinuities**

Frequent changes in the leadership of the DEA and the parent ministry were blamed for policy renegeing that was characteristic of the 2004-2014 period. The problem of

fundamentalism, which is characteristic of instituted social imaginaries, became a strategically limiting factor.

“[With] *departmental individual change*, you go from the *fundamentalist* that was Crispian Oliver and Pam Yako who were involved in the drafting of the Act to the *more pragmatic thinking* in the DEA leadership now. I think people have to appreciate that *succession* of DG’s and Ministers is *a succession of paradigms of thinking* which make things difficult to harmonise” (Expert 1 2014, *pers comm*, emphasis added).

The point Expert 1 raised had several implications. It implied that each directorate and the accompanying minister worked within a policy ecology in which institutional spaces, in a network of policy clienteles, had to be negotiated. A change in this leadership entailed a reconfiguration of institutional spaces and types of scientific ideas and ideologies relied upon. Above all, each director/minister was a member of an epistemic community of some sort and, as such, carried with him/her the intellectual and spiritual climate of his/her epistemic community as well as the ideologies of that community. Thus, the drafting of a policy instrument that spanned several generations of directorate/ministerial leadership was likely to experience the planning curse due to conflicting ideologies between the predecessors and their successors. To this complex misfit, conflicts with recipients of the policy transformed the policy ecology into layers of wickedness.

Contrary to the DEA’s claims that the NEM:BA was disempowering, the Kloof Conservancy (2013, p.7) argued that the DEA misconstrued its duty under the NEM:BA, which was to publish “regulations that fit NEMBA, not to remain supine while the [DEA] endeavoured to make NEMBA fit the [DEA’s] proposed regulatory regime.” Similarly, in *Kloof Conservancy v. Republic of South Africa*, 2014, Justice Vahed, in an *obiter dictum*, argued that “*the perceived inadequacies of NEMBA were without foundation*” (2014, p.39; emphasis added). In light of this *obiter dictum*, and the views of the FOSAF since 2005, the CSLA and the DWAF, it was concluded that the DEA disempowered the NEM:BA. It sought to satisfy its own preferred regulatory regime that had more to do with an extensive listing of species that were known to have some invasive tendencies than with addressing the public question of listing species with the most damaging impact on species, ecosystems, habitats, human

health, the economy or the environment. Further, in disabling the NEM:BA, the DEA effectively redefined the opportunity sets that the legislature had already redefined, thus initiating the phenomenon of deep-structure institutional isolation.

Table 8-3: Leadership changes in the Ministry and Department of Environmental Affairs

<b>Minister</b>	<b>Period</b>	<b>Policy ecology / policymaking order</b>	<b>Director General</b>	<b>Period</b>
Mohamed Moosa (African National Congress – ANC)	1999-2004	Transitional phase; legislative process was a transitional phase with high risk of relapse to limited access policymaking order	Oliver Crispian	1999-2005
Marthinus van Schalkwyk (New National Party (1997-2005), a new look of the old party that ruled during apartheid. After 2005, he became a member of the ANC)	2004-2009	Transitional phase; policy ecology actually eventually relapsed to a limited access policymaking order	Oliver Crispian Pam Yako	1999-2005 2005-2008
Buyelwa Sonjica (African National Congress - ANC)	2009-2010	Transitional phase; policy ecology oscillated between transitional phase and limited access policymaking order	Nosipho Ngcaba	2008-2015
Edna Molewa (African National Congress - ANC)	2010-2015	Transitional phase, although the policy ecology oscillated between the transitional phase and the limited access policymaking order. After the Trout SA propaganda campaigns in 2014 and litigation by Kloof Conservancy, it transitioned to an open access policymaking order	Nosipho Ngcaba	2008-2015

*Source: Personally compiled from various parliamentary and departmental records*

Table 8-3 summarises the changes in ministers and director generals in the Ministry and Department of Environmental Affairs. The political parties to which each minister belonged are indicated in brackets. Political party ideology seemed to have had a correlation with the

types of signs that flowed throughout the NEM:BA process. Chapter 6 established that the NEM:BA enactment process was in the transitional phase with a very high risk of relapsing to a limited access policymaking order during which the administrative preferences of the DEA shaped the content of the Act. The Minister at that time was an African National Congress (ANC) minister. It was the directorate in this period 1999-2005 that Expert 1 blamed for fundamentalism in its administrative practices and the accompanying scientific ideology.

The period 2004-2009 was the one in which implementation of the NEM:BA began. Outstanding semiotic processes in the 2004-2009 period were dismissal of the original task team without providing reasons and justification; the rejection of the 2005/2006 draft AIS regulations without providing reasons and justification; the publication of outrageous draft AIS regulations in 2007 as the FOSAF (2007) described them; and the rejection of the trout maps without providing reasons and justification. Epistemic violence was highest in this administrative generation. In a historical reflection into the ideology that shaped the NEM:BA drafting process, Expert 3 (2014, *pers comm*) remarked that “environmental legislation was based on the old apartheid style of managing and doing things.” By the apartheid style of managing things, Expert 3 meant a governance style of ruling down/ top-down logic. The transitional phase in the 1999-2004 period effectively relapsed into a limited access policymaking order in 2004-2009. All progressive scientists who had tried to follow the balanced approach of the Task Group for Invasive Biota (TGIB) of the 1980s, were summarily dismissed and a new team appointed.

### **8.6.3. DEA rejects trout maps**

The general perception from those close to the mapping processes was that the DEA rejected the maps in a similar way, and for similarly undeclared reasons, that it had rejected the draft AIS regulations of 2005/2006. For example, Expert 6 (2014, *pers comm*) remarked that “they threw out the maps because they realised there was such an overlap of yellowfish, black bass, carp, and barbel and they realised that what they were trying to implement was non-implementable.” Similarly, Expert 3 (2014, *pers comm*) pointed out that “the mapping process was thrown out and Ernst resigned... The mapping process was not a species management approach, but it was a catchment approach to environmental management,” which the DEA did not want. The SANBI (2009, p.6) report also recorded that

the trout industry proposed a “catchment approach”, the rationale being to minimise transaction costs of administration and compliance. The FOSAF (2012, p.2) argued that the DEA had based the mapping process on the “framework of the regulations... which entailed very little potential change to the current status quo.” Since the status quo was to be maintained, but suddenly the DEA decided to reject the mapping process, agitation in the industry was inevitable (Table 8-2B).

A senior SANBI official (2014, *email comm*) disclosed that the mapping process was “a very inflammatory project” and “very controversial” because “the DEA had [not] paid... attention to the social engagement process with trout fishermen”. The SANBI (2009, p.12) consultative workshop report similarly stated that the trout industry had “[c]oncern that DEAT is not really engaged in the process and have not listened to past comments on legal and administrative system concerns raised by the sector.”<sup>13</sup> The DEA failed on participatory governance (“social engagement process”) (Table 8-2B), hence the element of distrust from the trout sector. Thus, much of the controversy indicated the absence of political/participatory equity (Béné and Neiland 2006). These findings agree with the estimated odds which showed that a one standard deviation decrease in the variable “participatory” decreased the odds of perceiving the regulations to be reasonable by 410% (Table 7-13).

### **8.7. Interim regulations and escalation of controversy: 2011-2013**

With the comprehensive regulatory scheme of the 2009 draft AIS regulations set aside, the DEA published shortened AIS regulations that included species that deserved compulsory eradication and those that required regulation through a compulsory invasive species management programme in 2013 (Table 8-2B). The original task team defined the two categories of species in 2005/2006 as species whose harmful effects outweighed their economic benefits (Henderson 2013). The DEA decided to transfer trout to the category requiring a compulsory species management programme from a category that required regulation by zonal approach in the 2005/2006 and the 2009 drafts (Bashoff 2013a). If trout were not as harmful as to make their economic benefits less than their harmful effects, the sector queried the criteria that were used to list trout in the stricter category (FOSAF 2013).

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<sup>13</sup> The Department of Environmental Affairs (DEA) was formerly called the Department of Environmental Affairs and Tourism (DEAT).

The listing of trout under a compulsory species management category was a sign that angered and threatened the economic viability of the trout industry (Table 8-2B). The DEA *lost the trust* of the trout sector from this moment onwards. The anger of the trout sector subsequently led to a series of energetic interpretants one of which was the formation of a coalition/institutional entrepreneur named Trout South Africa (Table 8-2C). The coalition represented the interests of fly-fishers and the rest of the trout industry. A *Lysenkoan V* institutional adjustment process had begun (Table 8-1). Reacting to the regulatory unresponsiveness of the DEA, Cox (2013, p.5) argued that the “FOSAF has been suggesting ... alternatives for years but *have been ignored*”, hence “we are going to have to *oppose this law*. We need to do so *in the courts and in public*” (emphasis added). The trout industry promised a series of energetic interpretants such as media campaigns, road shows and litigation (Table 8-2C). The DEA assured the industry emphasising that the “view of the Department is that management (rather than requiring the eradication) of listed invasive species is consistent with NEMBA” and that the DEA was “mindful of the fact that trout poses a lower risk to biodiversity in certain places” (Ngcaba 2013, p.2), hence not targeted for eradication. Yet, trout was classified under a category for which ecological harm exceeded socio-economic benefits.

Despite the assurance from the DEA, the trout industry adopted an offensive strategy. Trout SA’s objectives in the offensive strategy were “to get trout delisted as an invasive species under the NEM:BA” in the short term; “to represent trout interests under the auspices of the DAFF” in the long term; and to “attack the DEA’s decision on all fronts” insofar as the listing of trout was concerned. The trout industry now wanted to have trout regulated under the Conservation of Agricultural Resources Act (CARA) of 1983 administered by the Department of Agriculture, Forestry and Fisheries (DAFF) (Table 8-2C). The DAFF has an economic mandate, which makes it more sensitive to developmental and economic matters (anthropocentrism) whereas the DEA was concerned with biodiversity conservation (ecocentrism and/or biocentrism). The contestation was now shifting to the level of propaganda because whatever could be used to frustrate the decisions of the DEA had to be used (Table 8-2C).

Governance failure as evident in deficiencies in administrative due process led to the turning point of the regulatory problem from a manageable problem to a wicked problem.

One of the factors contributing to the emotional interpretant of outrage was that the DEA did not want to disclose the interim regulations to affected parties. The FOSAF, after a prolonged struggle, was permitted to comment on the regulations “on an agreed confidential basis” (FOSAF 2013, p.1). The 2010-2014 period was under ANC ministerial leadership (Table 8-3). The culture of *ruling down* had not changed. The regulatory process was a limited access policymaking order that led to institutional isolation of sectors dependent on alien and invasive species.

### **8.8. Fifth iteration of AIS regulations and species lists 2013-2014**

The amendments to the NEM:BA, through the National Environmental Management Laws Amendment Act (NEMLAA) of 2013, became the logical interpretant that resolved the emerging series of energetic interpretants from the CSLA, the trout industry and the litigation by Kloof Conservancy. The NEMLAA finally enabled the DEA to re-publish the 2009 draft AIS regulations as the 2014 final AIS regulations with some modifications to the list of invasive species. Inasmuch as the DEA had *lost the trust* of the trout industry in 2013, which by now had resolved to oppose the DEA for any decision it made until trout was regulated under the CARA of 1983, a fierce contest followed the publication of the February 2014 draft AIS regulations for public comment.

#### **8.8.1. Fish sanctuaries coincide with mapped trout waters**

The unilateral declaration of fish sanctuaries by the DEA resulted in an emotional interpretant of outrage again. The trout industry questioned the credibility of the scientific evidence that informed the determination of fish sanctuaries. Fish sanctuaries, as a new institutional innovation, were designed to facilitate conservation of endangered indigenous fish species (Figure 8-3 and Figure 8-4). A mapping process informed the demarcation of the fish sanctuaries. However, the fish sanctuaries followed the same pattern that the rejected trout maps followed so much so that almost all formerly mapped trout waters became fish sanctuaries. Two scientific processes – the mapping of trout waters and the mapping of fish sanctuaries – gave diametrically contrary results. Just as the DEA had, in the past, failed to supply and justify the criteria used to list species as invasive, it also failed to supply and justify the criteria used to determine the fish sanctuaries (FOSAF and Trout SA 2014a; 2014b). Moreover, the DEA had not consulted interested and affected parties concerning the fish sanctuaries (FOSAF and Trout SA 2014a; 2014b).

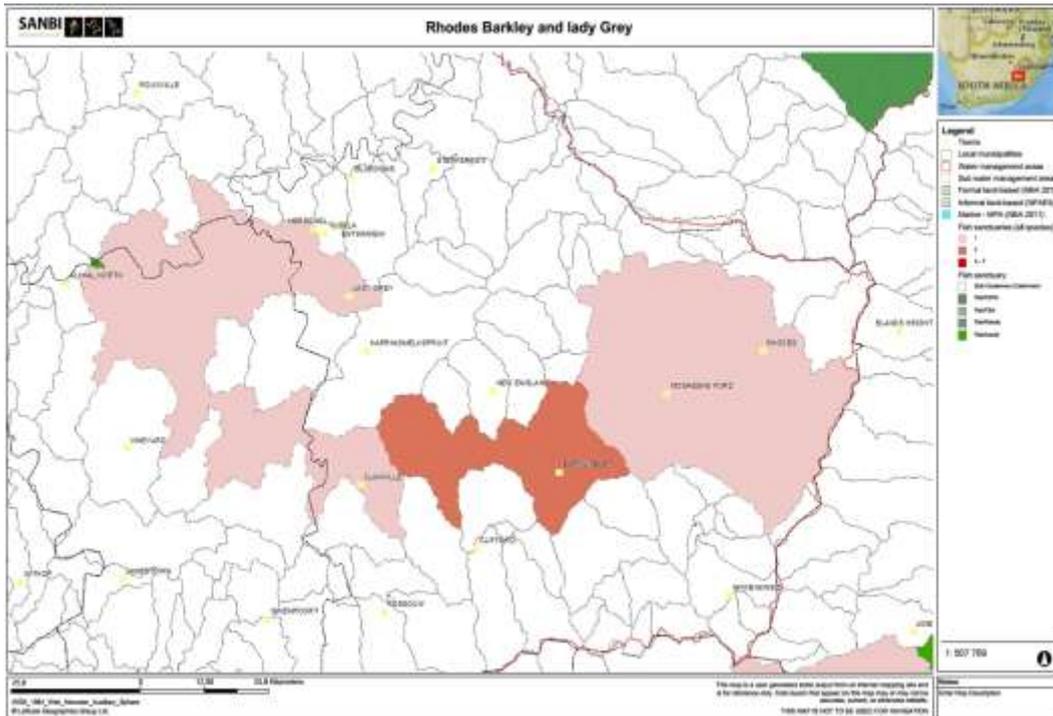


Figure 8-3: Rhodes, Barkley and Lady Grey fish sanctuary map

Source: Generated by the author on the South African National Biodiversity Institute interactive web tool.

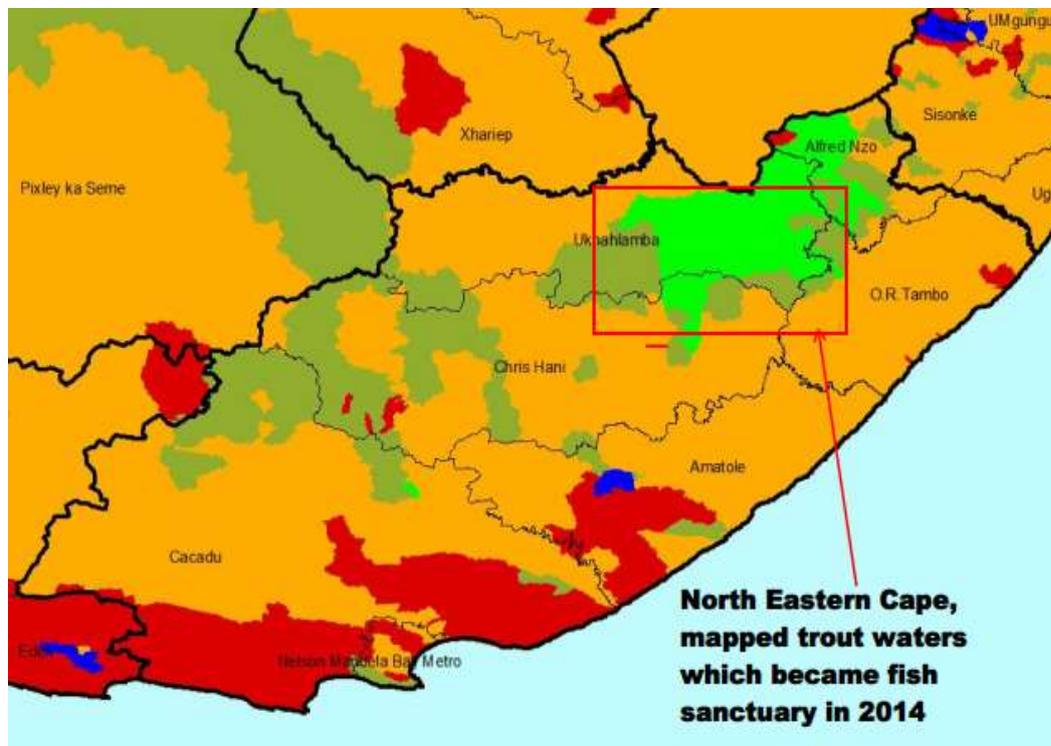


Figure 8-4: Eastern Cape Province trout zonation map

Source: South African Institute of Aquatic Biodiversity.

Some strategic informants commented on the institutional fitness of the fish sanctuaries.

“It is affecting research, teaching and service provision capacity of the university facility. It is affecting the industry at large. Most trout farms are in fish sanctuaries... *Who decided this!? Where is the consultation!? And by what criteria did they decide it!?*” (Expert 3 2014, *pers comm*, italicisation reflects emphasis in audio).

“We will have to acknowledge that *because of the debate*, provinces were coming around and saying, “Actually, we don’t have to list fish sanctuaries.” So, that was the *benefit of the criticism of our approach. Not that we hadn’t within our group said this doesn’t make sense to have fish sanctuaries*, but we had to give everyone to agree” (Expert 1 2014, *pers comm*, emphasis added).

Expert 3’s argument raised a number of issues. By disrupting research, teaching and service provision, fish sanctuaries could be categorised as “imbecile institutions” (Veblen 1914, p.25) or “zombie institutions” (Ayres 1996, not paged). At the level of principles of institutional adjustment, they failed to satisfy the principle of instrumental efficiency to the extent that they failed to promote the growth of the human life process. They failed to satisfy the principle of recognised interdependencies to the extent that they disrupted socially embedded interdependences in the research and teaching service provision, and economic production of trout (Foster 1981c). Fish sanctuaries also failed to satisfy the principle of technological determination because fish sanctuaries were not determined by the nature of the problem the DEA sought to address. They failed to satisfy the principle of minimal dislocation because they were planned to be implemented as ““shock therapy”” (Tool 1994, p.406). As the theory of reasonable value predicted, consensus is a product of the negotiational psychology of argumentation and pleading as well as coercion and persuasion. Expert 1 acknowledged that the debate and criticisms resulted in the disbandment of the imbecile institution.

