CONSIDERING ONE'S OPTIONS WHEN THE FISH LEAVE. A CASE STUDY OF THE TRADITIONAL COMMERCIAL HAND LINE FISHERY OF THE SOUTHERN CAPE

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ABSTRACT

Today, many pressures (socio-economic, resource scarcity, policy, and regulation) make fishers and their communities vulnerable on a variety of fronts. These pressures threaten fishing communities along the South African coast. Both natural and social changes in the traditional handline fishery affect the social-ecological system of a region as a whole. Fishers need to cope with these local global changes and require systems that support their strategies to achieve resilience. Furthermore, stressors that drive variability in the fishery system occur on multiple temporal and spatial scales thereby exposing fishers and communities to multiple stressors. The impact and interplay of these stressors at multiple scales need to be taken into account to develop a clear understanding of social-ecological linkages if sustainable livelihoods are to be promoted and guaranteed. There is however a shortage of appropriately scaled, context-specific data that is needed to inform various decision-making processes.

To this end, participant-led research was conducted in six communities in the Southern Cape, where 50 participants were interviewed over a period of 6 months in 2013/2014. The interviews were an attempt to gather and record perceptions and knowledge regarding stressors that are responsible for the social—ecological system and ultimately affect the fishers' ability to fish successfully. Based on this knowledge, the research was aimed at gaining insight into what strategies are currently employed to ensure sustainable livelihoods.

The data presented does not only offer valuable insights into the day-to-day experiences of the group of fishers, but also expose various knowledge gaps that exist in micro-scale interactions that influence the fishery system. This is achieved by first providing an analysis of various stressors, which include the impacts and responses to climate variability, challenges presented by policy and regulatory frameworks, social

and economic considerations, challenges presented by infrastructure and political considerations. The adaptation, coping, and reaction strategies implemented are analysed using a place-based context and variability of strategies employed between each specific place is discussed.

Apart from highlighting knowledge gaps, the development of a more complete understanding of current reacting, coping and adaptive strategies as well as the drivers behind the decisions contained in this thesis, provides valuable insight into a fishery system that is not well-described which underscores the need for context-specific research at smaller scales.

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GLOSSARY OF TERMS AND ACRONYMS

Terms

Adaptability: "Adaptability in a resilience framework does not only imply adaptive capacity to respond within the social domain, but also to respond to and shape ecosystem dynamics and change in an informed manner" (Berkes et al., 2003).

Adaptation: "proactive and anticipatory planning of individual or collective actions based on knowledge or experience of past or anticipated future changes and that will likely result in no regrets or sustainable social- ecological outcomes" (Bennett, 2014: 5)

Adaptive Capacity: "adaptive capacity reflects peoples' ability to anticipate and deal with change" (Cinner et al, 2011: 7)

Coping: "denotes passively accepting the consequences of a change or event and thus not changing behaviour to alter outcomes" (Bennett, 2014: 5)

Exposure: "degree of climate stress upon a particular unit of analysis, it may be represented as ether long-term change in climate conditions or by changes in climate variability including the magnitude and frequency of extreme events" (O'Brien et al, 2004: 305)

Perturbation/shock: "major spike in pressure beyond the normal range of variability in which the system operates" (Turner et al, 2003). Important to note that the onsets of shocks are intense and dramatic e.g. violent conflict, 2004 Indian Ocean tsunami.

Resilience: "the amount of change the system can undergo and still retain the same controls on function and structure; the degree to which the system is capable of self-organisation; and, the ability [of the system] to build and increase the capacity for learning and adaptation" (Resilience Alliance, 2010)

Riemhou: "involves the skipper keeping the boat positioned directly above the swimming shoal while it feeds on the edge of the reef. Keeping the motors in forward gear at minimal revolutions, the skipper must account for the forces of wind, current, swell, and tide in order to keep his crews' lines falling directly over the fish" (Duggan et al, 204: 12).

Risk: "product of magnitude and likelihood of harm" (Nursey-Bray et al., 2012:753

Reaction: "signifies an unplanned response to an event or change" (Bennett et al, 2014: 5).

Sensitivity: "degree to which a system will respond to a change in climate, either positively or negatively" (O'Brien et al, 2004: 305)

Stress/stressor: "continuous or slowly increasing pressure, common within the range of normal variability" (Turner et al, 2003: 8074). Important to note that stresses tend to be ongoing e.g. resource declines, issues associated with seasonality.

Small-scale fisher: "persons that fish to meet food and basic livelihood need or are directly involved in harvesting/processing or marketing of fish, traditionally operate on or near shore fishing grounds, predominantly employ traditional low technology or passive fishing gear, usually undertake single fishing trips; are engaged in sale or barter or are involved in commercial activity" (DAFF, 2012b: iv).

Sustainable Livelihood: A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities, assets and entitlements, whilst no undermining the natural resource base" (Chamber and Conway, 1992:6).

Vulnerability: "Vulnerability is the degree to which a system, subsystem, or system component is likely to experience harm due to exposure to a hazard, either a perturbation or stress/stressor" (Turner et al, 2003: 8074).

Acronyms

BCLME: Benguela Current Large Marine Ecosystem

DEAT: Department of Environmental Affairs and Tourism

DAFF: Department of Agriculture, Forestry, and Fisheries

EAF: Ecosystem Approach to Fisheries

ERA: Ecological Risk Assessment

MLRA: Marine Living Resources Act (No 18 of 1998)

PAR model: Pressure and Release Model

RH model: Risk-Hazard model

SFTG: Small Fisheries Task group

SSFP: Small scale Fisheries Policy (No 274 of 2012).

SST: Sea surface Temperature

TAE: Total applied effort

UN FAO: Food and Agricultural Organisation of the United Nations

Chapter 1 - Introduction

Kobus[1] is a 5th generation fisher who has been fishing for at least 34 years. His son hopes to continue the family legacy but it is unclear whether eking out a sustainable livelihood by engaging in fisheries will be a possible future livelihood option for both him and his son. A two-hour conversation with Kobus brings to the fore a myriad of stresses that affect the fishery on a daily basis. These stresses cover a wide spectrum of topics from the biophysical to the human systems. Although much is known of the interaction of these stresses at larger scales, small, local scale interactions are often poorly understood. This rings true when Kobus, from the onset, maintains that he as a fisher, with a wealth of self-gained and generational knowledge sees and knows many "small things" that fisheries managers and scientists do not. These "small things" are not always small and often have large impacts on local fisheries resulting in changes that increase fishers' vulnerability.