At the level of the test of progressivity, the fish sanctuary institutional innovation failed the democratic test to the extent that it was a product of scientific hegemony. It failed the growth of knowledge test because it foreclosed scientific enquiry into a consensual institutional arrangement. It foreclosed the Deweyan process of generating reasonable/instrumental value (Foster 1981a). The dominant social imaginary of the

entrenched epistemic community was law. It failed the minimal needs test to the extent that livelihoods were endangered. While attempting to create islands of purity, it satisfied the environmental continuity test in an undemocratic way (Nelson 2010). The fish sanctuary institutional innovation satisfied the possession of power test to the extent that the DEA and its advisors found reason-giving and justification of the innovation unnecessary.

The DEA seemed to be *learning after the fact* since 2003, which demonstrated that it did not *effectively* consult in the first place. The tendency to learn after the fact qualifies for what Tuchmann (1984, p.7) described as “wooden-headedness” or what Code (2008, p.32) describes as “intransigent politics of unknowing” to the extent that it characterises the refusal to be deflected by evidence to the contrary. The fact that the DEA, was informed by provincial nature conservation authorities – which had been managing trout since the mid-20th century – that fish sanctuaries were unnecessary after a costly contest, suggests ineffective consultation. Similarly, Chapter 6 established that during public hearings a recommendation was made for including in the Act express provisions for addressing invasiveness differentially, but the DEA neglected it. These instances suggest that an instituted social imaginary in policymaking was marginalising, through the sanction of ignorance, views from alternative epistemological systems under the pretext that the outsider groups were not qualified to make those recommendations. Yet, the process of amending the NEM:BA in 2013, a decade later, went back to the same recommendations.

Institutional isolation, as a phenomenon, has its roots in epistemological systems that shape the ideological and ideational climate of a policymaking community and processes. Strategic informants highlighted the problem of epistemic violence. For example, Expert 6 (2014, *pers comm*, emphasis added) remarked that “the DEA are not doing it correctly. Why are they *not listening to scientists*? If they are, then *they are not listening to the right ones*”. The justification Expert 6 offered for his comment was that although “the DEA claimed that the whole process was scientifically based, it is flawed... Yet, there are *teams and teams of experts, scientists and lawyers, employed by government*” (Expert 6 2014, *pers comm*, emphasis added). Expert 3 (2014, *pers comm*, emphasis added) also reiterated that the DEA leadership were “*biased towards the input from scientists who are mainly their own*. They don’t like *listening to independent scientific opinions*”. The most important point raised by

Expert 3 and Expert 6 was that the DEA had its own elite group of scientists and lawyers whose epistemic claims really mattered in the design of institutions.

### **8.8.2. Trout species excluded from invasive species lists**

In the 2014 draft regulations, the DEA initially listed trout species within a zonal framework so as to take into account the regional differential of the species' invasive impact. The regulatory framework demarcated sensitive and non-sensitive waters. Trout was considered invasive in national parks, provincial reserves, mountain catchment areas, forestry reserves and fish sanctuaries (DEA 2014a, List 6). However, trout was not "listed for other parts of the country, and may only [be] introduced into dams within fresh-water systems in which it has been formally documented to occur" (DEA 2014a, List 6). The implication was that trout was utilisable in the special conservation areas only under a permit and rigorous risk assessment.

The problematic special conservation areas, which were so extensive that they rendered most traditional prime waters sensitive, were fish sanctuaries (Figure 8-3 and Figure 8-4). Anti-trout scholars such as Cambray (1997; 2000; 2003a; 2003b), Cambray and Bianco (1998) and to some extent Skelton (1977; 1987; 2000) had argued previously that mountain catchment areas where self-sustaining trout fisheries were viable were the same waters where conservation initiatives must be carried out because some indigenous fish species lived in those waters. It was from these recommendations that fish sanctuaries were demarcated, but they focused exclusively on ecological criteria.

The problem for the trout sector was that the transaction cost burden of having trout categorised as invasive in waters that traditionally, and in the solution to the 1986 trout wars, were designated non-sensitive waters was high (Brown 2013, Crass 1986b, Skelton and Davies 1986). Following energetic interpretants in the form of road shows and media campaigns that the FOSAF and Trout SA launched since the publication of the February 2014 draft AIS regulations for public comment (Coan 2014a; 2014b, Cox 2014a; 2014b; 2014c, among others) (Figure 1-2), the DEA decided to delist trout in the final invasive species list that it promulgated in August 2014. The DEA (2014g) reiterated that the best way "to regulate the rainbow trout and brown trout is still being discussed with the aquaculture and

fly-fishing industries, and they have not been listed at present.” Thus, in the meantime, “Provincial controls over the two trout species will be continued” (DEA 2014g).

The series of energetic interpretants from the trout industry invoked energetic interpretants from the DEA, first, by delisting trout; secondly, by initiating negotiations; thirdly, by a media release to pacify the sector; and finally, a logical interpretant that the status quo regulatory arrangement would continue (Table 8-2C). The role of individual agency in shaping institutional change, through influencing administrative transactions highlights the significance of institutional entrepreneurship in weakening hegemonic epistemologies. Trout SA nearly achieved its objective to have trout delisted in the short term by damaging the DEA’s public image.

### **8.8.3. External sovereign agent intervenes**

A plausible hypothesis that emerges from this case is that as the *planning curse* generates a high transaction cost burden on the administrative agency of persisting with a disputed regulatory proposal, political pressure from, or negative public image in the eyes of, the agency’s superiors increases. The probability of the regulated interest group winning the contest also approaches unity as the planning curse attracts public interest, thus leading to instrumental embodiment of administrative ceremonial interests. Expert 4 (2014, *pers comm*, emphasis added) corroborated this hypothesis:

“The *context that created the shift* is that aquaculture has been prioritised by the Presidency as part of its Ocean Labs planning process to develop the Ocean Economy. I am part of the Aquaculture Labs which has the power *to summon* any government department to discuss how to facilitate aquaculture development. As the AIS [regulatory process] was identified as a *constraint*, ... [the Deputy Director General] was basically *ordered* to come to the labs and reach a *consensus* that would accommodate biodiversity objectives and aquaculture sector development goals. As he has to report back to the Minister on what was agreed, he was *forced* to reach an agreement.”<sup>14</sup>

The most important point in this quote was that a limited access policymaking order was broken by an authority superior to the administrative agency. The superior had the “power

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<sup>14</sup> The name of the Deputy Director General was removed for confidentiality

to summon” the administrative agency. In this case, the public image of the DEA had been damaged by the campaigns of the trout sector, and its principals “ordered” or “forced” the DEA to strike a “compromise” (Table 8-2C). The DEA’s regulatory proposal was perceived to be a “constraint” to the national *anthropocentric* vision for aquaculture development since it raised transaction costs of utilising the invasive species of which trout is a prime aquaculture species (Britz *et al.* 2009, De Moor and Bruton 1988, Safriel and Bruton 1984).

While the anti-trout scientists were part of the policy elite in the DEA’s team of scientists, a pro-trout scientist was a member of a higher decision making body, the membership to which influenced the negotiational psychology of command and obedience through the “summoning”, “ordering” and “forcing” of the DEA to reach a consensus. The ability to switch epistemic identities and to draw from multiple epistemic networks enhanced the individual agency of Expert 4 in influencing the weakening of a dominant social imaginary in the DEA, leading to the disbandment of a limited access policymaking order (Table 8-2C).

The emerging hypothesis adds a new dimension to North *et al.*’s (2007; 2012) postulation that the dominant coalition in the limited access order would find the political transaction costs of maintaining a limited access order too high to bear and would begin to grant civil, economic and political liberties to the once excluded groups. North *et al.*’s (2007; 2012) account endogenises the force for change from the limited access order to the transitional phase and, finally, the open access order, which assumes that a high level of trust would have been established to allow impersonal exchange. The trust then results in a change of will of the dominant coalition. The emerging hypothesis in the present analysis is that an external sovereign agent has to break the limited access policymaking order by raising the transaction costs for the dominant coalition of persisting with its interests (Table 8-2C). The extent to which the external sovereign agent intervenes depends on the non-coalition groups’ transaction costs of lobbying that external sovereign.

#### **8.8.4. Instrumental consensus – working compromise**

The only other stable equilibrium in Table 8-1 was the state of *convergence of instrumental interests*. The interest in promoting the welfare of society socio-economically presently and the interest in promoting the long-term welfare of society through biodiversity conservation converged. A logical interpretant that followed the series of road shows and media

campaigns (Coan 2014b) was the promulgation of a specific set of regulations for the trout species that would amend the AIS regulations that were promulgated in August 2014. Thus, a habit change emerged as a new set of institutions (Table 8-2C). The trout specific-regulations of 2014 brought the institutional adjustment process to a state of equilibrium, which is the *Instrumental consensus* (Table 8-1, Table 8-2C). The ceremonial-ceremonial configuration was a typical example of a limited access policymaking order (regressive institutional adjustment process), but the instrumental-instrumental configuration was an example of an open access policymaking order (progressive institutional adjustment process).

In effect, as Expert 4 (2014, *pers comm*) emphasised during interviews that “We need a harmonised policy. A policy on trout”, the compromise solution reached that envisaged outcome. Negotiations between the DEA and the trout sector led to a series of energetic and logical interpretants (Table 8-2C). First, a *memorandum of understanding* was drawn up, which first acknowledged a “place for trout” in South Africa as Bruton (1986) and De Moor and Bruton (1988) three decades earlier had argued. The memorandum of understanding emphasised that the government had “prioritised aquaculture under the National Development Plan. The growth of Trout Aquaculture lies within the parameters of the strategies that have been formulated as a result of that plan,” (DEA, FOSAF and Trout SA 2014a, p.1). Given the national policy to expand aquaculture to promote local economic development and alleviate poverty, the parties agreed that the national anthropocentric economic vision had to guide the regulatory regime for trout.

The compromise solution that emerged from the negotiations provided for green and orange zones. In green zones, Trout Regulation 2 provided that “Trout will not be listed as invasive species in catchments, or portions of catchments, that can be legally demarcated by the Department as “green zones”.” The DEA would manage trout “as alien species” (DEA, FOSAF and Trout SA 2014b) in the green zones. Within green zones, Trout regulation 3.3 provided that “Long-term (up to 20 years), multiple-release Permits may be issued for trout to registered Permit holders.” It quadrupled the permit duration from what it was in the February 2014 draft AIS regulations. The implication of embedding this incentive structure in this institution (long-term permits) guaranteed durability of tenurial rights, economic viability and substantially lowered transaction costs.

In orange zones, permission to farm trout would be granted if there was evidence of the existence of trout populations already. In these zones, the DEA would list trout as invasive species to be utilised under a permitting arrangement. Trout regulations 6.1, 6.2 and 6.5 provide that “[o]ne risk assessment is required for a potential specified Aquaculture Development Zone which will allow the granting of numerous permits to multiple applicants within the defined zone.” The regulations also provided that, through continuous assessment, orange zones could transition to green zones. Instead of every applicant carrying out a risk assessment, potential applicants would jointly fund a single risk assessment and have an orange zone defined for trout farming. The difference between individual and collective risk assessments in terms of transaction costs would potentially be large.

The instrumental consensus just discussed, had been recommended by the FOSAF since 2005 and later the Trout Interest Group in 2008 (Table 8-1). Self-regulation was part of the constructive agreements between the DEA and the FOSAF in 2009, which was the contemplation of self-administration provision in the 2014 Trout specific regulations. Thus, it was evident that the FOSAF and its subsequent collaborators in the trout advocacy process became successful institutional entrepreneurs. They became the agents of institutional change that proposed institutional innovations.

Chapter 6 established that at the inception of the Task Group for Invasive Biota (TGIB) in the 1980, two of the questions that occupied it were: (1) what management arrangements could be used for a species that was simultaneously beneficial and invasive in the same locality and (2) what could be done to a species that was invasive in one area and beneficial in another area. These two questions were the substance of the instrumental consensus expressed in trout-specific regulations designed in 2014. Some of the decision makers in the DEA and some scientists who were informing the process or involved as decision makers in the NEM:BA process since 2005/2006 were part of the TGIB in the 1980s. There was evidence of ceremonial encapsulation in the NEM:BA process whereby the entrenched biological invasion research community had attained hegemony in biodiversity policy process and had managed to prevent the use of the existing fund of knowledge to resolve the problem in a consensual manner (Bush 1983; 1987).

Table 8-4: Transaction cost burden of the proposed trout regulatory regime

<b>Restricted Activities for Trout outside of Protected Areas, that is in areas where trout traditionally have always been propagated, grown, stocked, farmed, fished and sold</b>	<b>Before instrumental consensus (effect on transaction costs shown as +/-)</b>		<b>After instrumental consensus 2014 (effect on transaction costs shown as +/-)</b>	
• Importing into the Republic, including introducing from the sea, any specimen of a listed invasive species	Permit required	+	Exempted, if Permit from DAFF	-
• Having in possession or exercising physical control over any specimen of a listed invasive species.	Permit required	+	Exempted	-
• Growing, breeding or in any other way propagating any specimen of a listed invasive species, or causing it to multiply.	Permit required	+	Exempted	-
• Conveying, moving or otherwise translocating any specimen of a listed invasive species.	Permit required	+	Permit Required	+
• Selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of any specimen of a listed invasive species.	Permit required	+	Permit Required	+
• Releasing any specimen of a listed invasive species	Permit required	+	Permit Required	+
• The transfer or release of a specimen of a listed invasive fresh-water species from one discrete catchment system in which it occurs, to another discrete catchment system in which it does not occur; or, from within a part of a discrete catchment system where it does occur to another part where it does not occur as a result of a natural or artificial barrier.	Permit required	+	Permit Required	+
• Discharging of or disposing into any waterway or the ocean, water from an aquarium, tank or other receptacle that has been used to keep a specimen of an alien or a listed invasive species.	Permit required	+	Permit Required	-
• Catch and release of a specimen of a listed invasive freshwater fish or listed invasive fresh-water invertebrate species	Permit required	+	Exempted	-
• The release of a specimen of a listed invasive fresh-water fish species, or of a listed invasive fresh-water invertebrate species, into a discrete catchment system in which it already occurs.	Permit required	+	Permit Required	+

Source: Author's analysis of the Trout Regulations 2014 (not yet gazetted) and pre-amendment NEM:BA

The implications of the instrumental consensus are illustrated in terms of reductions in the transaction cost burden borne by the trout sector (Table 8-4). At the core of the contentions was the burdensome nature of the regulatory regime that the DEA had been proposing since 2007, which implied overregulation of the trout sector (Bashoff 2013a; 2013b). Thus, the instrumental consensus that emerged after the contestation between February 2014 and August 2014 improved the transaction cost regime for the trout sector. Activities that still required permitting were those that constituted potential pathways for new invasions by trout. The trout industry now has the most favourable regulatory regime ever, which was attained after a costly and vicious institutional adjustment path as depicted in Table 8-1.

### **8.9. Conclusions**

Findings so far suggested a number of explanations for the controversial institutional adjustment process. Firstly, because the negotiation of the NEM:BA was prematurely closed before a real deal was struck, the regulatory phase became a re-negotiation of the NEM:BA. Secondly, because the NEM:BA negotiation process was a limited access policymaking order, the regulatory phase, which had some transitional phase conditions, found newly admitted participants negotiating for provision of their interests in the deal. Institutional spaces were renegotiated.

Findings also suggested a third result that tied the first two together to offer an explanation of how institutional isolation evolved. The DEA disenabled the NEM:BA in its quest to satisfy its ceremonial adequacy standard of administrative convenience, which informants characterised as fundamentalism in administrative processes. The ceremonial adequacy standard was about listing as many species as possible. The implication of designing institutions based on ceremonial adequacy in turn led the DEA to redefine administratively opportunity sets that had already been legislatively redefined. Institutional isolation had its genesis in this administrative redefinition of legal entitlements.

The redefinition of opportunity sets, which fell short of administrative due process, was characterised by the sanction of ignorance, which was a mechanism of institutional hegemony. The epistemic community (invasion biology) whose instituted social imaginary defined the climate of ideas, ideology and the types of knowledge to be used to design biodiversity regulatory institutions was the power structure that was driving epistemic

violence. The results suggested that while the initial iteration of regulations in 2005/2006 was framed to facilitate sustainable utilisation of alien and invasive species, the draft regulations failed to pass ceremonial adequacy standards of administrative convenience of the then directorate of the DEA.

Since the regulatory regime was influenced by the ceremonial adequacy standard of administrative convenience, it failed to satisfy the principle of technological determination which required a problem to define its own solution. Similarly, designing a regulatory regime to meet administrative convenience implied that the adjustment process passed the possession of power test, which made it regressive. Administrative convenience was found to have two transmission channels. First, the Department of Environmental Affairs politically marginalised economically- and developmentally-oriented departments from the biodiversity regulatory process. The epistemic community that constituted the physically and ideologically entrenched policy elite epistemically marginalised social science epistemic communities from the policy space. The conclusion, thus, is that a phenomenon of political coercion synergistically combined with epistemic violence through the negotiational psychology of coercion as well as command and obedience to create sufficient conditions for an effective limited access policymaking order which always resulted in institutional isolation.

The policy ecology was made complex because the succession of directors and ministers implied a succession of scientific and political ideologies as well as governance styles. The political ideology of the incumbent minister had a bearing on the institutional adjustment path. Because the drafting of the regulations spanned several generations of directorate/ministerial leadership it experienced the planning curse due to conflicting ideologies between the predecessors and successors. The apartheid style of managing and doing things implied that the processes of reason-giving and justification of public decisions were neglected. The regulatory process had largely been swinging back and forth between the transitional phase and limited access policymaking order. The pattern remained the same: regressive institutional adjustment proposals, attempts of one epistemic community to impose its warranted assertions as the reality/truth that must inform policy and the neglect of democratic policymaking imperatives.

The study found that institutional entrepreneurship played a significant role in the determination of the degree of persistence of the limited access policymaking order, which had underpinned institutional isolation. The hypothesis that emerged from the analysis was that institutional entrepreneurship transformed the reform process into a planning curse, which, in turn, generated a large transaction cost burden on the administrative agency of persisting with a disputed institutional design proposal. The political pressure from the agency's superiors forced the agency to compromise in order to resolve the policy issue. The planning curse increased the probability of the instrumental embodiment of administrative ceremonial interests.

An external sovereign agent had to intervene to break the limited access policymaking order by raising the transaction costs of the dominant coalition of persisting with its interests. The extent to which the external sovereign agent intervened depended on the transaction costs of lobbying the external sovereign borne by the lobbyists. The demise of a limited access policymaking order in 2014 resulted in a new institution for governing the trout industry that was an instrumental consensus. Instrumental interests for both the DEA and the trout industry were embodied in the new balanced regulatory path. The incentive structure in the trout-specific regulations is characterised by secure tenurial rights, economic viability and substantially lowered transaction costs. This 2014 consensual arrangement is exactly what the trout sector had advocated for since 2005. Thus, it is evident that FOSAF and its subsequent collaborators in the trout advocacy process became successful institutional entrepreneurs. They became the agents of institutional change by actively contributing to the construction of policy truth in spite of epistemic oppression.

The instrumental consensual solution was not new because the Task Group on Invasive Biota (TGIB) proposed it in the 1980s. Surprisingly, the decision makers in the DEA, some provincial conservation authorities, and some scientists who were now informing the NEM:BA regulatory reform process or involved as decision makers, were part of the TGIB. The only reason that could account for the duration of the controversy when the solution was already known to the DEA was that there was ceremonial encapsulation in the NEM:BA process, which managed to prevent the use of the existing fund of knowledge to the resolution of the problem. Instead of addressing the public question of listing and controlling species with the most damaging consequences and managing economically

useful invasive species as non-listed alien species, an extensive list was envisaged based on undeclared criteria.

Chapter 9 discusses the findings of the thesis in the context of institutional literature as well as general literature on policy sciences. It presents and discusses the thesis' contributions to institutional theory. The chapter also presents suggestions for future research and provides policy recommendations.

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### Phenomenon of institutional isolation: Discussion and conclusions

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“If you are influential, you should establish respect for yourself  
Through knowledge and through courtesy in speech  
Do not be domineering/ except in official matters.”

*The Maxims of Ptahhotep, not dated*

#### 9.0 Introduction

The study set out to contribute to the theory of institutional change using the South African case of the evolution of biodiversity governance institutions. Since it was such a broad research issue, a case study of the trout sector was used to illuminate the origins, emergence and persistence of institutional forms and proposals in the evolution of governance institutions for alien and invasive species. Judging by its protracted controversy with the Department of Environmental Affairs (DEA), the trout sector was the most visible in the evolving process, thus affording the study a detailed case study resource.

The surprising finding was that there was institutional incoherence between foundational environmental governance institutions – section 24 of the South African Constitution of 1996 and the National Environmental Management Act (NEMA) of 1998 – and the National Environmental Management: Biodiversity Act (NEM:BA) of 2004. The surprising fact re-echoed King David’s rhetorical question: “When the foundations are being destroyed, what can the righteous do?” (TNIV Bible 2005, p.372). The emphasis is on habitual practices that weakened democratic foundations for policy processes.

In attempting, as it were, to archaeologically exhume the source of the surprise, the researcher was sent into multiple epistemic directions. One thing that emerged from the research, to be sure, was that policy ecologies were far too complex to be guided by uni-disciplinary knowledge systems in deciding society’s institutional adjustment path (Hayden 2006; 2009, Max-Neef 2005, Weaver-Hightower 2014). The search for explanations revealed that the same power structure that was responsible for the broken foundations, to an

extent, was also responsible for the bitter controversies at the regulatory phase. Knowledge and ideology were the power structure, which constituted the instituted social imaginary. The legislative and regulatory phases were largely limited access policymaking orders with transitional phases that frequently relapsed to limited accessed orders. How did the orders emerge? How were the orders sustained? The thesis had some contributions to offer to answer to these questions.

The overall goal of the thesis was to evaluate the perception that sectors that utilised alien and invasive species had been institutionally isolated, and to evaluate the potential economic implications of the perceived isolation on the sectors in the evolving institutional change processes for sustainable biodiversity governance. Why was the process of regulating socio-economically useful alien and invasive species controversial? Did institutional isolation exist in the first place? Why did it exist? What forms, if it existed, did it assume? Who were the key players and what power did they possess in the entire reform process? What stories and visions of the future did the rival social groups tell and how did those stories and visions shape the institutional adjustment path in the reform processes in South Africa? By what criteria did the DEA weigh the competing stories and visions against each other in the process of choosing the most reasonable ones that became national legislation and regulations?

Institutional economists have often taken for granted that knowledge producers and knowledge consumers in policy processes belonged to different institutional systems and were distinct agents. The role of knowledge in institutional evolution fascinated North (1990), but it left him with an unresolved puzzle. He theorised that there was bi-directional causality between knowledge and institutional change. Knowledge drove institutional change through lobbying activities of knowledge holders, which was the power dimension of knowledge. Institutions, and especially the incentive structure they defined, determined the types of knowledge that epistemic communities generated, acquired and advanced.

North (1990) and Denzau and North (1994) postulated the corollary that there was also bi-directional causality between knowledge and ideology, which they characterised as fundamentalism, fads, dogmas and propaganda. North (1990) then postulated another corollary that ideology, in recorded history, was an important driver of institutional change.

Because of the limitations of studying institutional change within the framework of price theory, North (1990, p.86) concluded that “we are still at something of a loss to define, in very precise terms, the interplay between changes in relative prices, the ideas and ideologies that form people's perceptions” and how they influence institutional change.

Without relying on price theory, Ayres (1996) had much earlier offered what was considered in the present study to be a comprehensive hypothesis of how ideology influenced institutional change, but the present study did not find a sustained research agenda on Clarence Ayres' postulation. He postulated that ideas (instrumental knowledge) and ideology (ceremonial knowledge) were inseparable, which is a typical characterisation of the Veblenian Dichotomy – ceremonial and instrumental behaviours/values are inseparable although they are different (Bush 1983; 1987, Hayden 1982). The Ayresian hypothesis was that ideology, in recorded history, was one of the most predominant forces after technology in driving institutional change especially in cases where the epistemic community possessing a certain ideology gained ascendancy to the policymaking community. Thus, the ideologues became policymakers, which the present study interpreted to mean that the knowledge producer and the knowledge user in policy processes coalesced into one social agent. He went a step further to suggest that an epistemic community that was entrenched in a policymaking community sustained its presence through hegemonic discourses to shut out any other potential entrants (Ayres 1996, Peet 2002).

Building on the Northean puzzle and the Ayresian illumination of the puzzle, the study then developed detailed and empirically grounded plausible hypotheses of how the phenomenon of institutional isolation in institutional design processes evolved and its economic implications for marginalised socio-economic sectors. The mechanisms by which institutional isolation was dismantled were also investigated. The integrated institutionalist framework developed in Chapter 3 guided the analysis (Figure 3-2) and guides the present discussions. The sections that follow present and discuss the theoretical insights that emerged from the evaluation of the NEM:BA processes. Policy recommendations and suggestions for further research are also presented.

## **9.1. Institutional entrepreneurship and disbandment of the limited access policymaking order**

### **9.1.1. Disbandment**

The thesis broadened the conceptualisation of violence to include epistemic violence, which Ayres (1996) and Dotson (2011; 2014) postulated as the forceful triumph of one epistemic community over others in institutional arenas and processes. The study took the view that epistemic communities also emerge as spontaneous orders with the only goal of advancing their own epistemic interests (Langlois and Hodgson 1992, Kuhn 1996). Results illustrated that invasion biological research was only institutionalised nationally in 1980, although such a paradigm had spontaneously emerged several decades earlier (Ferrar and Kruger 1983). The assumption that was central in the study was that epistemic communities had a competitive spirit because of the need to maintain autonomy, prestige and power, which hindered inter-epistemic community trust and cooperation (Max-Neef 2005, Norgaard 2007). A limited access policymaking order in an epistemic sense eliminated ideational competition, that is, competition of knowledge claims. Lack of ideational competition led to weak innovation in institutional design processes.

In using violence in an epistemic sense and in policy processes, the thesis, contrary to North *et al.*'s (2007; 2012) view that the two social orders were mutually exclusive, demonstrated that limited and open access orders could actually coexist in various configurations. The difference between the broadened conceptualisation in the thesis and that of North *et al.* (2007; 2012) was that the former was a micro-application and the latter was a macro-application. In the reconceptualised framework, each configuration had different important implications about the severity and absoluteness of epistemic violence as well as the depth of institutional isolation (Table 3-1). While North *et al.* (2007; 2012) endogenised the driving force for transition from a limited access order to an open access order at the political level, the thesis exogenised the driving force at the policy/regulatory level.

The prediction that emerged from these qualifying manoeuvres added a new dimension to North *et al.*'s (2007; 2012) prediction that the dominant coalition's will would change such that it will begin to increase access to rents marginally by increasing impersonal exchange subject to robustness of trust levels. The dominant coalition would then begin to grant civil, economic and political liberties to the once excluded groups. The emerging theoretical

insight in the thesis was that an external sovereign agent was required to break the limited access *policymaking* order by raising the transaction costs for the dominant coalition of persisting with its ideological interests. The extent to which the external sovereign agent intervened depended on the transaction costs of lobbying the external sovereign authority borne by the non-coalition members. Such an external sovereign power could be the Presidency, the National Planning Commission or the judiciary as was the case in the present study. This implied that the limited access policymaking order emerged spontaneously, but was disbanded non-spontaneously as exogenous sovereign agents intervened.

Hara and Raakjær (2009, p.649-650) discuss a similar problem in the evolution of the South Africa's Marine Living Resources Act (MLRA) of 1998 whereby actors "organised themselves into 'communities of strategic interests'... in order to win specific policy positions." A limited access policymaking order had emerged which consisted of organised labour; conservation-oriented scientists; and the corporate sector, which had co-opted labour and scientists to its side. Scientific arguments were being used to withstand socio-economic transformation of the small pelagic sector, while defending exclusive access for, and pecuniary interests of, the corporate sector. This is what Hara and Raakjær (2009, p.650) describe as "mobilizing a legitimizing discourse – and the associated metaphors, labels and symbols of scientific authority" to sanctify policy choices, which is the dominant social imaginary.

Corporatocracy had won control of the MLRA policy process through the mechanisms of institutional hegemony – subreption and mystification – such that all other actors – labour, some political powers, governmental agencies and scientists – became means to corporate ends (Dugger 1980, Hayden 2003, Hara and Raakjær 2009, Norgaard 2007). Following lobbying efforts by marginalised small scale fishers, it took intervention by an external sovereign agent, the African National Congress (ANC) political party, to break the limited access order that had evolved. This is exactly the prediction that emerged from the thesis' qualifying assumptions added to the Northean social orders.

In the regulatory domain, the judiciary, subject to the inhibitive influence of transaction costs of litigation borne by potential litigants, acted as an exogenous countervailing power against regulatory domination since it had the power to review and set aside decisions of governmental agencies. The judiciary, in most cases, acts as a countervailing power through

“judicial activism” (Cortner 1976, p.330). For example, during the implementation of the United States’ National Environmental Policy Act (NEPA) of 1969 some administrative agencies were deliberately failing to comply with legislative requirements because they were trying to maintain “negotiated accommodations with clientele groups”, but judicial activism countered organisational resistance to change (Cortner 1976, p.327). The argument is that the survival of an agency depends on the maintenance of agency-clientele relationships such that the agency “prefers to reinforce and preserve its negotiated environment” (Cortner 1976, p.325). Following litigation by environmentalists, “court orders forcing agencies to implement NEPA’s procedural reforms and to give a broader construction to many of the Act’s provisions” were issued (Wichelman 1976, p.274). Interestingly, in the NEPA case, environmentalists were non-coalition members whereas in South Africa they are members of the dominant coalition who are ideologically, intellectually and physically entrenched in the environmental policymaking community. Thus, the pecuniary system (corporatocracy) controlled policy processes in the US and environmentalists were isolated because “[a]dministrators [did] not as a general rule seek their counsel” (Cortner 1976, p.329).

### **9.1.2. Institutional entrepreneurship and institutional isolation**

An important hypothesis that emerged from the application of the limited access order hypothesis to policy problems was that it takes some ceremonial power to initiate the disbandment of a ceremonial system so as to achieve an instrumental purpose. While the thesis hypothesised that some ceremonial power (energetic and emotional interpretants) was necessary to initiate the disbandment of the limited access policymaking order so as to achieve an instrumental purpose, Ordonomic research posits that only instrumental power produces instrumental outcomes (Hielscher *et al.* 2012). In the 1980s, propaganda campaigns were employed to weaken the deeply entrenched pecuniary system of the leisure class (Ferrar and Kruger 1983, Skelton 2000). Trout wars of the mid-1980s coincided with the institutionalisation of the invasion biological research programme (Ferrar and Kruger 1983). The propaganda campaigns achieved the termination of economic subsidies to the trout fly-fishing sector and also promoted focus on conservation of indigenous fish rather than alien fish (Skelton 2000). In the NEM:BA process, entrenched invasion biologists and environmental scientists assumed a fundamentalist ideological position from the

commencement of the drafting of the NEM:BA (legislative domain) in 2003 through to the drafting of alien and invasive species regulations (administrative domain).

The trout sector in 2014, however, also employed a propaganda strategy by deliberately opposing some of the proposals of the administrative agency no matter how reasonable they were. The trout sector's propaganda strategy was a tit-for-tat strategy with one objective in mind: *to have trout transferred to a more credible, stable, predictable and anthropocentric administrative regime*. The conspectus of epistemic violence and administrative fundamentalism on the one hand and propaganda on the other, created a planning curse which locked the regulatory reform process into a Nash inefficient and impoverishing institutional adjustment path. As the planning curse generated a large transaction cost burden on the DEA of holding on to a disputed regulatory proposal, negative public image in the eyes of the DEA's superiors increased political pressure to have the regulatory controversy resolved. The probability of the trout sector winning the contest approached unity, thus leading to instrumental embodiment of administrative and epistemic ceremonial interests (Table 8-1).

Seabrooke's (2014) discussions on the role of identity switching in creating individual power in the international political economy corroborate the implications of the knowledge-power nexus as established in the thesis. Multiple identity professionals have multi-epistemic dominances, which grant them significant power as governance and policy experts (Seabrooke 2014). The shrewd utilisation of different sources of knowledge creates opportunities for them to undertake "epistemic arbitrage" (Seabrooke 2014, p.335), which is the ability to "mediate between knowledge pools for strategic advantage" (Seabrooke 2014, p.336). Being successful epistemic arbitrageurs, the professionals become in time "epistemic arbiters" of what is appropriate knowledge and meaningful action across a range of policy areas" (Seabrooke 2014, p.335). The interaction between epistemic arbitrage and identity switching creates a power source for maintaining and hedging the policy space by creating a dominant epistemological system (Seabrooke 2014).

Identity switching played two dialectical roles in South Africa's NEM:BA AIS regulatory reform process. For example, Expert 4 is a practising academic and natural resource governance expert who advises some governmental agencies and departments on fisheries

and aquaculture policy, and his physical, ideological and intellectual presence in the Ocean Labs Planning process cannot be taken lightly as the cause for the summoning and ordering of the directorate of the DEA to strike consensus in a way that promoted trout-based aquaculture development. On the other hand, Expert 1 was an academic who switched his identity to a directorate position in the DEA and was once a chairperson of an international epistemic network – the Global Invasive Species Programme. Expert 1’s multiple identities granted him indisputable power as a leading authority in invasive species management and he became a gateway for the invasion biology epistemic community into biodiversity policymaking structures.

Each identity was associated with a different story, imagining and expression of how policy must be created. Seabrooke (2014, p.337) emphasises that successful epistemic arbitrage, through multiple identities, makes the agents “epistemic arbiters who enforce what types of knowledge and solutions are most relevant.” Discussing the same phenomenon, Rodríguez de Francisco and Boelens (2015, p.483) emphasise that “a policy model requires an influential institutional and discursive network that produces but also promotes and extends the model by means of alliance building.” The alliance necessitates the emergence of a dominant epistemological system that can silence non-alliance individuals/groups through the sanction of ignorance.

Using the paradigm of Ordonomics, which investigates the “interdependencies between institutions and ideas”, Hielscher *et al.* (2012, p.780-781) argued that “habits of thought implicated in... progressive institutional change have a cooperative, rather than a conflictual, nature.” The ordonomic research investigates rule configurations that make possible the transition from the “win-lose paradigm” to the “win-win paradigm” “that focuses on joint rule-interests”, which makes instrumental/reasonable outcomes possible (Hielscher *et al.* 2012, p.781-782). The transition from the win-lose paradigm to the win-win paradigm is the same as the transition from a limited access policymaking order to an open access policymaking order. The transition, however, has varying degrees of likelihood of success; some transitional phases relapse to the win-lose paradigm, while others progress to the win-win paradigm.

Progress from win-lose to win-win solutions is a transition from imbecile institutions to reasonable ones. It was shown through econometric analysis that institutional arrangements that were designed through an effective participatory process (open access policymaking order) were more likely to be perceived to be reasonable because they were consensually designed. Similarly, institutional design processes that took into account socio-economic (anthropocentric) interests increased the likelihood of a consensual institutional arrangement. Hielscher *et al.* (2012), Petrick and Pies (2007) and Pies and Petrick (2005) similarly argue that ceremonial systems can be harnessed into problem resolution through participatory policymaking. They presume that the participation of ceremonial interests slowly diffuses into the wider pecuniary system some elements of instrumentality such that ceremonial interests do not feel “threatened or directly questioned”, but become actively “involved in the instrumental processes of intelligent inquiry that are expected to benefit a wide range of stakeholders, including themselves” (Hielscher *et al.* 2012, p.780).

The new insight the thesis brings to the ordonomic argument, which so far examines the interdependence between institutions and ideas without also examining the interdependence between institutions and ideology, is that ceremonialism has instances in which it instigates instrumental outcomes. The ordonomic postulation is couched in terms of one group having ceremonial interests, while another/others has/have instrumental interests. Bush (1987) made a similar assumption in his theory of institutional change. The thesis argued that this was unlikely. The most plausible assumption is that every policy participant – a group or an individual – has an assortment of ceremonial and instrumental interests, which only differ in their relative degree of dominance in the group’s ideational processes. If this inductively derived assumption seems plausible, then it is proper to dimensionalise ceremonialism and instrumentalism.

Conceptualising the institutional adjustment problem in terms of layers of ceremonialism and instrumentalism, converges with North’s (1990) hypothesis of bidirectional causality between knowledge and ideology and their individual causal relations with institutional change. It also converges with Ayres’ (1996) illuminating argument that ideology and ideas were inseparable, but different and have different logics in social change. Hence, the thesis’ assumption is that every epistemic community simultaneously exhibits ceremonialism and instrumentalism. Every administrative agency simultaneously exhibits ceremonialism and

instrumentalism and every socio-economic sector, too, exhibit ceremonialism and instrumentalism simultaneously.

Table 8-1 illustrated that with this re-conceptualisation of the Bushian model of institutional change, two stable equilibria were possible in the evolution of institutions. The first was a ceremonial feasibility-ceremonial feasibility configuration, which ordonomists such as Petrick and Pies (2007, p.261) characterise as the only instance illustrating the “social undesirability of cooperation” or as illustrating invidious “class cooperation” (Hielscher *et al.* 2012, p.782). It is undesirable precisely for the same reasons that cartels are undesirable. It stifles competition and impoverishes wider society through a huge deadweight loss, while the cartel members accumulate the highest possible pecuniary and non-pecuniary returns (Varian 1992; 2010). Such collusive behaviour is consistent with the limited access order in an epistemic, political or policymaking sense.