Kobus' perspective provides a valuable insight into the interplay of a wide variety of themes ranging from biophysical changes such as regime shifts to changes in the human system such as declining income that are identified by study participants in this thesis at various scales. For example, he explains how a local inshore trawl industry that he believes targets Silver Kob[2] (*Agyrosomus indorus)* on a reef in his area of operation has a profoundly negative effect on local migratory patterns of the Kob, which in turn affects the handline fishers of the area. He also voices his concern about the possible negative impact that trawling has on reef and ecosystem health.

[1] Pseudonym – name changed to guarantee anonymity

[2] Hereafter referred to as "Kob"

Furthermore, he has also noticed, when catching Snoek *(Thyrsites atun)* on the West Coast that sharks appear to be targeting penguins more often in these areas.

Perhaps more significantly, Kobus also speaks of the continual challenges he experiences in administering and abiding by fisheries policies and regulations. He talks of many stressors: changing and unpredictable weather patterns; the profound and ever increasing inability to make ends meet due to declining local fish stocks and ever-increasing operating costs; the difficulty in finding and safeguarding experienced crew; the consequences of poor socio-economic conditions locally and the impact of skills shortages within certain sectors of the fishing community. The picture painted may seem dire and one may be forgiven for thinking that it is nearly impossible to survive in the industry, but this is not an entirely hopeless story. Kobus also tells a story of survival and resourcefulness of fishers that enable them to derive a sustainable livelihood. He fixes boats, trailers, and outboard motors and employs his crew to help him where he can. His wife has permanent employment that provides a reliable and steady income.

The brief synopsis above is an example of the type of story told by 50 participants from six communities that engage in the small-scale commercial handline fishery of the southern cape who were interviewed over a period of six months in 2013/2014. Interviews with fishers were conducted to gather and record their perceptions and knowledge of stressors that they believe are responsible for changing the social-ecological system and thus ultimately affect the fishers' ability to fish successfully. Based on these data, the aim of my research was to understand what strategies are currently implemented by fishers to deal with the stressors affecting the

system livelihood. Additionally these data provide valuable insight and context into their daily lives.

The importance of understanding the linked social-ecological system

The relationship between humans and the environment, which in this study implies the oceans, is a two-way relationship resulting in a need to regard humans and the sea as interdependent as opposed to separate entities (Ommer et al., 2011). It is consequently also imperative to develop an understanding of the linkages that exist between humans and the sea. Past failures to recognise that the oceans form an integrated social-ecological system (Berkes et al., 2003), as well as the social-ecological linkages within such systems, has led to a situation where ocean resources are seriously depleted and communities depending on these resources have been severely negatively impacted (Van Sittert 2002; Isaacs 2006; Ommer et al., 2011; Duggan 2012; 2014).

Fisheries remain a major source of food, income, and livelihood for millions of people across the world, most particularly those in developing countries (Garcia et al., 2003). However, coastal communities who rely on such fisheries are often subjected to a broad array of socio-economic and biophysical changes[3] (Bennett et al., 2014a), which leave these communities, the related fishing sector and management authorities having to grapple with the consequences of such changes. Additionally, it is now well recognised that although prior research has focused on single scales with single stressors, communities are experiencing multiple stressors (O'Brien & Leichenko, 2000; Ommer & team, 2007; Leichenko & O'Brien 2008; Bunce et al., 2010) and the

[3] Socio-economic changes range from shifting economic situations and political settings to environmental degradation, fisheries decline, and climatic changes.

ability to adapt to these stressors is influenced by actions at multiple scales (Adger et al. 2005; Cinner et al. 2009). The impact and interplay of these multiple stressors at multiple scales must be taken into account in order to develop a clear understanding of the above-mentioned social-ecological linkages and systems. Only then can sustainable livelihoods[4] be effectively promoted their continuation in the future guaranteed. The concept of an analysis of the human-environmental interaction within a spatial context emphasises an understanding of the environment and human systems as well as the interactions among them. Human activities are influenced by environmental conditions, be it economic, physical, or political, but humans, in turn; modify the physical environment in which they live (Rana, 1959; Dahlman et al., 2013).

The majority of fishers feel that they have long been, and continue to be, excluded from discussions surrounding policy, regulations, and management strategies, all of which directly and pervasively affect their lives. Consequently, the opportunity to share their experiences and knowledge thus provided a moment in which new ways of understanding of a fishery-in-context could emerge. Working together with local fishers and the fishing community to identify gaps between perceived and actual vulnerabilities, risks and uncertainties presents the possibility for iterative collaboration in which researchers, managers, policy makers and local community members might benefit mutually from the formation of new knowledge. Additionally, in pursuit of the formation of a more holistic knowledge base, the integration of local fisher's knowledge with natural- and social science research posits possibilities for the development of more effective, contextually based and therefore

[4] Chambers and Conway (1992:6) suggests that "a livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities, assets and entitlements, whilst not undermining the natural resource base"

efficient management strategies and the effective implementation of the Ecosystem Approach to Fisheries (EAF)[5].

South African Context

The South African coastline, being almost 3113 km in length, is widely regarded as one of the most naturally variable on earth and incorporates ecoregions ranging from cool-temperate on the west coast to warm-temperate on the south coast and subtropical on the east coast (Mead et al., 2013). In addition to this high natural variability, the coastline is affected by a range of anthropogenic driven stressors including resource scarcity, poor socio-economic conditions and policy and regulatory challenges. These stressors result in fishers and their communities becoming increasingly vulnerable to change which poses a threat to traditional fishing communities along the South African coast (Adger, 2006). Fishers will need to cope with these and other global changes and will need systems that will support their own strategies in order to achieve resilience to changes (Berkes et al., 2003). In addition to vulnerability created by variability in both the biophysical and human environments, approaches to fisheries policy formation and management have tended to perceive humans as separate from the natural environment and have thus sought to manage fish separately from people. Given that the small-scale commercial handline industry represents many of the poorest subsistence and small-scale fishers, who are often unable to access capital or legal representation, many of these fishers have increasingly found themselves disenfranchised within their industry and alienated from

[5] Petersen et al. (2010:1) offers the following description of EAF - "An Ecosystem Approach to Fisheries (EAF) management, which takes into consideration ecological relationships between species (harvested or not) and balances the diverse needs and values of all who use, enjoy or depend on the ocean now and in the future, is now accepted as the preferred approach to managing fisheries".

the very policies and management protocols, which impact so deeply on their lives and those of their dependants.

The Marine Living Resources Act of 1998 (MLRA) and ensuing policy documents have been written and promulgated with the ecological approach to fisheries (EAF) as a significant management objective (Sowman et al., 2011). EAF strives to balance diverse societal objectives by taking into account the knowledge and uncertainties about the biotic, abiotic, and human components of ecosystems and their interactions and seeks to apply an integrated approach to fisheries with ecological meaningful boundaries. In order to develop and implement effective management approaches as well as promote social and ecological wellbeing of the system it is important to form a holistic knowledge base of the selected localised system. One part of forming this knowledge base is to establish the vulnerabilities that fishers are exposed to as well as the strategies and networks they use in order to cope and adapt to these vulnerabilities. Currently, the knowledge base used to make decisions is for the most part informed by formal scientific research, which, more often than not, takes places on a national and regional scale, whilst neglecting localised scales. Local ecological knowledge held by fishers is often not recorded and is regarded, for the most part, as insignificant. In my own experience, whilst conducting a vulnerability assessment of the traditional handline fishery in Kalk Bay in (Gammage, 2012) it was found that fishers hold a great depth of knowledge and display significant insight into pressures within the social-ecological system within which they operate. This knowledge needs to be taken into account in order to form a more holistic and comprehensive knowledge base. This knowledge base can then be used to inform many processes within the identified fisheries system whether it is to enhance

management practices or as an indicator of social ecological health of the system. In short, effective implementation of EAF and related management approaches is impossible if we do not have a knowledge base that is sufficiently broad and well informed to use in subsequent research activities and decision-making.

This dissertation strives to add to this knowledge base by providing a description and analysis of the information held by those involved in the small-scale commercial handline fishery of the Southern Cape Coast. This is done by using fishers' knowledge as the primary data sources to answer three basic questions: "What are the stressors that fishers are exposed to?"; "What are the impacts and relative importance of these stressors?" and "How do fishers cope and adapt to the changes brought about by these stressors".

Chapter 2 provides a topical overview of peer reviewed literature and seeks to lay the basis for the theoretical framework within which the research has been placed. Chapter 3 presents the interview data obtained from the fishers as a "results" chapter without any analysis in order to give the reader develop an understanding into the experiences, perceptions and knowledge held by the fishers. An analysis of the stressors that affect change within the context of this specific fishery system, using both interview data and peer-reviewed literature, forms Chapter 4, whilst Chapter 5 analyses the current responses of fishers to stressors and changes in the form of coping, reaction, and adaptation. Chapter 6 concludes the thesis by highlighting pertinent points emanating from the different analyses.

Chapter 2 - Literature review

This literature review seeks to provide an overview of concepts and topics linked to the development of an understanding of aspects of the social-ecological system and interactions of the small-scale commercial line fishery system within which this research has been framed and conducted. First, it is important to examine the definition of small-scale fisheries and some issues pertaining to global and South African small-scale fisheries. As the resilience based approach to vulnerability, forms the theoretical and conceptual framework of the research, a brief overview of the concept of vulnerability follows. Stressors in the system give rise to vulnerability and the review explores available literature of two common stressors i.e. changes in the biophysical system as well as policy and regulatory challenges within the South African context. Stressors furthermore, expose a system to both risk and uncertainty and these concepts and risk assessments carried out in the South African context are briefly explored.

Adaptation strategies employed to cope with changes and their analyses is one of the key aims of this research and necessitates a review of the concept of resilience as well as the framing of adaptation within this context and resulting implications for our understanding of coping, mitigation and reaction as responses to change is presented. An overview of the literature regarding the need for different scales of analysis, multiple exposure, and case studies concludes this review.

2.1 Small-scale fisheries

It is necessary to unpack the exact definition of what constitutes a fishery and more pertinently, a small-scale fishery. A diverse range of categories and descriptions

of various fisheries around the world been defined in order to serve different purposes. Berkes et al. (2001:6) posits that these various terminologies differ “in detail of definition but not in substance”. Berkes et al (2001:6) furthermore holds that any definition of a fishery needs to include “biological, technological, economic, social, cultural, and political dimensions”. Having said that, it remains both necessary and beneficial to discern between large scale (commercial/industrial) and small-scale (commercial, artisanal, subsistence) fisheries.

Over the last several decades, researchers have been grappling with how to define small-scale fisheries. With no unanimous definition in existence, terms such as “traditional”, “artisanal” and “subsistence” are often used interchangeably when attempting to develop a suitable definition for the term “small-scale” (Sowman 2011; DAFF, 2012b). Using the term “small-scale” is preferable as it remains the most comprehensive term and serves to link a range of activities spanning from subsistence fisheries to formal business enterprises. Several authors have concluded that as small-scale fishing activities, whether full-time or part-time, are not consistent within and across countries and regions; the definition used for small-scale fisheries will vary according to location and context (Smith, 1979, Panayoyou 1982; Pollnac & Poggie 1991, Berkes et al. 2001, McGoodwin 2001, FAO 2003a, 2003b, Defeo & Castilla 2005, Sowman, 2011). There are, however, features that are common to most small-scale fisheries (Berkes et al., 2001).