The second stable institutional equilibrium was instrumental feasibility-instrumental feasibility configuration (Table 8-1). This policymaking order is consistent with the open access order and is characterised by constructive ideational competition. Consistent with Hielscher *et al.* (2012, p.782), an instrumental feasibility-instrumental feasibility configuration is such that “[p]rivileges may be abolished by consent of the privileged classes themselves who see, on the basis of the instrumentally warrantable knowledge, that social cooperation may become even more advantageous...” The idea here is that there exist “[u]nexploited mutual advantage[s]” (Petrick and Pies 2007, p.256) that can only be realised through constructive cooperation in the design of rules for making rules as well as in the design of rules to live by.

The core issue here is the idea of valuation. Petrick and Pies (2007, p.256) maintain that “the interests of all affected individuals ... are the only source of values.” Quite similarly, Original Institutionalist theory of institutional change maintains that “those who receive the incidence of the policy... [must be] able to find and employ means to change such policy” (Tool 1994, p.414). Norgaard (2007, p.375) also argues that deliberative institutional change results in “equitable solutions”, which is the ordonomic win-win paradigm. Thus, values cannot be externally imposed if successful resolution of world problematiques is to ensue. The ordonomic approach, just as the Northean, the Veblenian and the Commonsian

institutionalist schools do, emphasises “the role of competition as a key institutional arrangement for social cooperation” (Petrick and Pies 2007, p.261). In a limited access policymaking order, however, the source of values is not the affected parties, but the entrenched (natural/social) scientists whose ideological position becomes the value criterion, which then creates a win-lose scenario (Bromley 2012, Hielscher *et al.* 2012, Petrick and Pies 2007, Pies and Petrick 2005).

While reviewing Original Institutional theory of change, it was argued that since a problem was defined as the difference between what ought to be and what is (Foster 1981c), and that what ought to be was defined by the knowledge frontier, knowledge producers had potentially tremendous power in defining the institutional adjustment path. The power was even greater when the knowledge producers became the knowledge users in policy design. This theoretical observation from the thesis is a logical extension of the Commonsian theory of sovereignty, which so far identifies three manifestations of sovereignty – sanction of religious/moral opinion, sanction of poverty, and sanction of physical violence (Commons 1899a; 1899b; 1899c; 1900; 2009, Dawson 1998, Dugger 1980; 1996b). The thesis added the sanction of ignorance or the power of epistemic opinion, which manifests as epistemic violence. Semiotic results substantiated this theoretical observation. Knowledge producers are sovereign agents especially when they become entrenched insiders in the policymaking community. Since values embody knowledge and knowledge produces values (Bush 1983; 1987; 2009, Dewey 1939, Foster 1981a), knowledge producers have significant potential to define the value frontier. The problem arises when the knowledge producers become part of the value trade-off problem as the ordonomic argument states.

There is a striking agreement between the ordonomic conclusion and the thesis’s findings. First, the trout sector was more inclined to non-confrontational regulatory reform processes between 2005 and 2012 and it proposed some of the most balanced and well thought out proposals. In this case, ceremonial and instrumental interests in the trout sector self-initiated into instrumental enquiry processes, which really made it easy for the DEA to abolish/modify environmental entitlements allocated to the sector by the 1867 Act consensually, if the DEA had chosen to do so.

Secondly, the trout sector required a credible justification for changing the status quo. The credibility of the institutional change, as the sector demanded, had to be demonstrated in two ways. Criteria used to decide the listing of trout or any other species as an invasive species had to be democratically evaluated and be able to pass wider scientific scrutiny. Scientific evidence used to inform proposed regulatory decisions, as econometric estimates illustrated, had to be context-relevant and credible, thus increasing the likelihood of the regulatory proposals being perceived to be reasonable. Essentially this is the instrumental warrantableness of the knowledge used in institutional design that Hielscher *et al.* (2012) argue for. Bromley's (2004b; 2006, 2008a; 2008d) volitional pragmatism actually insists that it is not just the instrumental warrantableness, but also the instrumental valuableness of the knowledge that mainly matters in public policy. Warrantableness implies certification of a theoretical claim by the wider membership of a particular epistemic community. Valuableness implies that other related and non-related epistemic communities and the polity, at large, give their consent to the warranted claim. Volitional action in public policy is premised on valuable knowledge (Bromley 2004b; 2008d).

### **9.1.3. Institutional entrepreneurship and the planning curse**

The use of a tit-for-tat strategy by the trout sector was premised on regulatory unresponsiveness to recommendations that were repeatedly made since 2005 and the cheating, as perceived by the FOSAF, that happened when the July 2013 interim AIS regulations transferred trout to a stringent category without justification and reason-giving for the transfer. The DEA created a sense of fear in the trout sector, which the ordonomic approach, would consider a poor approach to policymaking because ordonomic policymaking requires "giving the privileged classes no reason to fear any explicit disavowal of their self-interest" (Hielscher *et al.* 2012, p.782). When there is a stronghold and the entrenched insiders show no willingness to negotiate genuinely and "public policy ... [is] held hostage to the prescriptive truth claims imposed on it" by the entrenched epistemic community (Bromley 2008a, p.237), how can reasonable value be realised? On this question, institutionalist and ordonomic literature is silent.

While the thesis considered a minimum level of ceremonial power to be necessary to ignite the process of disbanding a limited access policymaking order, the ordonomic approach, and indeed, the institutionalist literature in general, do not consider such a possibility. Whether

it is scientists fighting institutions of the leisure class or the socio-economic sector fighting an epistemic community that ideologically controls the policy process, ceremonial power has a role. Institutional literature of the Veblenian tradition has not explored this potential channel of power. Ceremonial power is generally regarded as bad because it hinders instrumental progress (Ayres 1996, Bush 2009, Rutherford 2011). To the Commonsian school, ceremonial power is merely the exercise of the negotiational psychology of argumentation and pleading as well as coercion or persuasion (Commons 2009, Hiedanpää and Bromley 2012). Thus, to the Commonsian theory, ceremonial power is not necessarily bad as long as it satisfies the dictates of performance, avoidance and forbearance (Commons 2009, Ramstad 1986).

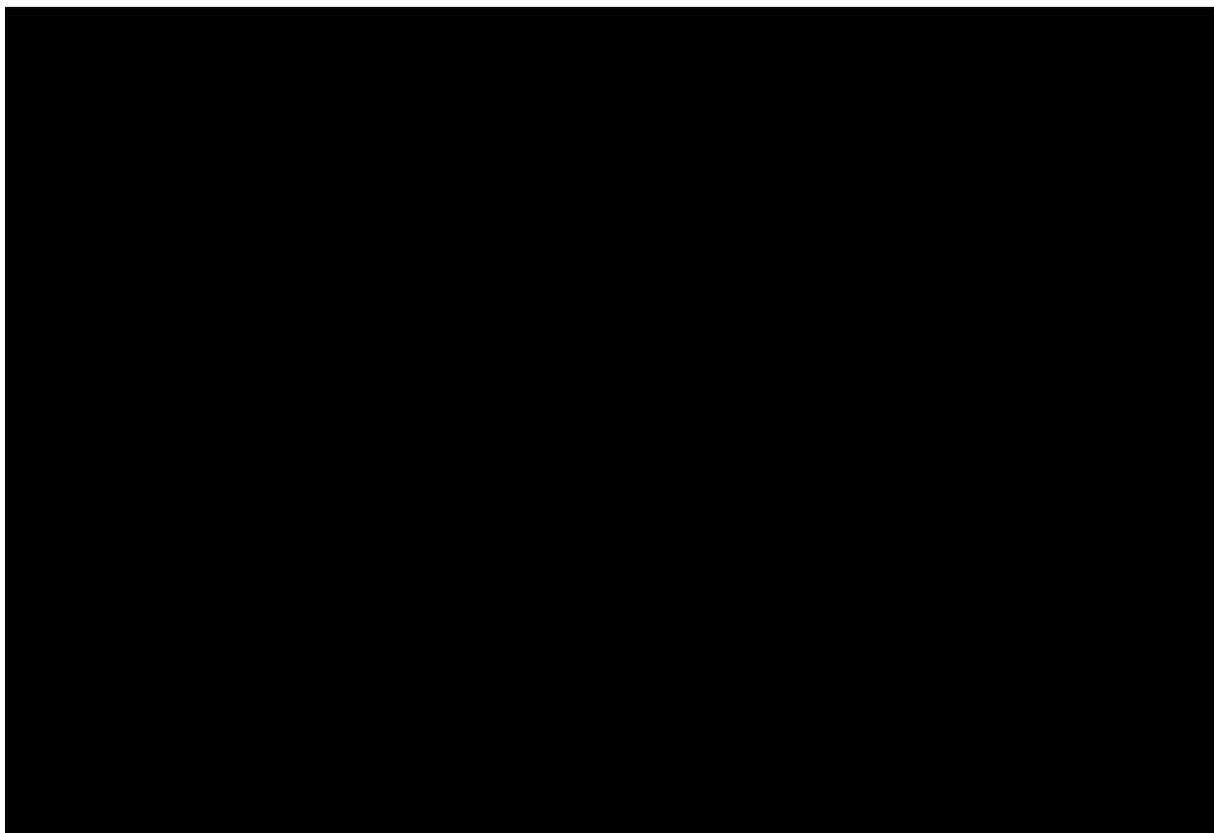


Figure 9-1: Distribution of transaction cost burden of controversial policy process

*Source: Author's analysis*

The precise reason for the dominant coalition's unwillingness to negotiate, which means heightened epistemic violence, can be explained in a number of ways. Figure 9-1 serves to illustrate the argument. From an academic point of view, it costs "nothing" to intensify

debate about a particular policy issue both intellectually and ideologically. It affords the scholars that are fuelling the debate a favourable international epistemic standing, especially if the controversial policy issue is an internationalised research issue. The fiercer the controversies, the more members of that entrenched epistemic community publish papers, and the more they enhance their reputations. The benefits arising from increased research output, sustained research funding and academic prestige as well as the possibility of becoming global epistemic arbiters for such policy issues all serve to make transaction costs negative. Thus, policy controversy generates positive externalities for the entrenched epistemic community. The political and economic transaction costs of adopting a fundamentalist ideological position for the entrenched community, under conditions of positive externalities received by the epistemic community, are likely to be zero or negative.

If the governmental agency is not under pressure to implement the policy immediately, it can wait and allow “sufficient uni-disciplinary evidence” to accumulate to sanctify its decisions (Bromley 2004b; 2007; 2008a). Although the agency bears positive economic transaction costs of public policy (Coggan *et al.* 2010, Marshall 2013, McCann 2013, McCann *et al.* 2005), it cares less if there is weak monitoring of the quality and relevance of its expenditures and if the planning curse is not yet severe. Because of the use of the sanction of ignorance, the transaction cost burden borne by the administrative agency initially might be negative because *the burden of proof is shifted to the non-insider group*. The transaction cost burden is also negative because of two other major reasons: first, the agency relies on open access global research evidence that the entrenched epistemic community supplies and recommends for use and second, the principal-agent problem is severe in the initial phases of the controversy until the planning curse reveals regulatory failures to the legislature.

Once the planning curse sets in, the taxpayer bears the burden of those avoidable public policy transaction costs. However, the real sector that produces goods and services, which is to be affected by that proposed policy, bears a strictly positive transaction cost burden (Mettepenningen *et al.* 2009). It is evident that there is no reason why entrenched insiders can ever be willing to negotiate genuinely without some minimal level of ceremonial coercion and intervention by an external sovereign agent. When the stronghold is characterised by epistemic violence and fundamentalism, there is no hope for using non-

confrontational approaches in the *initial* stages. Non-confrontation approaches only work at some later stage. The problem is that the entrenched epistemic community often lacks self-introspection or what Rodríguez de Francisco and Boelens (2015, p.483) call the lack of “epistemic reflexivity of its members, [which] reduce the capacity of its members to analyse critically their own theoretical and methodological presuppositions.” James (1907, p.78) more emphatically discusses lack of epistemic reflexivity stating that

“the greatest enemy of any one of our truths may be the rest of our truths. Truths have once for all this desperate *instinct of self-preservation and of desire to extinguish whatever contradicts them*” (emphasis added).

However, once there are some warrantable/warranted assertions to the contrary, existing truths no longer are truths because they begin to be doubted (Peirce 1877; 1878; 1905, Rorty 1998). The instinct of self-preservation becomes an ideological and fundamentalist issue, which is wooden-headedness in essence. In such cases, “disagreeing with official policy may lead not merely to a certain coolness in relationships but even to total exclusion” (Rootes 2013, p.703).

The role of minimal ceremonial power is to raise political transaction costs, in a policy process, for the hegemonic coalition of insisting with its ideological position (Figure 9-1). The policy process degenerates into “a dilemmatic situation ... [which] is a situation of collective self-damage among rational actors” (Hielscher *et al.* 2012, p.784). The greater the burden of the political transaction costs, the greater the likelihood of the dominant coalition expressing willingness to negotiate. This depends on the severity of the planning curse, which is the case when the department now bears a higher transaction cost burden than the regulated sector (Figure 9-1). Semiotic analysis revealed that the propaganda campaign waged by the trout sector damaged the DEA’s public image resulting in unbearable political transaction costs of remaining intransigent.

Figure 9-2 illustrates the role of a contest of ceremonial interests in impoverishing society. The hypotenuse side is based on the win-lose paradigm; it is based on a win it all or lose it all principle. It is a trade-off framework of policymaking – a zero-sum game (Hielscher *et al.* 2012, Petrick and Pies 2007, Pies and Petrick 2005). The bold vertical arrow indicates that it is in the interests of the biocentric/ecocentric ceremonial interests to increase the sanction

of ignorance against sectors that utilise alien and invasive species. The dotted arrow shows that the sectors that utilise alien and invasive species find it in their interest to use ceremonial power increasingly until the policy elite is weakened. Both contestants choose to exert as much ceremonial power as they can to defend/realise their interests.

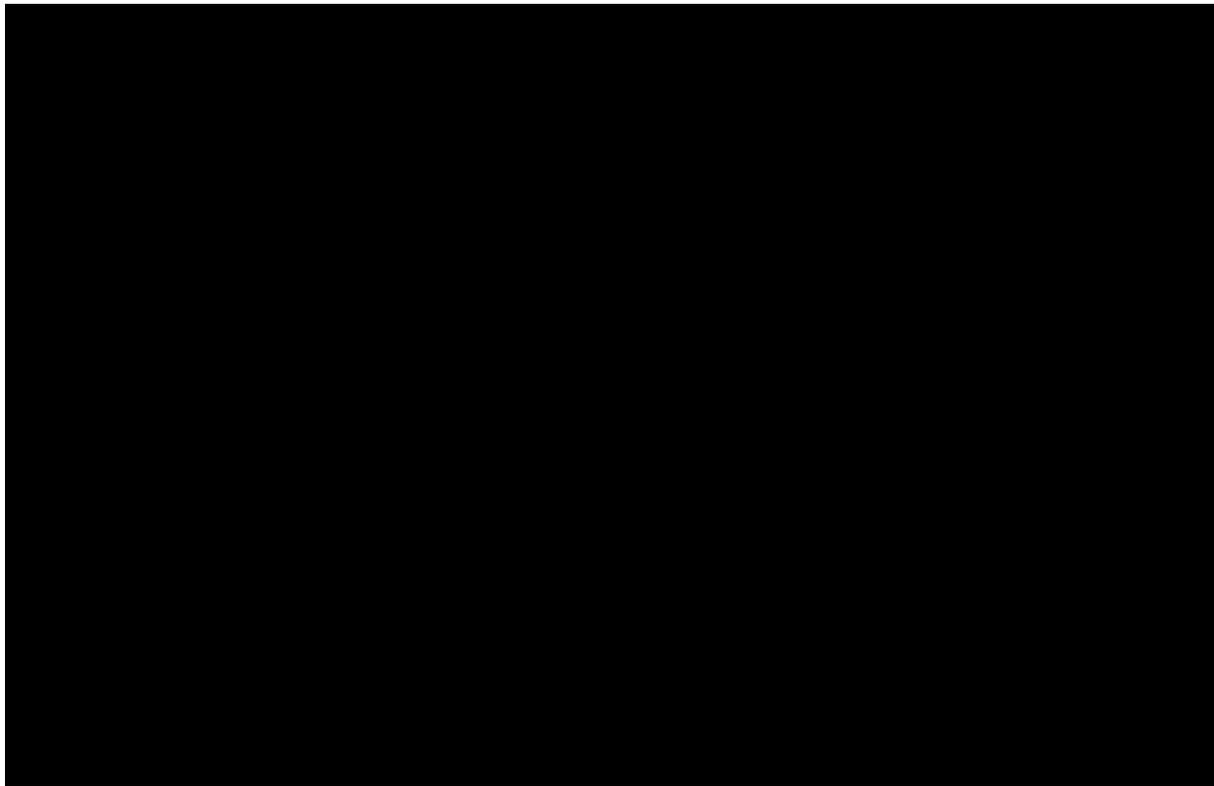


Figure 9-2: Impoverishing Nash policy equilibrium in a limited access policymaking order

*Source: Author's analysis*

Petrick and Pies (2007, p.262) argue that the wickedness of the policy problem necessarily follows from the fact that the policy scientists position themselves “within the value trade-off”. Their recommendations become inconsistent with reasonable value because they tend to be ideologically driven rather than being consensually driven. This is typical of the biocentric-anthropocentric dilemma in the South African biodiversity regulatory reform. The core of the problem was the reliance on uni-disciplinary approaches to policymaking. However, the working institutionalist paradigm in Figure 3-2 illustrated that transdisciplinarity is the desirable valuable knowledge generation and value generation framework. The contribution of the thesis to the ordonomic and intuitionist debate is to illustrate that there is an unexplored possibility of knowledge producers and knowledge

users becoming one social agent. Once an epistemic community becomes intellectually, ideologically and physically entrenched in policymaking structures, the line of distinction between knowledge producers and users becomes blurred and instrumentally warrantable assertions graduate into new institutions before they have been subjected to the test of valuableness or public reasoning.

Econometric estimates suggested that a policy process that was anthropocentric usually faced little resistance because those who would bear the incidence of the policy considered it to be reasonable. Consideration of cultural, social, developmental, economic, livelihood and spiritual interests of affected parties made a policy instrument anthropocentric. Mueller (1938, p.324) emphasised that dominant group-driven legislation often neglected the fact that “readjustments are not unilinear, but carry multiple ramifications”, which often generated Nash inefficient outcomes (Figure 9-1, Figure 9-2). A *tempered ecocentrism* would probably have been accepted as reasonable. However, the anti-alien lobby justified the intensity of its ideological position by emphasising that there was a cultural lag – that is, “vestigial ceremonial remnants” (Glade 1952, p.432) – caused by the refusal of the trout sector to conform to societal norms. In a win-lose policymaking paradigm, the standard solution is to “apply some sort of whip to the slower process! And there are as many “whips” suggested as there are propagandists...,” (Glade 1952, p.427). Thus, entrenched policy elites recommend some form of whipping to deal with pecuniary systems.

Epistemic violence destroys social DNA. Participation increases the robustness of the ideas that shape a policy, and in the process, reduces ideological content in the final policy instrument. However, by its nature a limited access policymaking order is an anti-participation system. Econometric analysis revealed that a policy process that was participatory and inclusive in terms of the knowledge base from which it drew its ideas was deemed reasonable. According to Brinkman and Brinkman (2006), the cultural lag hypothesis has been critical in sociological literature in detecting social problems and power structures. However, they also argue that the Veblenian Dichotomy utilises the cultural lag hypothesis to build consensus by allowing for “the origination and innovation of a social DNA to promote a synthesis of the disparate parts of culture via instrumental knowledge” (Brinkman and Brinkman 2006, p.1009). The subtle point here is that in a limited access policymaking order, the social DNA cannot be created since uni-disciplinary knowledge

defines the institutional adjustment path and, more so, a considerable content of ideology, rather than instrumental knowledge, enters into policy design.

Without some external intervention, a prolonged phase of increased propaganda by the socio-economic sectors and fundamentalism in epistemic claims (epistemic violence) evolves (Figure 9-1). The result is the planning curse precisely because large amounts of resources are devoted to planning and continuous re-planning of change without successfully changing existing institutional arrangements. Since legislators (the principals) often have incomplete information such that it is difficult to monitor the regulatory behaviour of the administrative agency, the minimal ceremonial power of affected parties helps to shed light on the often latent problematic regulatory behaviour of the agency. The moment the public image of the governmental agency has been damaged, and legislators (the principals) have increased information at their disposal, conditions for successful lobbying become apparent if the non-coalition members choose to do so.

Once the principal (external sovereign agent) intervenes, the ordonomic argument sets in. The dominant coalition is now willing to engage in earnest negotiations because it is under an order to do so (Table 8-2C). The final outcome for the South African regulatory reform process was an instrumentally feasible-instrumentally feasible configuration (Table 8-1, Table 8-2C), which was an instrumental consensus, which balanced conservation and socio-economic outcomes. The outcome fundamentally diverged from the initial administrative position and that of its scientific advisory elites prior to the intervention of the external sovereign agent. Instrumentality of the consensus was indicative of progressive institutional change. The instrumental consensus was exactly what the trout sector had proposed since 2005. Thus, it was evident that Federation of Southern African Flyfishers, Trout South Africa and Trout Interest Group were successful institutional entrepreneurs. They became the agents of institutional change that proposed institutional innovations, which, in their various shades, were adopted wholesale or partially.

Figure 9-3 transforms the problem in Figure 9-2 orthogonally. The process of transformation is a deliberative process, which the ordonomic approach and the institutionalist approach discuss as a “profound societal learning process” (Hielscher *et al.* 2012, p.783). Institutional change is regarded as progressive to the extent that “societal actors succeed in solving

occurring social conflicts with the help of institutional arrangements that meet broad consensus” (Hielscher *et al.* 2012, p.783). The real issue is that consensus is a function of effective participatory policymaking (Waller Jr and Robertson 1991). Effective participatory policymaking engenders equity, which Béné and Neiland (2006) characterised as a four dimensional concept consisting of institutional equity, endowment equity, political equity and economic equity. Institutional equity ensures a fair distribution of the burden of transaction costs of the proposed regulatory arrangement. Political equity ensures that there is equal opportunity to participate and have one’s voice seriously considered in the policy process.

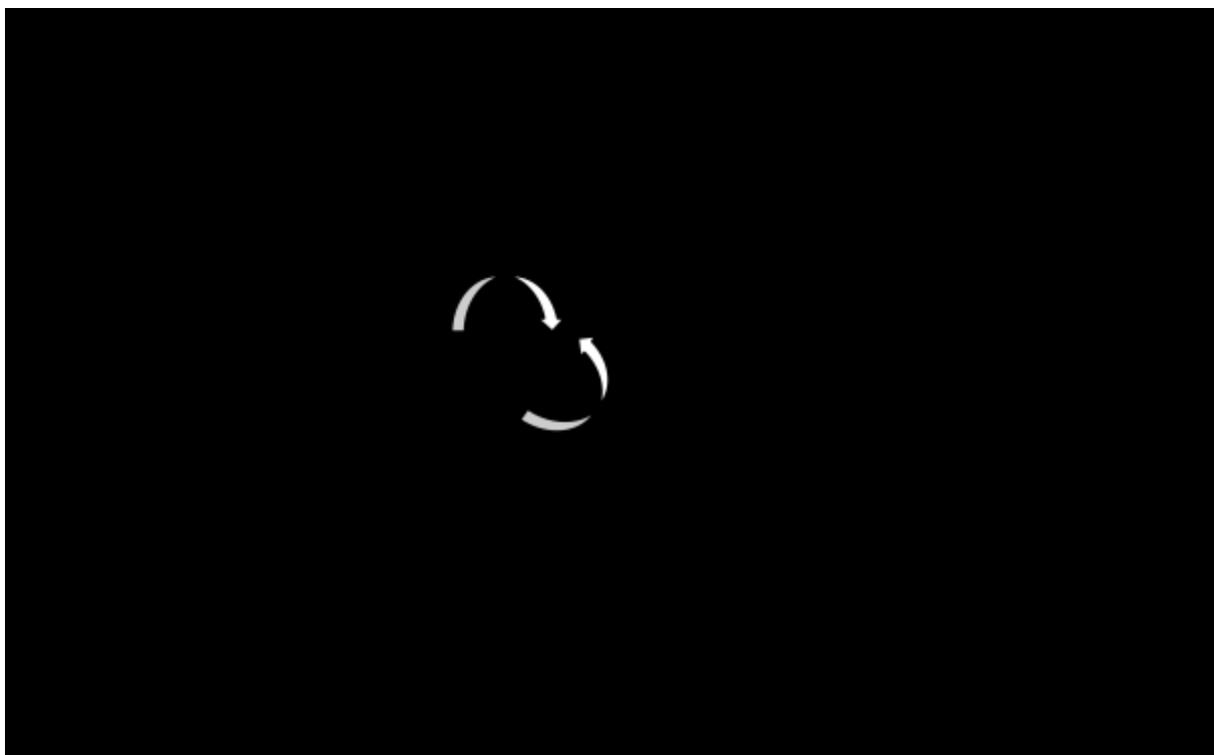


Figure 9-3: Orthogonal transformation of a wicked policy problem into a manageable policy problem

*Source: Author’s analysis*

The dotted arrow in Figure 9-3 illustrates that the problem becomes a cooperative/assurance policy game in which parties can choose to realise as much of the instrumental outcomes as are possible, while restraining ceremonialism to its bare minimum. Only that which generically advances the human life process in an impersonal way becomes the focus of the deliberations (Hielscher *et al.* 2012, Veblen 1898b; 1898c;

1914; [1899] 2005). That is why the axes in Figure 9-3 now have instrumentally-dominated interests. Unlike Figure 9-2 which illustrates the problem of unidisciplinary policymaking approaches, Figure 9-3 depicts transdisciplinary processes where there is constructive competition of ideas and reasonable/instrumental valuation of what it is society finds the best thing there is to do in the present circumstances.

While the DEA sought advice from the epistemic community that aligned to its administrative preferences and ideology (trade-off paradigm, Figure 9-2), in Figure 9-3 policy “advice is sought orthogonally to, not as a compromise in the conflict” (Petrick and Pies 2007, p.262). Hielscher *et al.* (2012, p.794) argue that “[e]very orthogonal position is a contribution to realizing this instrumental vision of social value.” This orthogonal transformation is possible because the conceptual space for the policy discourse is first transformed into one that uses the terminology of deliberative, consensual and transdisciplinary knowledge (Gual and Norgaard 2010, Max-Neef 2005, Norgaard 2007, Waller Jr and Robertson 1991). Transdisciplinarity creates “semantic innovations [that] open up new trajectories of social evolution via orthogonal positions” (Hielscher *et al.* (2012, p.794). Semantic innovations, as it were, create social DNA.

Hiedanpää and Bromley (2011, p.100) discuss the problem of governance failure in wolf management in Finland, which was one of “authoritarian tendencies of the EU that fail[ed] to understand the context of wolves for rural livelihoods in Finland” combined with the failure of Finish authorities “to involve the public in the formulation of policy”. Political equity was not promoted and endowment equity was endangered by the EU’s win-lose paradigm. The South African AIS regulatory reform process suffered from the problem of uni-disciplinarity because the regulatory process was conceived as a natural science process by the Minister from the onset. The faulty conception of the problem gave multiplied power to entrenched invasion biologists. But the neglected problem was that designing regulations for alien and invasive process had inescapable anthropological, sociological and economic dimensions to it. South Africa’s National Environmental Management Act (NEMA) of 1998, section 2(4)(g) provides that “Decisions must take into account... *all* forms of knowledge, including *traditional and ordinary* knowledge” (emphasis added). This is a clear mandate to foster transdisciplinary approaches to policymaking. Semantic innovations can easily emerge in such a framework that considers all knowledge forms – scientific and non-scientific.

To sum up, the prevalence of the limited access policymaking order created an albatross of large private and public transaction costs of biodiversity regulatory reform in South Africa. With the invasion biology epistemic community ideologically, physically and intellectually entrenched in the environmental policymaking community, and expressing no willingness to transform the conceptual space to a transdisciplinary one, impoverishing Nash outcomes emerged. No amount of deliberation could change the will of the dominant coalition. As such, some ceremonial power coupled with intervention by exogenous sovereign agents orthogonally transformed the problem into an assurance policy game that produced the most balanced instrumentally consensual institutional arrangement after August 2014.

## **9.2. Exclusive deal negotiation and premature closure**

Institutional change at its core is a negotiation of socio-economic deals. Hiedanpää and Bromley (2011) conceptualise the legislative phase as the realm of reasons. In the realm of reasons, reasons are given and justifications tendered for changing the prevailing entitlement structure of society. Findings showed that the legislative process for the NEM:BA was a limited access policymaking order and, largely, was shaped by administrative preferences of the directorate of the DEA. Results showed that some impractical theoretical issues shaped the NEM:BA and fundamentalism (ideology) in the scientific foundations of the Act had made the NEM:BA's fifth chapter an unreasonable law. Fundamentalism defies reason and is transcendental as the Ayresian view postulates (Ayres 1996, Bromley 2012, Hayden 2006), but it can only be changed when a third-order change process occurs (Bartunek and Moch 1987). Such a change requires some ceremonial power to challenge the dominant epistemological system and can be magnified by the intervention of an external sovereign agent.

Forasmuch as the realm of reasons was actually the realm of fundamentalism or realm of ideology, it follows that the deal negotiation process was prematurely closed. The premature closure implies that the stopping rules in the design of new institutions were not informed by instrumental/reasonable value, but by ideological positions and the ceremonial adequacy standard of administrative convenience (Dawson 1994, Hielscher *et al.* 2012, Ramstad 1991). Because of the ceremonially determined closure rules, the development of regulations suffered major setbacks as groups that were marginalised in the realm of reasons took the regulatory phase (realm of rules) to be an opportunity to negotiate for

favourable deals. Sectors that utilise alien and invasive species were the most vocal and, in particular, the trout sector made the most noise. Recommendations that were rejected in 2003 when the NEM:BA was being drafted, which could have promoted a consensual solution were brought up again at the regulatory phase.

It was argued in Chapter 3 that whenever the legislative phase is a limited access policymaking order the regulatory phase becomes a contest of interpretive schemes. One typical sticky point was the definition of an invasive species. Econometric estimates indicated that as the invasive species listing framework broadened from being “aliennes only” to being inclusive of “aliennes, ecological criteria and socio-economic criteria”, the probability of perceiving trout to be invasive decreased by 87% (Table 7-18). Invasion biologists and the DEA maintained that invasiveness must be defined ecologically. The trout sector insisted that it had to be defined by jointly considering ecological and socio-economic criteria as the NEM:BA provided for. By dimensionalising the definition of invasive species, the thesis revealed that the DEA followed an biocentric approach, which led to administrative over-classification of invasive species (Table 5-2). Administrative focus on ecological criteria only was an instance of redefinition of legal entitlements. The dimensionalisation also revealed that an entirely anthropocentric framework, that focused on socio-economic criteria only, led to administrative under-classification of invasive species (Table 5-2). If both dimensions were simultaneously considered, consensus would have been achieved without resorting to costly policy contests characterised by a planning curse.

Because of the polarisation, the DEA amended the NEM:BA claiming that the NEM:BA, in its original form, was disabling. Although the NEM:BA failed to provide for a differential approach to invasiveness, it required the listing of only those species that deserved eradication. The DEA did not like the original legal scheme as semiotic analysis in Chapter 8 revealed. This led to the re-definition of legal entitlements (realms of economic freedom) at the administrative level. Whereas the DEA argued that fundamentalism in science and administration made the NEM:BA’s fifth chapter a disabling law, the thesis, however, found that the DEA’s quest for having as many alien species as possible listed as invasive was a manifestation of fundamentalism and strong biological nativism. Peretti (1998; 2010) called strong biological nativism the green apartheid hypothesis. The theoretical insight suggests that the phenomenon of institutional isolation had its genesis in the redefinition of

the Act for what the DEA presumed to be *total* lack of enabling provisions. Even the Durban High Court doubted the reasonableness of this alleged lack of enabling provisions. Both the pro-alien species lobby and some anti-alien species lobbies agreed that the DEA had misinterpreted the Act.

The realm of rules, simply put, made new law without reason giving and justification even though approval of the amendments from the realm of reason was sought. In a revealing discussion, Cortner (1976, p.323) argued that “Policy adopted by the legislature is not self-executing. Administrators... *exercise discretion* as to how and to what extent *their actions comply with statutory provisions*” (emphasis added). Similarly, Dreyfus and Ingram (1976, p.243) emphasised that “Policy performance usually falls short of policy promise” because policy intentions “become diluted and deferred in the practical chore of translating what legislatures say into what government does”. The core of their argument was that administrative systems imposed major frictions and setbacks to all the good intentions of the legislature so much so that regulatory practice diverged from policy objectives. In essence, the “frustration in application” (Dreyfus and Ingram 1976, p.243) is an implicit manifestation of institutional isolation in the sense that a choice not to implement the legislative will fully is an implied re-definition of the legal entitlements. Social groups whose interests caused the legislature to draft the law the way it currently appears become institutionally isolated because of problematic regulatory practice.

The case for South Africa, however, is different from what Cortner (1976) and Dreyfus and Ingram (1976) discuss. Instead of the DEA exercising discretion in evaluating how and to what extent its actions complied with statutory provisions, it used its discretion to evaluate the extent to which the NEM:BA fitted its ceremonial adequacy standard of administrative convenience. Thus, the DEA wanted the Act to comply with its administrative preferences as semiotic analysis in Chapter 8 revealed. The Kloof Conservancy (2013, p.7) described the dilution and deferment of legislative intent as a misreading of the DEA’s duties under the NEM:BA to publish “regulations that fit NEMBA, not to remain supine while the [DEA] endeavoured to make NEMBA fit the [DEA’s] proposed regulatory regime.” The rewriting of the legislation represents a deep-structure system of institutional isolation. Since all species considered in an *ecological sense* to be invasive despite being ineligible for eradication were

to be listed as invasive, the transaction cost burden to be borne by sectors utilising some of these species suddenly increased.

It is interesting to note that once the Act was redefined, the DEA began to argue that the trout sector's legal arguments were legalese and legal nit picking. Following the NEM:BA amendment, fish sanctuaries were designated unilaterally. The problem was that fish sanctuaries were another indirect way, without giving reasons and justification or declaration of the criteria used to determine the sanctuaries, of re-claiming waters where trout traditionally have been utilised socio-economically. By completely undermining the assurance the trout mapping process had achieved, fish sanctuaries became an imbecile institution (Veblen 1914) and significantly altered economic equity, institutional equity, political equity and endowment equity (Béné and Neiland 2006).

Whenever the trout sector queried the determination of fish sanctuaries with observational evidence, entrenched scientists dismissed the claims as invalid because they were generated through a "pub review system" unlike their claims that had passed through a "global peer review system". This was a manifestation of epistemic violence. Rodríguez de Francisco and Boelens (2015) also observed that in the face of phenomenological evidence that undermined scientific claims, policy elites chose to remain *indifferent* in the interest of sustaining their epistemic claims, assumptions, models and ideologies. It is evident that the claims of one epistemic community were being taken for absolute truth just because, as James (1907, p.78) emphasised, established truths have the "instinct of self-preservation and of desire to extinguish whatever contradicts them."

### **9.3. Nature and cause of institutional isolation**

Institutional isolation was found to assume three forms: departmental, epistemic and sectoral. The degree of imbecility of rationing transactions at the regulatory phase was a function of the absence of transdepartmental and transdisciplinary activity in the policymaking order. The cornerstone of the integrated institutionalist framework proposed in Chapter 3 is transdisciplinarity (Figure 3-2). Insofar as departmental policies are warranted and valuable assertions metamorphosed into institutions, it follows that transdisciplinarity is also mirrored in transdepartmentalism in policy processes.

The foundational environmental governance framework for South Africa demands transdisciplinarity and transdepartmentalism. For example, the National Environmental Management Act (NEMA) of 1998, which is the foundational environmental legislation, provides for “co-operative ... environmental governance” (preamble) and that there “must be *intergovernmental* co-ordination and *harmonisation* of policies, legislation and actions relating to the environment” (NEMA 1998, section 2(4)(l), emphasis added). The Republic of South Africa Constitution of 1996, section 41, also provides that “[a]ll spheres of government and all organs of state within each sphere must ... co-operate with one another in mutual trust and good faith by ... co-ordinating their actions and legislation with one another.”

Harmonisation is a process of building institutional coherence (Coglianese 2001, Hayden 2006) and, in particular, comparative coherence. Coglianese (2001, p.1223) emphasises that “a regulation fails to make sense comparatively if it turns out to be inconsistent with other regulations of ... the same general type”. Institutional coherence can only happen if laws and regulations that are related, in the sense that they deal with the governance of related issues, have a reasonable level of correspondence. The incentive structures, the realms of individual freedom, the prohibitions and permissions must be reconciled. The relatedness might mean that one piece of legislation is about socio-economic utilisation of biodiversity, while another is about conservation of biodiversity. These two pieces of legislation are related in an antagonistic framework. Harmonisation, therefore, is transdepartmental and transdisciplinary at its very core and seeks to locate common instrumental interests and eliminating inter-departmental and inter-epistemic pride and conflicts in the institutional design process (Hielscher *et al.* 2012, Petrick and Pies 2007, Pies and Petrick 2005).