The Food and Agriculture Organisation of the United Nations (UN FAO) broadly characterises small-scale fisheries as “a dynamic and evolving sub-sector of fisheries employing labour-intensive harvesting, processing and distribution technologies to exploit both marine and inland water fishery resources” (FAO/RAP/FIPL 2004). Small-

scale fisheries offer not only an invaluable input to food security, sustainable livelihoods and poverty alleviation (Béné et al., 2007) but they also represent a low capital investment, low technology, gear and vessel sector with fish caught largely to meet local market or subsistence demands (McGoodwin 2001; FAO/RAP/FIPL 2004). It is also important to recognise that all fisheries may be deemed commercial in nature as even the smallest artisanal fisher sells catches that are surplus to those of their household consumption. In fact, there are few fisheries in the world today in which none of the catches are sold (Berkes et al., 2001).

2.1.1 Small-scale fisheries globally

With small-scale fisheries including approximately 95% of the total active fishers in the world, an excess of 20 million people may be regarded as primary producers and another approximately 20 million can be classed as small-scale processors, marketers and distributors (McGoodwin, 2001; FAO/RAP/FIPL 2004). When one includes the additional workers (including dependants) involved in the different fisheries, then small-scale fisheries support an excess of 200 million people worldwide (McGoodwin, 2001). Small-scale fisheries make a significant contribution to nutrition, poverty alleviation, food security and sustainable livelihoods in the communities and regions in which they are active, more so in developing countries.[6]

Small-scale fishers operate in both developing and developed countries with many shared commonalities: they operate on a small-scale with low personal capital commitments, levels of production and political power and are generally found in communities along the coast with activities taking place close to “home” communities.

[6] http://www.fao.org/fishery/topic/16601/en accessed 27 Nov 14

The fishers (and industry) exercise very little to no power or influence in the development and implementation of policy and they also have very little ability to protect the fisheries that they depend on from intrusion by larger scale fisheries and other threats such as oil exploration or mining (Berkes et al., 2001; McGoodwin, 2001).

In addition to management concerns associated with other fishing sectors, the small-scale fishing sector has additional characteristics that must be borne in mind when decision-making takes place. Challenges in collective action, power struggles, and conflict resolution plague small-scale fisheries. They are composed of many small businesses and operators. This is contrary to the larger scale and more industrialised fisheries where more structural decision-making is able to, and does, take place. Small-scale fishing communities may also be remotely situated and geographically and politically removed from decision-making centres, especially in larger countries. The noted limitation of fisheries authorities to manage small-scale fisheries is exacerbated by the use of conventional fisheries management approaches developed for individual fisheries in developed countries (particularly Europe and North America) which do not necessarily suit small-scale fisheries in developing countries (Berkes et al., 2001).

Globally, small-scale fisheries have been, and continue to be, plagued by problems and management challenges the world over. To this end, the UN FAO Advisory Committee for Fisheries Research working group has reviewed key issues and options for improved management and subsequently promulgated a vision for the development of the sector in order to see the contribution of the fishery as being “fully realised”. This vision is for a sector where fishers are:

- “not marginalised and their contribution to national economies and food security is recognised, valued and enhanced;
- fishers, fish workers and other stakeholders have the ability to participate in decision-making, are empowered to do so, and have increased capability and human capacity, thereby achieving dignity and respect; and
- poverty and food insecurity do not persist; and where the social, economic and ecological systems are managed in an integrated and sustainable manner, thereby reducing conflict” (FAO/RAP/FIPL 2004).

Many constraints hamper the implementation of this vision. The UN FAO in its document “A research agenda for small-scale fisheries” published in 2004 has arranged these constraints using a broad thematic approach that allows for more clearly defined research objectives. The themes given by this document are as follows:

- “policy, legislation, governance and institutional arrangements;
- contribution, role and importance of small-scale fisheries;
- management approaches to small-scale fisheries;
- post-harvest issues and trade; and
- Information system” (FAO/RAP/FIPL 2004).

This research agenda seeks to assist researchers in constructing new approaches to evaluate and manage small-scale fisheries. Importantly, in order to make the most impact, more traditional, biologically centred approaches must be amplified by a significant amount of social and economic research. This will entail using participatory approaches in collaboration with individuals, fisher groups, communities, and various management structures. This collaboration cannot be restricted to fisheries, but in order to increase liaison and sharing of information, interaction with other facets of planning such as development, agricultural labour policy, water and coastal use also needs to take place (FAO/RAP/FIPL 2004).

2.1.2 Small-scale fisheries in South Africa

Fisheries in South Africa are responsible for the provision of food security and contribute to the livelihoods of approximately 30 000 fishers (Sowman, 2011). The small-scale fisheries sector in South Africa is multifaceted; as Sowman (2011:302) states “bio-physical-, socio-economic-, cultural characteristics” have resulted in a miscellany of fisheries systems. Despite a two-year inquiry by the Subsistence Fisheries Task Team (SFTG), appointed to specifically advise on challenges and issues surrounding the management of small-scale fisheries (Harris et al., 2002a; 2002b), very little attention was specifically paid to small-scale fisheries in the post-Apartheid transformation process that took place from 1996 – 2007. The SFTG acknowledged the existence of a body of fishers that do not satisfy the requirements of a subsistence fisher. It determined that this specific group of fishers would be best classified as “small-scale commercial fishers” (Harris et al. 2002b; Sowman, 2011). Whilst this resulted in a revised definition for the category of “commercial” fishers, the SFTG failed to develop definitive recommendations regarding sectoral management,

although there was recognition that the management of these two groups (subsistence and small-scale commercial) was in need of alternative approaches (Subsistence Fisheries Task Group Report, 2000; Harris et al. 2002b,).

A 'limited commercial right' was introduced by government as part of the 2002-2003 medium-term rights allocation in order to provide a regulatory framework for this small-scale sector. However, only a small number of applicants were successful and many fishers were left without rights (Isaacs, 2006; Sowman 2006; 2011). The continued failure to acknowledge and cater for traditional small-scale fishers resulted in mass action as well as formal legal action launched by various civil society groups (Sunde, 2004; Isaacs, 2006). Subsequently the South African Equality court ordered the Minister of the Department of Environmental Affairs and Tourism (DEAT) in May 2007 to provide access to marine resources to disenfranchised traditional small-scale fishers by making regulatory provision for relief until such time that a formal policy could be promulgated. This resulted in the so-called Interim Relief policy that has been in place since 2007/2008 (Sowman, 2011; DAFF, 2012b). Subsequently, the small-scale fisheries policy No 474 of 2012 was promulgated. This policy actively seeks to address management and regulatory concerns specifically related to small-scale fisheries in South Africa[7]

The small-scale fisheries policy includes subsistence fishers in the broader group of small-scale fishers found in South Africa. The policy offers a definition that states that small-scale fishers are "persons that fish to meet food and basic livelihood need or are directly involved in harvesting/processing or marketing of fish, traditionally

[7] Although the policy was promulgated in 2012, the required amendment to the Marine Living Resources Act no 18 of 1998 was only signed in May 2014 (Marine Living Resources Act No 5 of 2014). Clarity is still awaited in terms of the practical arrangements for the implementation and management of the fishers that operate within the regulatory framework of the small-scale fishers policy (Sowman et al., 2013).

operate on or near shore fishing grounds, predominantly employ traditional low technology or passive fishing gear, usually undertake single fishing trips; are engaged in sale or barter or are involved in commercial activity" (DAFF, 2012b: iv). Importantly this definition, although not explicitly stated, includes fishers currently engaged the small-scale commercial line fishery.

There is certainly much more that can be written about small-scale fisheries in general and in South Africa but it does not fall within the scope of this thesis. What becomes clear is that due to the nature of the fishing activities undertaken and the impacts that changes in their social-ecological environment will have on these fishing activities, this sector be regarded as particularly vulnerable. This vulnerability to change poses risks to the fishery and fishers on multiple scales that threaten both present and future livelihood options.

The concept of vulnerability has become the focus an increasing amount of academic and applied writing on global environmental change, marine observation, and fisheries (Bennett et al., 2014b). The development of the concept of vulnerability is complex resulting in distinct approaches being developed and followed by various scholars. It is thus necessary to explore the concepts by reviewing both traditional and newer approaches that has emerged as our understanding of vulnerability has improved.

2.2 Vulnerability

The utilisation of the term “vulnerability” in the scientific context originates within the discipline of geography, natural hazard research as well as analyses of food security. Additionally, vulnerability has also been likened to ideas such as resilience, risk, marginality, adaptability and exposure (Gbetibouo et al., 2009). Adger (2006: 268) defines vulnerability as the “state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of the capacity to adapt”. Researchers are, however, increasingly adopting a definition of vulnerability that is more multi-dimensional. Tuler et al. (2008:11) provide a definition where vulnerability is seen as “linking exposure to a hazard, the sensitivity of people to loss from the exposure and the ability to adapt or cope with the exposure or loss”. Demographic, economic, environmental, individual decision-making, institutional, socio-cultural, and technological factors are examples of the wide array of factors or stressors of vulnerability that may contribute to the three components of vulnerability highlighted by the definition provided by Tuler et al. (2008).

The vulnerability approach is particularly useful when dealing with fisheries management. Fisheries management is steadily becoming increasingly complex due to the amount of physical and geographic variation in terms of time, space, and scale that exists in any system. Depending on human factors, which include culture, technology, beliefs, politics, government and economics, resources also display variation (Adger, 2006). The usefulness of vulnerability studies are highlighted by Tuler et al. (2008:11) in the statement that vulnerability studies “serve to highlight how hazards arise, how exposures and susceptibility to the threats are distributed, and how

people are able to adapt or cope with threats and their effects within the human-environment system".

2.2.1 Traditional approaches to vulnerability

The idea of vulnerability provides a powerful analytical tool that can be used to provide a description of "states of susceptibility to harm, powerlessness, and marginality" of physical and social systems (Adger, 2006:268). Two traditional approaches have been used to conceptualise vulnerability. These traditional approaches usually make a distinction between process and outcome. The end-point approach sees vulnerability as the "end-point" in respect of the amount of potential damage that a climate-related event or hazard may cause within the system. The emphasis of the "end point" approach is on technology and shifts thereof as adaptation options, with the desired outcome being the estimation and reduction of the costs of climate change impacts (Kelly & Adger, 2000; Enson & Berger 2009; Bennett et al., 2014a). The alternative traditional approach regards vulnerability as the "starting point" - that is as a condition that is prevalent in a system before the hazardous event is come across. Viewing of vulnerability as the "starting point" implies that the vulnerability will determine adaptive capacity[8]. The starting point approach considers the causes of vulnerability such as geopolitical and economic contexts and options for adaptation that are related to development. Vulnerability provides a guide to standardise analysis of the measures put in to improve security through a risk reduction (Adger, 2006). The approach allows for the prioritisation of political, research agendas towards vulnerable sectors and regions, and allows for the

[8] Adaptive capacity can be defined as the ability to adjust to the changing environmental and socio-economic conditions and is therefore pertaining to present day vulnerability (Gbetibouo et al., 2009).

development strategies of adaptation that may lead to the reduction climate-sensitive risks that are independent of their assignation (Gbetibouo et al., 2009). This is attained through the examination of the characteristics held by households, communities, or regions that make these entities susceptible to change (Bennett et al., 2014a).

2.2.2 PAR and RH models

The 'traditional" view of vulnerability discussed in the previous section has led to the emergence of two models that guide traditional vulnerability assessment – pressure and release (PAR) models and risk-hazard (RH) analysis. PAR models explicitly define risk as a "function of a perturbation, stressor or stress[9] and the vulnerability of the exposed unit" (Turner et al., 2003:8074) and try to track the advancement of the sources of vulnerability through constantly changing processes to an end-state that is characterised by hazardous conditions (Cutter et al., 2008). However, the constantly changing human environment is not addressed when considering the vulnerability of the biophysical subsystem. There is thus a failure to provide detail regarding the causal sequence of structure of the hazard, which includes nested scales of interactions. There is furthermore a tendency to understate feedback that takes place outside the scope of analyses (Turner et al., 2003; Cutter et al., 2008).