Qualitative analysis established a crucial point that the first iteration of draft alien and invasive species regulations in 2005/2006 was multi-departmental, but it was not multi-disciplinary in a holistic sense. Multi-departmental and multi-disciplinary processes are far less integrated and demanding than transdepartmental and transdisciplinary processes (Max-Neef 2005). The inter-disciplinarity that characterised the AIS regulatory reform process was that of conservation biological sciences to the exclusion of social sciences. Some ecological economists and political scientists believe that such forms of exclusive inter-disciplinarity create wicked policy problems (Balint *et al.* 2011, Degnbol *et al.* 2006,

Gray and Gill 2009, Hartmann 2012, Jentoft 2006, King 1993, Norgaard 2007, Ostrom and Cox 2010, Rittel and Webber 1973). Based on opinions of experts who participated in process as decision makers, the thesis also established that the DEA rejected the regulations because the process had become too multi-departmental and overly complex for *the scheme the DEA preferred*. The 2005/2006 draft regulations, however, had managed to identify joint rule interests; hence, their wider acceptance by departments with socio-economic mandates, socio-economic sectors as well as conservation and invasion biologists.

By rejecting the 2005/2006 regulations that were developed through a multi-departmental process, the DEA's behaviour substantiated the hypothesis that the first level of institutional isolation is departmental. The period 2004-2009 was the era of managing things the apartheid way as empirical findings revealed (Table 8-1). It is from this time that the harmonisation vision failed. Dreyfus and Ingram (1976) argue that "[c]reative and innovative intentions boldly stated in the preambles of legislation... face frustration in application." The Department of Environmental Affairs became hegemonic or as two strategic informants stated it, "the NEMA is saying you guys you all need to *sing from one hymn book*... but that's the big challenge for government because they are *operating in their silos*" (Expert 4 2014, *pers comm*, emphasis added) and they work "in a *very paradigmatic, narrow way*" (Expert 3 2014, *pers comm*, emphasis added).

Many of the subsequent drafts were not supported by the Department of Water Affairs, the Department of Agriculture, Forestry and Fisheries, and the Department of Trade and Industry. It was only in 2014, after the intervention by the Ocean Labs Planning Processes, that true harmonisation began leading to the instrumental consensus (Table 8-1). As Expert 4 observed, the cacophony of voices singing from different policy hymn books remains a big problem. Operating in silos means transdepartmentalism is far from being a reality. The problem goes back to the legislative process itself. During the drafting of the NEM:BA the forestry sector asked for clarification as to whether the DEA had harmonised the draft with legislation in other departments. The Director General of the DEA "responded that *they could cross-reference*" (Parliamentary Monitoring Group 2003, emphasis added). It is evident that the DEA had not followed transdepartmental or even inter-departmental legislative making processes. The view in the quote was that there was a possibility for

cross-referencing and not necessarily harmonising, but the directorate behaved as though it was not legally bound to harmonise. It behaved as though harmonisation was optional.

A department that is hegemonic is associated with a hegemonic epistemic community simply because the department sanctifies particular types of knowledge claims as absolute truth and every other epistemic claim from other epistemic communities as non-truth. There is an investigable causal link between departmental isolation and epistemic isolation. Since each of the departments stated above had a team of scientists, the real seat of power behind each department's behaviour was the epistemic community informing its decisions. The ideas and ideologies of that community served as a value framework. The combination of regulatory hegemony, the sanction of poverty, monopsonistic demand for such truths and monopoly in the supply of such truths create a powerful vicious circle of institutional isolation and a deeply-rooted limited access policymaking order maintained by the sanction of ignorance.

To the extent that institutions are designed through rationing transactions of sovereign agents and the rationing transactions are shaped by particular ceremonial and instrumental knowledge claims, the interactional effects of departmental isolation and epistemic isolation cascade down to socio-economic sectoral isolation. The extent to which a sector's interests are incorporated into policy design depends on the extent to which that sector has been researched. The conclusion has important implications because the thesis' empirical results illustrated that the DEA and other funding agencies only funded research into ecological invasion and under-funded or never provided funds for socio-economic analysis of the trout sector. Yet, the NEMA requires the carrying out of a cost benefit analysis to inform policy decisions. So how was the cost benefit analysis carried out without holistic assessment of the trout sector? The bottom line is that the knowledge base that defined the value frontier was uni-disciplinary.

In a context of regulatory incoherence and domination, it is likely that a sector whose regulator is dominated suffers gradual economic isolation and low socio-political priority. The dominated regulators and their sectors will not be able to effectively appropriate and participate in the determination and exercise of sovereign will and power. This view summarises the evolution of the problem of institutional isolation. In a non-

ordonomic policymaking system, a sector's interests are defended by its regulator. However, when the regulator is excluded from the policymaking arena as a limited access policymaking order emerges, the interests of the sector become marginalised. The sector becomes of low socio-political priority. The sector is excluded from participating in the determination of the sovereign will.

#### **9.4. Conclusions**

In the problematisation of the concept of institutional isolation, the introductory chapter discussed the phenomenon of institutional hegemony that had occupied Original Institutionalists since the birth of Institutional Economics as a research paradigm. Because of the prevalence of asymmetrical power relationships in institutional spaces and processes, Original Institutional Economics theorised about the inhibitive influence of ceremonial systems. Generally, ceremonial systems, as the Veblenian Dichotomy suggests, manifest in pecuniary systems. Ceremonial systems also manifest in value systems, belief systems, attitudinal systems and spiritual proclivities, which feminist literature conceptualises as the instituted social imaginary. The instituted social imaginary creates a cultural lag.

The thesis set out to contribute to the theory of institutional change by investigating a perceived phenomenon of institutional isolation and its economic implications. The study affirmatively answered the research question finding that institutional isolation had evolved as a three dimensional phenomenon in the NEM:BA process: regulatory (administrative) domination, epistemic domination and sectoral marginalisation in the alien and invasive species regulatory reform process.

By conceptualising the policymaking process as either of the two social orders – limited and open access orders – and by illustrating the possibility of their coexistence, the study broadened the scope of application of the Northean model from physical violence to more intricate forms of violence in institutional design processes. It was shown that the policymaking system was a limited access order right from the drafting of the NEM:BA to the regulatory process. An area which the thesis discussed in some greater detail was the mechanisms by which a limited access order was maintained. The Commonsian theory of sovereignty played a significant role in reading these mechanisms from the qualitative data. The sanction of ignorance, the sanction of poverty, and careerism were found to be

important in the emergent order and its sustenance. The sanction of ignorance is a new concept the study added to the edifice of the Commonsian theory of sovereignty. The limited access policymaking order was controlled by a specific epistemic community – invasion biology – and the limited access order was largely sustained by the sanction of ignorance (epistemic violence). Former academics who found themselves in governmental positions of authority, as it were, placed the foot in the door so as to create greater access for their epistemic community to the policymaking structures. The evident result was a deep ideological, intellectual and physical entrenchment of one epistemic community in the policy process.

The emergent limited access policymaking order was such a stronghold that it took an external sovereign agent to break it. The planning curse brought the problematic behaviour of the administrative agency to light, thus raising the political transaction costs of remaining intransigent. Application of some ceremonial power by non-coalition members was prerequisite to the disbandment of a limited access policymaking order. Multiple epistemic identities and identity switching facilitated the disbandment of the limited access policymaking order although the same channels were responsible for the persistence of that policymaking order. These findings added a dimension to the Ordonomic and Northean theories that endogenised the force of transition from a limited access order to an open access order.

The integrated intuitionist framework proposed in Figure 3-2 dissected knowledge into ceremonial and instrumental knowledge systems. This conceptualisation resurrected an almost forgotten Ayresian tradition that ideas and ideology are inseparable and that ideology is ceremonial whilst ideas are instrumental. The discussions made the point that ideology provided the arsenal for epistemic violence, which was also a manifestation of sovereign power. Ideological approaches to policy problems make it harder than ever to orthogonally transform a problem into a win-win paradigm.

By conceptualising the valuation framework as transdisciplinary rather than uni-disciplinary, the study was able to uncover a dominant epistemological system that is deep-rooted in South African environmental policy practice, namely that environmental policy is conceived as a natural science process. This in itself is a spiritual proclivity dominating the DEA's

instituted social imaginary because natural scientists are charged with the responsibility for making the rules society must live by. Conceptualising environmental policy as a natural science process resulted in institutional isolation, the major economic implication of which was the increased transaction cost burden of the proposed regulatory regime and of institutional entrepreneurship to oppose it. However, after external intervention, an instrumental consensus based on multidisciplinary thinking emerged, which went back to the 1986 solution with a few more institutional innovations.

The question then remains of why it took ten years to solve a problem that had a readily available solution. The answer is uni-disciplinarity, fundamentalism and ceremonial encapsulation of the existing knowledge fund by the entrenched scientific community and the administrative agency. A logical conclusion is that the South African taxpayer bore a large deadweight loss that was imposed by fundamentalism in administrative processes. More so, socio-economic sectors were exposed to a large transaction cost burden as they lobbied for reasonable and balanced policies. However, the ultimate solution which created trout-specific regulations implied a favourable transaction cost burden on the trout sector.

The study also set out to establish how, in the face of institutional isolation, the trout sector responded. The study found significant levels of investment in institutional entrepreneurship, which included proposals for balanced regulatory regime for trout and, indeed, any economically useful alien species. The institutional entrepreneurship also took the form of propaganda/tit-for-tat strategies that created an impoverishing Nash institutional adjustment path. In the context of the transformed Bushian model, such a strategy indicated a confrontation between ceremonial interests or ceremonial and instrumental interests. The equilibria were unstable. The trout sector sought nothing short of transference of trout to an anthropocentric, credible, predictable and stable administrative regime of the Department of Agriculture, Forestry and Fisheries as opposed to the biocentric administrative regime of the DEA. The increase in political transaction costs for the DEA of persisting with its envisaged regulatory regime and external intervention by the Ocean Labs Planning process brought the controversy to rest and converged to institutional solutions that the trout sector had been advocating since 2005, and in fact as far back as 1986.

Overall, the study's argument that the interaction between knowledge and power in defining the extent, speed and character of institutional adjustment, shed additional light on the institutionalist conception of how knowledge shapes policy. The general tendency in Original Institutional theory is to view all knowledge as good for institutional design, yet even good knowledge can become bad knowledge if it is dominated by ideological interests in institutional design processes. The study demonstrated that the coexistence of a limited and open access order was a reality in policy processes. Knowledge producers and more so, if they become knowledge implementers, have significant power in defining the institutional adjustment path. This argument implies that the concept of sovereignty had to be extended beyond the three manifestations of sovereignty that the Commonsian theory postulates. Knowledgeable agents are the new sovereigns in a knowledge economy. They define the technological frontier; they define the value frontier; they define the ideological frontier; and they convert warranted assertions into new institutions without subjecting them to the test of valuableness.

#### **9.4.1. Implications for institutional theory**

While reviewing institutionalist theories of change, it was argued that literature had focused on the role of technology in shaping institutional change. Literature had also focused on the role of the cultural lag in hindering progressive institutional change. A general assumption in the OIE of the Veblenian tradition is that all knowledge produced by the arts and sciences is instrumental. However, Clarence E Ayres demonstrated the distinguishable role of ideology and ideas in shaping institutional change. The Northean School later identified the distinct role of knowledge and ideology in shaping institutional change. Even with the Ayresian and Northean contributions, there was another undeclared assumption that knowledge producers and knowledge users in institutional design processes were different social agents. The study's findings, however, imply that institutional economic theorists have to realise that the conventional knowledge producer-user dichotomy is not always relevant. Since it is sometimes seamless, several implications follow.

With the prevalence of the mechanisms of institutional hegemony, such as epistemic entrenchment in the policy community, epistemic violence, identity switching and epistemic arbitrage, a real danger to the Deweyan/democratic instrumental knowledge production system is posed. This observation implies that North *et al.*'s (2007; 2012) social orders have

wider application than the macro-level that they have been limited to. The social orders are not necessarily mutually exclusive as the Northean theory presumes; there is a possibility for the realm of reasons to be an open access policymaking order, while the realm of rules is a limited access policymaking order. The converse is also possible. The Northean social orders provide an ontological framework for the type of the Commonsian negotiational psychology that prevails. This seems to be a tentative convergence of John R Commons' negotiational psychology and Douglass C North's socio-cognitive analysis of institutional change.

While the Commonsian School and the Veblenian School have generally considered power holders to be property owners and those in influential political positions or some religious and cultural estates of significance, the study demonstrated that knowledge producers are holders of significant power in a knowledge economy. If knowledge producers are power holders, then Fagg J Foster's conceptualisation of purposeful institutional adjustment as a problem resolution process and a problem as the difference between 'what ought to be' and 'what is' imply that knowledge producers determine the value frontier. Insofar as they define the value frontier, they determine the path, speed and extent of institutional change. The problem arises when the problem to be resolved is multidimensional and has many trade-offs. The problem can further be compounded when the knowledge producer and user becomes one social agent, which means that warranted assertions and the ideology of a particular epistemic community graduate into new institutions before they are tested for valuableness. Wicked problems easily follow and impoverishing institutional adjustment processes logically follow.

The OIE of the Veblenian tradition generally presumes that some social groups are holders of ceremonial interests and others are holders of instrumental interests. This assumption is traceable in every study that applies the Veblenian Dichotomy to policy analysis. The study's findings are that each social group simultaneously possesses ceremonial and instrumental interests. Using this modified assumption, which was abductively derived, the study extended the Bushian concept of institutional spaces and two stable equilibria were identified. A convergence of ceremonial interests between governmental authorities and a powerful social group was a stable equilibrium, which naturally corresponded to a limited access policymaking order. Ordonomic research identified such a stable equilibrium as the

only instance where cooperation is undesirable. Usually such an undesirable state of cooperation is characterised by unidisciplinary knowledge and a concerted use of the sanction of ignorance. A convergence of instrumental interests between governmental authorities and some social groups was another stable equilibrium and naturally, corresponded to the open access policymaking order. In this case, transdisciplinary and transdepartmental approaches to public policy determined the path of institutional change. Reasonable value guided policy evolution.

The general assumption in the Veblenian Dichotomy literature holds that ceremonial systems are past-binding. The thesis' findings suggested that ceremonial systems also do cause path independent change, usually underpinned by the principles of scarcity and futurity. They have a forward looking component. It was shown that Lysenkoism is a powerful ceremonial encapsulation mechanism that institutionalists have not extensively applied to evolution of institutional arrangements since Bush's (1987) introduction of the concept into the theory of institutional change. The study even demonstrated that Veblen had in mind a far more complex system in which imbecile (that is, Lysenkoan) institutional systems initially were forward-binding, and once they attained the Commonsian sovereign power, they became past-binding. Usually, in their advanced stages, Lysenkoan systems become comparable to the Northean limited access policymaking order.

It logically follows that Lysenkoan systems cannot be disbanded by deliberative efforts; it takes some ceremonial power to break a limited access policymaking order. The fall of Lysenko had everything to do with a subsequently hostile political environment to Lysenkoan ideas and ideology, yet political support initially buoyed the rise of Lysenkoism into epistemic power in the Soviet Union. Similarly, limited access policymaking orders can only be disbanded by the intervention of an external sovereign agent following aggrieved parties' concerted investment institutional entrepreneurship employing ceremonial and instrumental means. Institutional theory often takes it for granted that ceremonial power is bad. However, the study found that when an entrenched system is blocking access to institutional arenas in every way it can, marginalised groups mobilise and sometimes exaggerate their grievances to attract political attention which eventually raises political transaction costs of maintaining the limited access policymaking order. Exaggeration is a

propagandist strategy; a tit-for-tat strategy. This logically leads to the disbandment of the limited access order.

#### **9.4.2. Policy implication for South Africa**

##### ***a. Setting up institutional design processes***

The most important implication of the study's findings for policymakers, legislators and regulators is that policy adjustment has many social ramifications that usually become evident during the implementation of the policy. The harmonisation vision that the NEMA of 1998 and the Constitution of 1996 propose have been mutilated in many ways because of faulty policy design process. The major implication of the present study is that harmonisation demands transdepartmentalism and transdisciplinarity if wicked environmental policy problems and, indeed, any other policy problems are to be resolved.

The findings suggest that a policy process should not be initially conceptualised as a unidisciplinary process no matter how unidisciplinary it might seem to be because social systems and ecological systems interact and co-evolve. How certain are policymakers that a single epistemic community will competently address the demands of both systems? Unidisciplinary thought shaped the NEM:BA and, again, it shaped the regulatory phase. Findings of this study suggested that the DEA, and so all other departments, could do well by contextualising scientific evidence; prioritising local scientific evidence; systematically studying socioeconomic aspects of the policy issue (anthropocentrism) as the natural science aspects have conventionally been given systematic attention; and promoting effective participatory policymaking. Effective participation was found to result in reasonable and empirically balanced policy propositions that would engender, as the NEMA of 1998 requires, political equity, institutional equity, endowment equity and economic equity. These aspects were inadequately attended to in the NEM:BA processes because of the reliance on unidisciplinary knowledge.

The implications of the study's findings indicate that government departments have difficulties in achieving harmonisation. Power struggles and competition amongst departments has compartmentalised institutional design processes. An interesting finding of the study was that unidisciplinarity eventually led to the redefinition of opportunity sets based on the argument that the NEM:BA was disabling. Yet, in 2003 Members of

Parliament were praising the NEM:BA as the best ever drafted piece of legislation that only required an enabling regulatory regime. The administrative redefinition of opportunity sets was the genesis of the deep-structure problem of institutional isolation. This conclusion is a new insight into the emergence of new institutions, which suggests that much of the national legislation is not made by legislatures, but by the directorates of governmental departments. The legislature sanctifies the will of these administrative authoritative agents.

***b. Transaction costs of public policy***

The divergence between legislative intent and administrative preferences, as the study found, suggests that the study's findings also imply that there is weak monitoring of administrative/regulatory behaviour in South Africa. There is a principal-agent problem. This structural weakness has important implications for the extent of efficiency in the utilisation of public resources. The study illustrated that there exists a measurable planning curse. Between 2004 and 2014, legal experts, invasion biologists and international experts as well as other professionals were hired to offer consultancy services to the DEA, yet the final solution came back to ideas that already existed or were rejected in 2003 when the NEM:BA was being drafted. The question that remains unanswered, which the present study has only touched on is: "Was it necessary to spend significant resources in planning processes for 10 years without solving the problem?" If scholars had been granted access to sufficient information, an empirical investigation could have been launched to measure the size of the planning curse which was attributed to ideological battles in institutional design processes.