RH models try to develop an understanding of the impact of a hazard by regarding it as a function of the exposure as well as the sensitivity of the exposed entity. RH models fail to address the manner in which systems amplify and accentuate the impacts of the hazard in question (Turner et al., 2003). The approach does not discern among subsystems and components that are exposed and may result in

[9] Hazards (in this context) is the general collective term used for stresses and perturbations (see Turner et al., 2003)

important variations in the consequences of hazards. Specifically, RH models do not take into account the role played by the coupled political economy (with specific reference to institutions and social structures) in constructing contrasting exposures and consequences (Turner et al., 2003).

The development of vulnerability analysis (both anticipated and embedded within PAR & RH models) ties in with three notions – entitlement, coping through diversity and resilience. Sensitivities to perturbations and stressors are maintained differently by different systems. According to Turner et al., (2003:8075) entitlements can be defined as the "legal and customary rights to exercise command over food and necessities of life". Entitlements help to explain why certain social units may be differentially at risk to change. Coping capacities, which serve to facilitate social units' response to the effects (including potential effects) of hazards, vary between them. It is thus important to recognise that there is a link between entitlement, endowment[10], and coping capacity and this link may be further developed to include social institutions that serve to enhance and empower coping capacity. It must be noted that entitlement and endowment are often relegated to questions of poverty and effectively disguise the acknowledgment that social units are dynamic and proactive. A wide range of strategies (such as diversification) is employed by even the severely economically marginalised in order to increase the defence mechanisms available to them. In light of this, it becomes evident that much of entitlement, endowment, and coping capacity rests within the realm of social, economic, institutional, and political structures. Thus

[10] An endowment may be any income or form of property that is given or bequeathed to someone or may refer to a quality or natural ability possessed by a social unit that may both exist in both the biophysical or human systems.

any sort of vulnerability analysis must take these structures and interactions into account (Turner et al., 2003).

2.2.3 Newer approaches to vulnerability

A third, more modern view of vulnerability that has emerged is described by Bennett et al. (2014a:2) where vulnerability is depicted as being "more comprehensive and integrated – conceptualizing vulnerability as a function of interactions between three elements: exposure, sensitivity and adaptive capacity". Bennett et al. (2014a:2) goes on to say that "vulnerability is seen as depending in part on exogenous change that occurs not only at various scales and partly on localised social capacity and technical infrastructure". In the context of this view, exposure refers to the existence of and level at which stressors are felt by a region, resource or group (Marshall et al., 2010).

Sensitivity within this conceptualisation of vulnerability may be described as "the extent to which a system is affected or harmed by the exposure to the stressor" (Tuler et al., 2008; Marshall et al., 2010). The potential impact of a stressor is defined by the combination of exposure and sensitivity (as shown in Figure 1) (Bennett et al., 2014a) whilst adaptive capacity may be defined as the "ability to respond to challenges through learning, managing risk and impacts, developing new knowledge and devising effective approaches" (Marshall et al., 2010:5). The impact of a stressor and the overall degree of vulnerability is established by the adaptive capacity displayed (Bennett, 2014a).

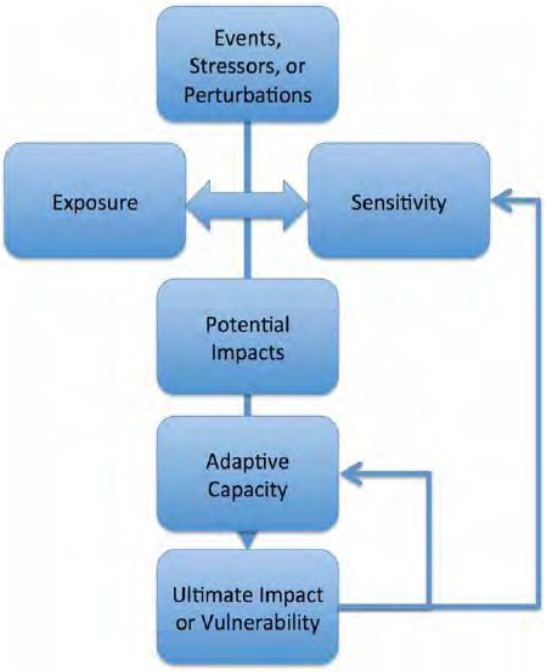

Figure 1: "Vulnerability shown as a function of exposure and sensitivity to stressors and adaptive capacity" (adopted from Bennett et al., 2014a: 3).

Whilst traditional vulnerability research has examined the impacts of biophysical and socio-economic stressors in isolation, the fact that multiple stressors and socio-economic stress are at play within a system needs to be recognised in order to successfully adapt, plan and legislate (Hjerpe & Glaas, 2012; Bennett et al., 2014a).

2.3 Stress/stressors that lead to vulnerability

The recognition of multiple stressors and avenues of vulnerability extends a contribution towards resilience science (and in particular social and institutional dynamics of social-ecological systems) through the "methods and conceptualisations of the stresses and processes that may lead to threshold changes" (Adger, 2006). It also becomes necessary to develop insights into the possible stressors/hazards faced by fishers that hamper (or may hamper) their day-to-day fishing activities. These stressors/hazards effect the change to which fishers become (or are already)

vulnerable. The following section provides an overview of the literature of two stressors that will surely effect any fishery and drive change.

2.3.1 Changes in the physical and biological environment

Coastal communities all over the world are enduring several social, cultural, economic, political and environmental changes and are in particular, sensitive to the impacts of climate change (Ommer& Team, 2007; Tuler et al., 2008; Bunce et al., 2009; Perry et al., 2010; 2011; Bennett et al., 2014a).

Climate variability and change

With the climate change phenomenon commonly described as one of the biggest threats facing the world today, it is no surprise that climate variability and change has been determined to be the most recent threat to the worlds fish stocks that are already declining at an accelerated rate. There is however, much uncertainty as to the exact impact of the observed variability and poses a big challenge as this lack of uncertainty influences the social-ecological systems' ability to adapt effectively. Furthermore, it is not recommended that possible impacts of climate change and variability to marine ecosystems are evaluated in isolation. Instead, such evaluations are best done in terms of, and in the context of, other anthropogenic pressures in the provision of a basis for the re-evaluation of fisheries management systems. This is done in order to develop more effective management responses to secure a sustainable[11] future for marine fisheries (Allison et al., 2009). Brander (2010) underscores this by pointing out that "normal climate cycles and variability" have been

[11] The term sustainability (as used in this context) refers to ensuring that fisheries operate in such a manner that there is sufficient fish for present generations without compromising the possibility and ability of future generations to also harvest fish.

the cause of fluctuations in fisheries throughout history as “changes in the physical and chemical environment occur naturally on a daily, seasonal, and longer term basis”.

Changes in the global climate present important opportunities and challenges for both society and economies alike (Allison et al., 2009). High demand for fish and income by the burgeoning human population as well as the impacts of fishing techniques that are increasingly efficient, has led to many species of fish becoming depleted resulting in effective commercial extinction. It was estimated in 2011 that over 70% all stocks are either fully exploited or depleted[12] (FAO, 2011).

Climate change projections compiled and released by the Intergovernmental Panel on Climate Change (IPCC)[13] are regularly used by marine scientists to make qualitative and quantitative projections of responses by marine ecosystems to environmental variability due to anthropogenic climate change and ocean acidification (both resulting from the accumulation of greenhouse gases). Whilst global models are able to predict likely consequences of change on larger scales (e.g. Cheung et al., 2009), the refinement of predictions targeting specific regions are a challenge as downscaling to local scales is problematic. Projections indicate that fish, fisheries, and fisheries-based economies as well as the broader components of marine ecosystems will be affected. Themes that may be considered when dealing with climate change impact projections include the likely impacts on ecosystem productivity

[12] *http://see-the-sea.org/topics/commerce.overfishing.htm* accessed 5 April 2012

[13] The IPCC is a scientific body operating under the auspices of the UN and was established in 1988 by the United Nations Environmental Programme (UNEP) and the World Meteorological Organisation (WMO). Its role is to provide clear scientific views on climate change knowledge states as well as potential environmental and socio-economic impacts. This is achieved by the revision and assessment of the most recent scientific, technical, and socio-economic information relevant to climate change that is produced worldwide. The body currently has 195 member states and the fifth assessment report (AR 5) was released in 2014 (*www.ipcc.ch/organisation*.html).

and habitat, marine fish and shellfish, fishers, fisheries and fishery-dependent communities, ramifications for future food supply as well as uncertainty and skill assessment (Hollowed et al., 2013).

Fish stocks are impacted directly and indirectly by climate change and climate variability. Physiology and behaviour are directly impacted and may affect growth, reproductive capacity, mortality, and distribution of fish. Indirect impacts may result in a change in productivity, structure, and composition of the marine ecosystems on which fish are dependent for food. Fishing effort, biological interactions, and non-climatic environmental factors may have similar effects. It is essential to bear in mind that when a change is attributed to climate, other factors must be evaluated and the degree of confidence in the attribution clearly indicated (Brander, 2010; Hollowed et al., 2013).

It is important to note that climate change and variability have been observed throughout history with natural systems having developed the capacity to adapt which may provide assistance in the effective implementation of future mitigation measures. However, two major factors limit future adaptive capacity. The current and future rate of predicted climate change is more rapid than that of change attributed to natural variability and the concurrent pressures compromise resilience of species and systems.

The South African context of environmental change

Research conducted along the South African coast to investigate change and variability in terms of climate has primarily focussed on rainfall, wind

speeds and sea surface temperature (SST) (Mead et al., 2013)[14]. This section seeks to provide an overview of the pertinent findings of these studies.

The mean annual temperature in South Africa has risen at least 1.5 times more than the observed global average of 0.65˚C over the last 50 years. An overall increase in the frequency of extreme rainfall events has also occurred over the same period (Ziervogel et al., 2014). These changes are likely to continue with both the South African Long-Term Adaptation Scenarios Research Programme (LTAS)[15] and fifth IPCC assessment reports indicating that a 3 – 6 ˚C warming of the interior of South Africa is a real possibility by 2081. Predicted changes in the magnitude and direction of precipitation are much less certain than that of air temperature (Mackeller et al., 2014; Ziervogel et al., 2014).

Analyses of trends observed in both rainfall and temperature indices over the period 1960 – 2010 in the water management zone that encompasses the Western Cape and parts of the Eastern and Northern Capes by Mackeller et al. (2014) show that there has been an increase in both minimum and maximum temperatures experienced over the region as a whole. A decrease in overall rain days, indicating drier conditions along the Southern Coast has also been noted (Mackeller et al., 2014). Overall rainy days have significantly decreased in both the summer and autumn (2.5 & 3.5 days respectively) with an annual mean decrease of 11.3 days being noted over a 50-year period. The same trends were found by Kruger (2006) as well as Rouault

[14] Some studies conducted have also highlighted the impact of the ENSO phenomenon on climate of the West Coast of South Africa (particular reference to SST, rainfall and wind). It is important to note that the future magnitude and impacts of both ENSO and Climate change, will dictate eventual effects of climate change in South Africa (Rouault et al., 2010; Dufois & Rouault, 2012; Philippon et al., 2012).

[15] The LTAS is a process led by the South African Department of Environmental Affairs (DEA) (in collaboration with the South African National Biodiversity Institute (SANBI)) and aims to respond to the SA National Climate Change Response white paper (NCCRP) by the development of national and sub-national adaptation scenarios for SA under conceivable future climate conditions and development pathways. It is envisaged that these scenarios will be used to inform future development decisions and adaptation planning in order to build climate resilience (www.sanbi.org/biodiversity-science/state-biodiversity/climate-change-and-bioadaptation-division/ltas).