In a country that has several social problems competing for the same funds, the legislature would need to set up a mechanism for monitoring departmental performance and compliance with statutory requirements. Similarly, such a mechanism has to evaluate the quality of expenditures in terms of their rational link to public purpose. Similarly, the fact that institutional adjustment processes experience planning curses suggests there is need for a centralised monitoring agency. The National Planning Commission could be reconstituted into a transdisciplinary body that oversees implementation of all government policy, legislation and regulations as well as facilitating harmonisation of governmental actions.

With a central coordinative agency, the policy ecology would not experience administrative discontinuities because of the succession of directors and ministers. The study illustrated that administrative discontinuities always led to a succession of scientific and political ideologies as well as governance styles, which resulted in sudden policy reversals and redefinition of opportunity sets. The political ideology of the incumbent minister had a bearing on the institutional adjustment path and the apartheid style of doing and managing things prevailed from 2004-2009. Because the drafting of the regulations spanned several generations of directors/ministers it experienced the planning curse due to conflicting ideologies between the predecessors and successors. A central council mandated with monitoring the harmonisation processes would ensure continuity by providing coordinative leadership.

Apart from a coordinative agency, funding strategies that promote transdisciplinary policy research can facilitate weakening dominant epistemological systems. Since scholars agree that uni-disciplinarity is often driven by the need to maintain independence, academic prestige and sustained flow of research grants, funding strategies logically become the starting point for encouraging transdisciplinarity, while a coordinative agency facilitates transdepartmentalism. Semantic innovations, due to transdisciplinarity and transdepartmentalism, create social DNA, but epistemic violence destroys social DNA.

#### **9.4.3. Suggestions for future research**

There are some tentative results that the study established which deserve further systematic research. The planning curse associated with a contested institutional adjustment process is a potentially investigable area to determine the size of the deadweight loss. This deadweight loss becomes part of avoidable transaction costs of changing institutions. The revolving door phenomenon between senior governmental employment positions and academic professional practice as tentatively established in the thesis is an important area of institutional research. This area is fertile for research for the precise reason that it facilitates the evolution of a deep-rooted limited access policymaking order. Once the order emerges, manifestations of institutional hegemony through epistemic violence and domination naturally follow. The combination of the revolving door, careerism, sanction of ignorance and sanction of poverty effectively sustain a limited access policymaking order.

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### Appendix 1: Distribution of the online survey link

13/5/2014 :: FOSAF - Federation of Southern African Flyfishers :: Please complete this questionnaire on NEM:BA and the proposed regulations & AIS listings.



#### FOSAF NEWS - Please complete this questionnaire on NEM:BA and the proposed regulations & AIS listings.

Juniours Marire is a PhD student at Rhodes University. The questionnaire he asks you to complete is for part of his Doctoral study in Economics examining the current process of establishing Alien and Invasive Species listings and Regulations of the National Environmental Management: Biodiversity Act [NEMBA] 2004 and their probable economic impact the trout industry. Government's intentions in the regulations are to manage, control and/or eradicate alien and invasive species with the ultimate objective to conserve indigenous fish species.

This questionnaire seeks to solicit information about your views about socioeconomic factors related to trout fly fishing and the NEMBA regulations. The results of the study will be used for the thesis, for academic publishing in journals and as input to government policy.

To complete the questionnaire please go to:

<https://docs.google.com/forms/d/1ho1FBdoWKhuFXGpVupUodmJX6qdXj287NOBvuofapEY/viewform>.

[Return to News](#)

## Appendix 2: Online survey questionnaire



**RHODES UNIVERSITY**  
Gradamizere • 1910 • South Africa

Dear Trout fly-fisher, trout farmer, and others

My name is Juniours Marire, a PhD student at Rhodes University. This survey is part of a Doctoral study in Economics examining the current process of establishing Alien and Invasive Species Regulations of the National Environmental Management: Biodiversity Act [NEM:BA] of 2004 and their probable economic implications for the trout industry. Government's intentions in the regulations are to manage, control and/or eradicate alien and invasive species with the ultimate objective of conserving indigenous fish species. This questionnaire seeks to solicit information about your views about socioeconomic factors related to trout fly fishing and the NEM:BA regulations. The results of the study will be used for the thesis, for academic publications in journals and as input to government policy. You retain the right to drop out of the survey at any time or to leave out questions you do not want to answer. The survey is anonymous. This survey will take about 10-15 minutes. This survey begins now in May and ends on 31 July 2014. Thank you for supporting my study.

**Given the above information are you willing to participate in the survey?**

**\*Required**

- yes  
 no

**About NEM:BA**

**Have you ever heard about the National Environmental Management: Biodiversity Act?** It is a South African law that focuses on managing, conserving and protecting biodiversity. Biodiversity plainly means variety and abundance of biological life forms

- yes  
 no

**If yes, how would you rate your understanding of the National Environmental Management: Biodiversity Act?** In the scale, 1=no understanding ; 2=basic understanding; 3= good understanding; 4=excellent understanding

1   2   3   4

---

no understanding     excellent understanding

---

**Have you ever heard about the Alien and Invasive Species regulations of the National Environmental Management: Biodiversity Act?** A series of draft regulations have been published for public comment since 2007. Interim regulations were published for implementation in July 2013. Another draft was published for public comment in February 2014. These regulations are supposed to put into effect Chapter Five of the National Environmental Management: Biodiversity Act 2004

- yes
- no

**If yes, how would you rate your understanding of the Alien and Invasive species regulations?** In the scale, 1=no understanding ; 2=basic understanding; 3= good understanding; 4=excellent understanding

1   2   3   4

---

No understanding     Excellent understanding

---

### Controversies in the process of developing the regulations

The Alien and Invasive Species Regulations have been under discussion for nearly a decade so far, and they are yet to be finalised. Controversies have characterised the whole process of creating the regulations. One major controversial issue is the listing of trout as invasive. Kindly respond to the following statements by choosing the appropriate answer. In the scale, 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

**In my opinion, the Department of Environmental Affairs has not conclusively relied on international research evidence on the invasiveness of trout in order to decide on its invasiveness in South Africa** e.g. academic research done overseas or the global list of worst invasive species

1   2   3   4   5

---

strongly disagree      strongly agree

---

**In my opinion, a South African research-driven implementation of the National Environmental Management: Biodiversity Act has been at the forefront of the Department of Environmental Affairs' alien and invasive species management concerns** e.g. Research

to create a conclusive and comprehensive database of invasive traits and impacts of alien and invasive species within South Africa

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion, the Department of Environmental Affairs has not adequately researched the nature of threat posed by trout on indigenous species, habitats and ecosystems before listing them as invasive**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion, scientists in, or advising, the Department of Environmental Affairs developed the Alien and Invasive species regulations in consultation with interested and affected parties such as fly-fishers**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion, the Federation of Southern African Flyfishers (FOSAF) lacks the specialised knowledge necessary to contribute towards alien and invasive species regulations.**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**My trust in the Department of Environmental Affairs has increased as a result of the National Environmental Management: Biodiversity Act decision processes.**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**The Department of Environmental Affairs justified to interested and affected parties the rationale for the listing of trout/or any alien species as invasive**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**I think the Department of Environmental Affairs has not equally taken responsibility for researching the socioeconomic benefits of trout species as it has researched on the ecological invasiveness of trout.**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion, all species regardless of whether they are indigenous or alien, have a permanent place in the ecology and economy of South Africa**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**I believe that the regulations strike a balance between conservation of indigenous fishes and economic utilisation of the trout.**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion, trout should be listed as invasive if it can be demonstrated that in a given catchment the benefits of conserving indigenous fishes exceeds the economic contribution of trout.**

1 2 3 4 5

---

strongly disagree      strongly agree

---

**In my opinion the sufficient condition for listing trout as invasive is that**

- they must be alien and established outside their natural distribution range
- they must be alien and established outside their natural distribution range, and threaten or can potentially threaten ecosystems, habitats and species

- they must simultaneously be alien and established outside their natural distribution range; threaten or can potentially threaten ecosystems, habitats and species; and do cause economic, human health and environmental harm

**Based on the sufficient condition for invasiveness, can trout be possibly classified as invasive?**

- Yes
- No

**Which of the following factors are likely to be hindering achievement of consensus on how to manage trout?** you can tick more than one response

- absence of an aquatic biodiversity policy framework which leads to policy uncertainty
- the Department of Environmental Affairs withhold strategic information from stakeholders
- an ineffective consultative processes
- too much discretionary powers in the regulation of alien and invasive species given to the Minister by the NEM:BA
- domination of ecological invasion science over the implementation of the NEM:BA
- inconclusive scientific evidence about the current invasive capacity of trout
- environmental greed on the part of the trout industry
- lack of provisions for the economically productive use of trout
- environmental activism that seeks to purify South Africa's environment from anything considered as alien
- reliance of officials on scientific definition of invasive species rather than the definition in the National Environmental Management: Biodiversity Act
- Other:

**In my opinion, the National Environmental Management: Biodiversity Alien and Invasive Species Regulations, in their current state, are**

In the scale, 1=completely not reasonable; 2=not reasonable 3= reasonable; 4=very reasonable

1   2   3   4

---

not very reasonable     very reasonable

---

**What is your profession/occupation?** e.g. aquatic scientist, lawyer, economist, government official etc

**Are you a trout fly-fisher?**

- yes
- no

### **Social aspects of trout flyfishing**

In this section, I just want to understand more about your perceptions of, beliefs about and interests in trout fly-fishing. On a scale of 1-5, with 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree, kindly respond to the following statements

**Trout fly-fishing is a way of getting intimate with nature**

1   2   3   4   5

---

strongly disagree      strongly agree

**I consider trout to be significant cultural symbols in South African fly-fishing circles.**

Broadly defined, culture is a commonly shared way of life in a given community such as the fly-fishing community. It has its own symbols such as species, language, writings and customs and traditions

1   2   3   4   5

---

strongly disagree      strongly agree

**Trout is still significant social status symbols in South African fly-fishing circles.**

Status symbols are artefacts/species that are regarded with high respect in given community/social groups.

1   2   3   4   5

---

strongly disagree      strongly agree

**Roughly, what percentage of your friends did you get to know as a result of trout fly-fishing?** this question seeks to understand how trout fly-fishing is critical for your social belonging

- 0%

- 1% to 10%
- 11% to 20%
- 21% to 30%
- 31% to 40%
- 41% to 50%
- 51% to 60%
- 61% to 70%
- 71% to 80%
- 81% to 90%
- 91% to 100%

**The alien and invasive species regulations provide for my spiritual, cultural, social, physical, economic and development needs**1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

1   2   3   4   5

---

strongly disagree      strongly agree

**Even if the regulations promote conservation of indigenous fishes, their livelihood impact should not be neglected.**

1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

1   2   3   4   5

---

strongly disagree      strongly agree

### **Economic aspects of trout flyfishing**

In this section I want to have a rough understanding of your fly-fishing expenditure patterns

**For how long have been a fly-fisher?**

**In the last 12 months, did you make a trip or vacation that involved fly fishing for trout?**

- yes
- no

**On average how many trips did you make in the past 12 months?**

**On average how much do you spend on accommodation per trip?**

**On average how much did you spend on guiding services per trip?**

**On average how much did you spend on fly-fishing literature such as magazines and books within the last 12 months?**

**On average how much did you spend on food and drink per trip?**

**On average how much did you spend on fishing tackle in the last 12 months?**

**On average how much did you spend on access fees to fish on trout waters per trip?**

**On average how much did you spend on fuel and transport travelling to your preferred trout fly fishing destination per trip?**

**What is your most favourable trout fly-fishing destination?**

**Do you own a second home in your most favourable destination?**

- yes
- no

**Are you a member of a fly fishing association or club?**

- yes
- no

**If yes, which of the following describes your club?**

- My club negotiated exclusive access to trout waters
- My club owns private trout waters

**Which other fish species do your club waters have?**

### **Socio-demographic profile**

Rhodes University fully supports, and itself practices, a policy of non-discrimination. The information you are asked for in this section will help in analysing the data and to track progress in reaching transformation goals. Note that the survey is anonymous and that you can choose not to answer any of the questions.

**You are**

- male
- female

**You are**

- Coloured
- Indian
- White
- Black
- Other

**Your highest level of education is**

- less than matric level
- matric level
- certificate level
- diploma level
- undergraduate level
- postgraduate level

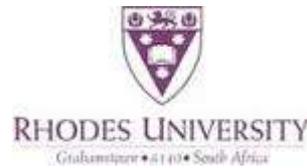
**How much is your after tax income per month**

- less than R10 000
- R11 000 to R20 000

- R21 000 to R30 000
- R31 000 to R40 000
- R41 000 to R50 000
- greater than R50 000

**Thank you very much for supporting me in my study**

## Appendix 3: Interview guide for government officials



### Interview Guide for DEA official

My name is Juniours Marire, a PhD student at Rhodes University. This interview is part of a Doctoral study in Economics examining the process of institutional change and its potential effects (positive or negative) on the economic potential of the trout sector. Government's proposed regulatory regime is to control, manage and/or eradicate trout with the ultimate objective to conserve indigenous fish species. The main objective of this study is to evaluate the reasonableness of the regulatory regime in the context of the trout sector. The results of the study will be used for the thesis and for scholarly publications in academic journals. The interview will be kept confidential and all results will be anonymous unless you choose to be identified in some capacity. Once the interview is done, if you choose to be identified by personal name or organisational name, I shall transcribe the interview and send to you the transcript for review before I use it in my thesis.

Thank you for supporting me.

#### Introduction

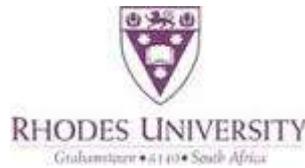
In recent years the debate about management of alien and invasive species has been deepening because of a worldwide realisation of high extinction rates of species due to, among other things, invasion. In South Africa, a classic case is the controversy surrounding the management of trout species (Brown and Rainbow). The debate seems to gravitate around the invasive capacity of trout and the regulatory regime the DEA is proposing.

1. There seems to be divergent views about what an **invasive species** is in South Africa. How does the DEA define it?
2. Some intellectuals have read a **spirit of eco-nationalism** in this new terminology in that it seems to privilege translocated indigenous species regardless of their invasive capacity. What is your view on this?
3. What is your view of the invasive capacity of trout **relative** to other threats to indigenous species? Is your **scientific evidence conclusive** about the invasiveness of trout?
4. The trout sector argues that the DEA has not declared to stakeholders the **criteria** it used to classify trout as invasive. What criteria did you use?

5. What difference does it make if trout is managed as an alien species under a permitting system rather than to declare them invasives managed under a permitting system?
6. Does the DEA have an aquatic biodiversity policy framework?
7. What management framework has DEA finally settled for and what is your evaluation of the **magnitude of the regulatory burden** on the sector of the proposed framework?
8. Taking the discussion further, I note that in 2009/2010, the DEA through SANBI funded a **trout mapping process** that was led by Dr Ernst Swartz. The process produced maps that were going to be the basis for a reasonable regulatory regime for trout. How does this process relate to the **mapping of fish sanctuaries**, which seems to be an entirely different process?
9. There is a claim that the fish sanctuaries coincide with trout zones that were produced by the trout mapping process. On that basis, the major point of controversy is that the DEA has **marginalised** the trout sector and may destroy it in the end, and that the science informing the regulatory process is **not credible**. What is your view on these claims?
10. The NEMA requires governmental departments to carry out **cost-benefit analysis** in order to inform administrative and regulatory actions. Has there been a cost-benefit analysis surrounding trout species? How much economic value do they contribute to South Africa vs. how much ecological cost do they impose?
11. The NEMA requires that government departments harmonise their policies. To my mind, comes policies such as the aquaculture policy of the DAFF (and similar initiatives of the DTI), the biodiversity conservation instruments of the DEA. A major complaint is that government departments are sending conflicting signals. Have there been attempts to **harmonise these policies**?
12. Related to the previous question, the claim has been that the DEA has put **biodiversity conservation interests at the forefront of its concern** and in the process has marginalised socioeconomic interests. Would you say the DEA has managed to locate a trade-off in this matter or it is an either-or issue?
13. In your personal capacity as the DDG, what would you say has been the most difficult part in trying to regulate the trout industry? Similarly, what have you found to be more interesting in the whole process?

Thank you very much, DDG, for giving me this opportunity to hear your views/story about this very important but interesting political economy question.

## Appendix 4: Interview guide for aquatic scientists



### Aquatic and biological invasion scientists – Interview Guide

My name is Juniours Marire, a PhD student at Rhodes University. This interview is part of a Doctoral study in Economics examining the likely (positive or negative) economic impact on fishing tourism of the Alien and Invasive Species Regulations published by the Government of South Africa on the February 2014 under the National Environmental Management: Biodiversity Act [NEM:BA] 10 of 2004. Government's intentions in the regulations are to control and/or eradicate trout with the ultimate objective to conserve indigenous fish species. The main objective of this study is to evaluate the reasonableness of the regulations in the context of the trout sector. The results of the study will be used for the thesis, for academic publishing in journals and possibly for influencing government policy. The interview will be kept confidential and all results will be anonymous unless you choose to be identified in some capacity. Once the interview is done, if you choose to be identified by personal name or organisational name, I shall transcribe the interview and send you the transcript for review before I use it in my thesis. You will get a summarised version of the results when the study is complete.

Given this information, are you willing to participate as a key informant in this research?  
Yes/No (delete the inapplicable)

Would you allow me to audio-record this interview? Yes/No (delete the inapplicable)

Are you happy being identified in the interview and research output

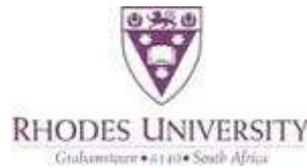
- a. As an aquaculture scientist of your institution
  - b. by your name or
  - c. Anonymous aquaculture scientist
1. An argument has been put forward that the NEMBA regulations are framed on a weak and misleading biological foundation in that a species that cannot reproduce cannot be invasive, and they say trout is such for the greater part of South Africa. What is your response to this claim?
  2. What do you consider to be a **sufficient condition** for resolutely concluding that a species is invasive?
  3. **In the South African context**, would you consider the sufficient condition to still hold?

4. In your opinion, which of the three components [(a) alien that is established (b) threatens ecosystems, species and habitats (c) causes economic, human health and environmental harm) of the legal definition of invasive species is the most important?
5. De Moor and Bruton (1988) have argued that surely trout have a permanent place in South Africa's culture and economy. In your opinion, is there really a place for alien invasive species such as trout in the South African society?
6. The government has published NEM: BA AIS regulations for 2013 and 2014 that listed trout as invasive and so sanctioned the eradication and/or control of trout. But, these regulations have faced resistance from the fly fishing sector. What is your overall evaluation of the regulations?
7. The NEMA 1998 provides that "Environmental management must **place people and their needs at the forefront of its concern**, and serve their **physical, psychological, developmental, cultural and social interests equitably**." In your view, would you say the regulations pass this test and why?
8. In the 1986 Colloquium hosted by JLB Smith Institute and Department of Ichthyology and Fisheries Science at Rhodes, P.B.N Jackson asserted, "the argument that no indigenous fish species served the same purpose as well as the introduced alien still holds good." How realistic is this hypothesis? If it is realistic, how can NEM:BA regulations succeed without providing for the perpetual existence of the AIS such as trout? Would the psychological, social, physical, spiritual, cultural and developmental needs of the people be met?
9. Some aquatic scientists (e.g. Paul Skelton, Jim Cambray) have argued that the major problem associated with resistance by trout fly fishers is "**environmental greed**". Would you elaborate on the forms this greed assumes?
10. The trout industry has argued that aquatic scientists do indeed acknowledge that there is a scarcity of conclusive knowledge about the invasiveness of trout. What is your opinion on the claim that much of the scientific evidence presented about the invasiveness of trout in SA is by way of assumptions?
11. The general consensus among aquatic scientists is that the scattered evidence of economic contribution shows that trout are important to the SA economy, but they should be actively managed. **What do you imply by active management? Is it a species management programme? Is it a zonation system?**

12. The trout sector lobbied for a trout zonation/mapping process which was later on carried out between 2009 and 2010. In your view, was it necessary to zone trout? Would this facilitate the conservation of indigenous fish species since many upper catchments of conservation concern are the very zones of interest to trout fly fishers?
13. Do you see any potential for consensus on how to manage alien invasive species especially trout? Elaborate.
14. What is your evaluation of the claim that in net terms, land/rivers with trout sport fisheries have higher biodiversity conservation rates than land/rivers without trout flyfishing tourism? (e.g well conserved landscapes that leave land relatively undisturbed thus saving much more in terms of terrestrial species)
15. Do you have any other information that you want to share that you perceive to be helpful to my study?
16. Are you happy being identified in the interview and research output
  - a. As an aquaculture scientist of your institution
  - b. by your name or
  - c. Anonymous aquaculture scientist

**Thank you very much for supporting my study**

## Appendix 5: Interview guide for trout sector players



### Interview guide on the NEM: BA Alien and Invasive Species Regulations process FOSAF/Trout sector players

My name is Juniours Marire, a PhD student at Rhodes University. This interview is part of a Doctoral study in Economics examining the likely (positive or negative) economic impact on fishing tourism of the Alien and Invasive Species Regulations published by the Government of South Africa on the February 2014 under the National Environmental Management: Biodiversity Act [NEM:BA] 10 of 2004. Government's intentions in the regulations are to control and/or eradicate trout with the ultimate objective to conserve indigenous fish species. The main objective of the study is to evaluate the reasonableness of the regulations in the context of the trout sector. The results of the study will be used for the thesis, for academic publishing in journals and for influencing policy. The interview will be kept confidential and all results will be anonymous unless you choose to be identified in some capacity. Once the interview is done, if you choose to be identified by personal name or organisational name, I shall transcribe the interview and send you the transcript for review before I use it in my thesis. You will get a summarised version of the results when the study is complete.

Given this information, are you willing to participate as a key informant in this research?  
Yes/No (delete the inapplicable)

Would you allow me to audio-record this interview? Yes/No (delete the inapplicable)

Are you happy being identified in the interview and research output

- d. As a FOSAF/YWG member or
  - e. As a FOSAF/YWG official or
  - f. by your name or
  - g. As an official in the flyfishing sector (anonymity)?
1. Can you tell me about FOSAF (its history, achievements, obstacles and vision & values)?
  2. Why do fly fishers treasure trout so much above any other species – indigenous or alien?
  3. What is your *evaluation of the process of coming up with the NEMBA act itself?*

4. FOSAF and Trout SA do mention that South African Environmental Law (NEMA in particular) is anthropocentric, but the NEM:BA seems to be ecocentric. In your view where did the whole process of coming up with the NEMBA miss it (if at all it did)?
5. Chapter 5 of NEM:BA focuses on management of alien and invasive species. This chapter was due for implementation by August 2006, but it has not yet been implemented. In your opinion, what do you consider to be the real problem with this legislation? Is it any issue of challenges with drawing up regulations or the NEM:BA itself is a flawed law?
6. Now that the NEM: BA regulations are out, what is your **overall evaluation** of the regulations?
7. What were (and are) your expectations as you engaged (engage) in this process?
8. In FOSAF's various submissions to DEA, there is a consistent reference to NEMA's provision that environmental management must serve people's "**socio-cultural, physical, psychological, spiritual, developmental needs**". Can you explain to me what this provision mean to an average flyfisher?
9. Let's look at the process of arriving at the promulgated NEM: BA regulations.
  - i. From reading your various submissions to DEA since 2007, I note that one of the contentious issues in the regulatory reform process is the **listing of trout as invasive**. What is your view of the invasive capacity of trout?
  - ii. In your opinion what are the **implications** to the trout fishing tourism sector **of the listing of trout as invasive**?
  - iii. Paul Skelton (2000: 39) has argued that one of the behavior factors undermining conservation of indigenous fish species is "environmental greed". Jim Cambray (2003, 2009) has taken that argument further arguing that essentially most trout fisheries exist in mountain catchments that are favourable for trout, yet they are the very habitats of conservation concern for indigenous fishes. He argues that the catchments are syndicated and he infers that environmental greed of this form buttresses the resistance of the sector to regulations that target trout eradication/control. **[a]** What is your opinion on this hypothesis? **[b]** Does the distribution of fish sanctuaries seem to coincide with the distribution of trout waters? **[c]**How were the fish sanctuaries determined? **[d]**If there is such a clash between fish sanctuaries and trout waters, what in your view, should be the most reasonable course of action?
  - iv. FOSAF pioneered the concept of trout zonation. How successful was the **trout mapping** process in the development of the regulations? How well did the regulations incorporate the zonation system?
10. FOSAF's submissions to the DEA since 2007 claim that the NEM: BA **regulations are unduly burdensome on the sector**. In what ways/aspects are the regulations likely to be burdensome?
11. In your opinion, what has been preventing a consensus arrangement for managing trout in South Africa from being reached? In comparison to the 1985/6 trout deregulation

saga, do you see a **compromise solution** coming forth now? What **aspects of the compromise solution to the trout deregulation controversy of the late 1980s** do you think should have been maintained in the 2013 regulations? (probe why they should have been maintained)

12. Do you have any other information that you want to share that you perceive to be helpful to my study?

13. Are you happy being identified in the interview and research output

- a. As a FOSAF/YWG member or
- b. As a FOSAF/YWG official or
- c. by your name or
- d. As an official in the flyfishing sector (anonymity)?

**Thank you very much for the assistance and cooperation.**

## **Appendix 6: Items excluded from Cronbach's alpha and subsequent analysis**

1. Have you ever heard about the NEM:BA Alien and Invasive Species regulations?
2. If yes, how do you rate your understanding of the alien and invasive species regulations?
3. If yes, how do you rate your understanding of the NEM:BA?
4. Trout can be listed as invasive species IF it can be demonstrated that the benefits of conserving indigenous fishes in a given catchment exceed the economic benefits of trout.
5. All species regardless of whether they are indigenous or alien have a permanent place in the ecology and economy of South Africa.
6. Trout fly-fishing is a way of getting intimate with nature.
7. Trout is an important cultural symbol in South African fly-fishing circles.
8. Trout is an important status symbol in South African fly-fishing circles.



**Appendix 8: Factor loadings (unrotated pattern matrix) and unique variances**

Variable	Factor1	Factor2	Factor3	Factor4	Uniqueness
DEA researched socioeconomics of trout	0.6469				0.5710
DEA consulted in developing AIS regulations	0.6922				0.3966
Fosaf lack specialised knowledge to contribute to AIS regulations	0.6365				0.4138
Trust in DEA increased due to AIS regulations process	0.7893				0.2834
DEA justified rationale for listing trout as invasive	0.7526				0.3349
AIS regulations strike trade-off between conservation and alien-based economic activities	0.4828				0.4195
Is trout invasive?		-0.4269	-0.5323		0.3843
DEA conclusively relied on international evidence to list trout			0.5444		0.4468
What is sufficient criterion for listing a trout as invasive?		0.7000			0.3696
DEA researched the nature of ecological threat posed by trout	0.4799			-0.5428	0.4313
AIS regulations NEMA 2.2 needs	0.4625		0.4932		0.3978
Even if regulations promote conservation of indigenous fish, their livelihood impact should not be neglected		-0.5224			0.4705
DEA followed a science driven process in AIS regulations	0.5307			0.4959	0.3768

\*blanks represent loadings < .4









**Appendix 13: Goodness of fit test for factorial logit model**

Classified	True		Total
	Trout is invasive =1	Trout is not invasive =0	
+	13	4	17
-	6	56	62
Total	19	60	79
Percent correctly classified = 87.34%			



### Appendix 15: Testing whether simple logistic model is nested in factorial logistic model

Logistic regression

Number of observations = 79

LR chi2 (9) = 24.52

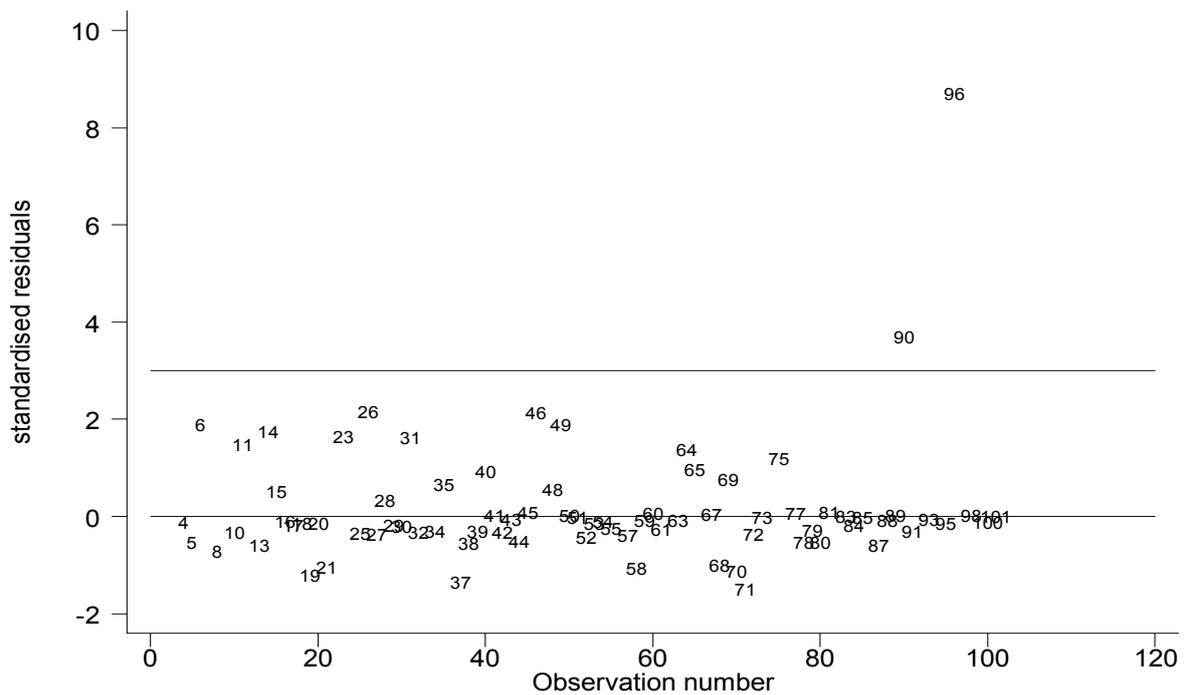
Prob > chi2 = 0.0035

Pseudo R<sup>2</sup> = 0.2814

Log likelihood = -31.319691

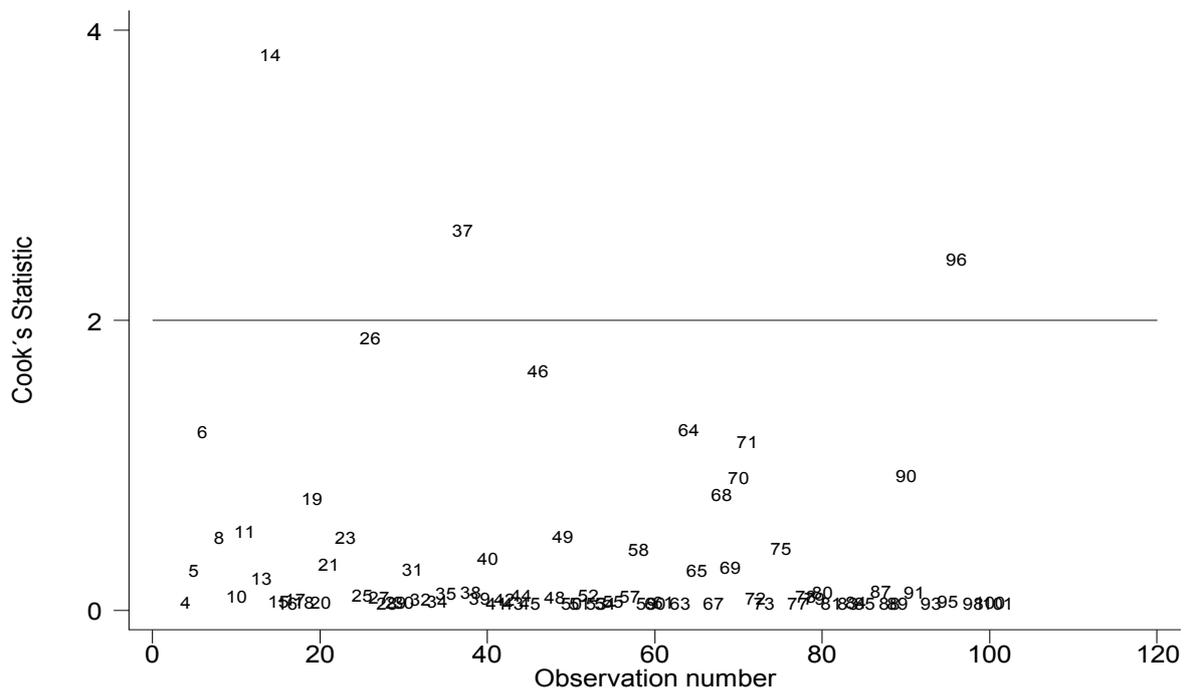
Is trout invasive?	Coefficient	Std. Err.	z	P> z
Sufficient condition for listing trout as invasive	-1.74	.599	-2.91	0.004
Level of understanding of AIS regulations	-.808	.503	-1.60	0.109
List trout as invasive if net benefits of conserving indigenous species are positive in a given locality	.612	.279	2.19	0.029
All species regardless of origin have a permanent place in the ecology and economy of South Africa	-.842	.321	-2.62	0.009
Even if AIS regulations facilitate conservation of indigenous fishes, their livelihood impact should not be neglected	-.039	.250	-0.16	0.875
Percentage of friendships gained from trout flyfishing	.092	.159	0.58	0.563
Level of education	-.430	.266	-1.62	0.106
Salary	-.116	.240	-0.48	0.629
Log of years of fly-fishing	-1.236	.663	-1.86	0.062
Constant	11.371	4.204	2.70	0.007
<p>H<sub>0</sub>: logistic model treating categorical predictors as quantitative is nested in factorial logistic model</p> <p>H<sub>1</sub>: logistic model treating categorical predictors as quantitative is not nested in factorial logistic model</p>				
Likelihood-ratio test		LR chi2(12) = 16.22		
		Prob > chi2 = 0.1814		

## Appendix 16: Examination of outlier residuals on model estimates



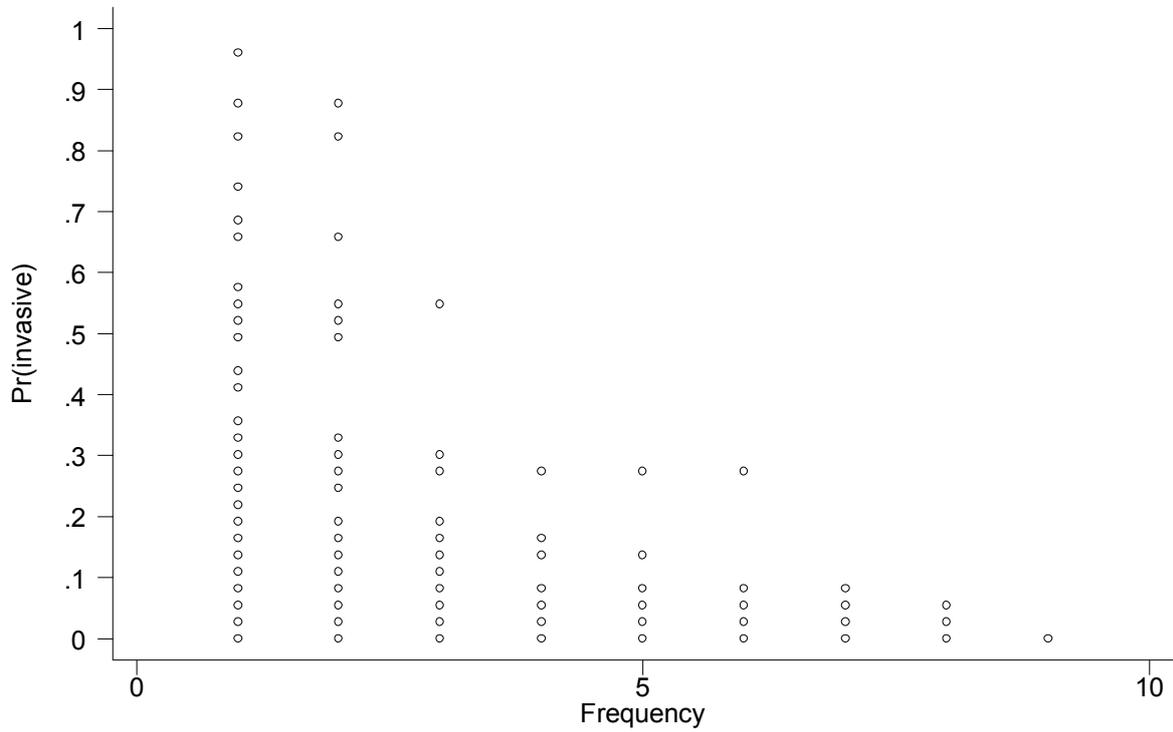
The figure reveals that observations 90 and 96 had the largest influence on the residuals of the estimated model. They were outliers. However, the question of which observations have the greatest influence on the estimated coefficients is not addressed in the figure. Cook's statistic does that well (Long, Freese 2006).

## Appendix 17: Cook's statistic for assessing influence of residuals on estimated coefficients



The Cook's statistic reveals that observations 14, 37 and 96 had the largest influence on the estimated coefficients. After dropping these observations, two variables (understanding AIS regulations and the perception that the livelihood impact of the regulations should not be neglected even if they facilitate the conservation of indigenous fishes) were now perfectly predicting the response variable. Thus, the resolution was to retain the observations and use the results with caution.

### Appendix 18: Dot plot of predicted probabilities



The majority of the predicted probabilities in the Figure lie between zero and 0.4. The estimated model seems reasonable.