& Richard (2003) and (2005) when conducting similar analyses. However, a disagreement between downscaled global circulation models (GCMs)[16] and observations of the rainfall and temperature may have implications for the assessment of projections of future climate in South Africa. The clear signal of increased temperature in both the model and observed trends has important implications for the functioning of natural systems and ensuing societal impacts (Mackellar et al., 2014).

The South African Marine environment's complexity (being one of the most complex systems in the world) can be attributed to the presence of three major currents (Benguela-, Agulhas-, and Circumpolar current) that dominate a relatively small geographic area. These currents, and their interactions, not only result in a highly variable and dynamic system that displays a large amount of natural variability on the decadal and inter-annual scales, but also serve as the driver of the broad Southern African climate system (Reason & Hermes, 2011; Moloney et al., 2013). The natural variability found within the system makes it difficult to separate long term trends from large amplitude, short term trends (Griffiths, 2009; Moloney et al., 2013) although two distinct ecosystem regime shifts have been identified, the first in the 1960s and the second in the mid-1990s/early 2000s (Howard et al., 2007; Blamey et al., 2012).

The Benguela Current Large Marine Ecosystem (BCLME) located off the west coast of Southern Africa, is a marine ecosystem boundary current system that can be largely divided into the Northern and Southern sections (Jarre et al., in press; Blamey et al., 2015). The Southern Benguela, of which the Agulhas bank forms part, is found

[16] GCMs are numerical models that represent the physical processes in the atmosphere, ocean, cryosphere, and land surface. They remain the most advanced tools currently available for the simulation of the response of the global climate system to an increase in greenhouse gas concentration in the atmosphere. The resolutions of GCMs are currently relatively coarse in relation to the scale of units of exposure of most impact assessments. In addition to this, many physical earth processes that also occur at smaller scales (such as cloud cover) can also not be modelled properly using GCMs thereby leaving much uncertainty within the modelled responses *(www.ipcc-data.org/guidelines/pages/gcm_guide.html*).

off the west and south coasts of South Africa (Blamey et al., 2015). Observed spatial and temporal changes in the Southern Benguela ecosystem can be attributed to various natural and anthropogenic drivers (Blamey et al., 2015). Moloney et al. (2013) also highlight different scales at which changes take place that make it difficult to tease out all the exact drivers and interactions. Although general expectations in terms of sea surface temperature (SST) changes include the warming of the oceans around Southern Africa, a southward shift in the high-pressure belts and increased stratification of the water column, these expected climate change manifestation are not supported by observation made over the past 60 -100 years. The observation of long-term trends in ocean temperature furthermore is complicated by decadal-scale variability in the coastal and shelf waters of the Southern Benguela (Jarre et al., in press).

Whilst a general warming trend of both inshore and offshore SST is expected on the Southern Agulhas bank, different datasets have shown conflicting trends in terms of cooling and warming of SST (see Blamey et al., 2012; Hutchings et al., 2012; Blamey et al., 2015; Jarre et al., in press). The nature of the observed discrepancies is described in chapter 4 of this dissertation. It is however, at this stage, important to note that there is much less agreement between the signals of different datasets for the southern coast as opposed to the west coast. These discrepancies are the focus of ongoing research (Jarre et al., in press).

The expected general increase in SST the world over will result in thermal expansion, which is the biggest driver of sea level rise. Sea level rise on the Southern coast over the period 1957 – 2006 has been measured at about 1.48 mm (Miller & Douglas, 2004; Mather et al., 2009). However, the observed trends in sea level rise

shows an increase from west to east when barometric pressure and vertical crust movement is included in the corrected values for sea level rise (Mather et al., 2009).

In terms of the biological component of the marine environment, changes in distribution have not only been observed for individual species but also entire communities (Perry et al., 2005). Impacts of climate change and variability on fisheries production and marine ecosystems are of increasing concern. Research conducted on the West Coast of South Africa has indicated that changes noted over a relatively short period can be indicative of regime shifts[17] in the southern Benguela inshore region (Blamey et al., 2012). Hutchings et al., (2012) compared monitoring data collected in St Helena Bay, which indicated changes in both abiotic and biotic components of the ecosystem. They draw the conclusion that whilst high variability is observed, the Namaqua shelf and inner bay has to date displayed a high amount of resilience to the effects of global warming and suggest that the major drivers of observed changes in the pelagic ecosystem is a result of top down processes notably, fishing (Hutchings et al., 2012). It must further be noted that whilst stressors have thus far been demonstrated through decadal-scale variability, the effects of climate change seems inevitable and adds to the complexity of the fishery system as not only the resource base will be affected but also coastal town inhabitants (Jarre et al., in press). In the South African line fishery, a distinct over-exploitation of almost all warm/temperate, bottom-dwelling and sub tidal linefish has been documented and the risk of commercial extinction for some species, a reality. This in itself has an effect

[17] Regime shifts refer to "sudden strong deviation from one fairly stable state to another, where various components of the system are affected, and the time-frame for the change to occur is relatively short" (Jarre et al. (in press).

and negative impact on productivity (with associated social and economic impacts), trophic flow, and biodiversity of the ecosystem (Griffiths, 2000).

2.3.2. Policy and regulation

The South African line fishery spans the coast from Port Nolloth (West coast) to Richards Bay (East coast). This is not a capital-intensive fishery and is traditional in nature with a fair amount of generational fishers still participating. It is a multi-user, multi-species, and multi-area fishery that targets 200 species, of which 95 make a significant contribution to both recreational and commercial catches (Griffiths, 2000; DEAT, 2005b; Blamey et al., 2015).

The origin of the South African boat based fishing industry is directly related to the European seafarers that first came to South African shores in the 1500s. The fishery was slow to develop despite the abundance of fish and the colonisation of the Cape by the Dutch in 1652. This is partly due to fishing restrictions imposed by Jan Van Riebeeck in 1657/8 in order to allow for the development of the agricultural sector. These restrictions were removed in 1795 when the British took over management of the Cape colony (Branch & Clark, 2006). By the mid-1800s, the commercial line fishery industry was thriving. The introduction of motorised vessels, the availability of echo-sounding equipment, as well as the establishment of small boat harbours after the Second World War saw the next major growth period of the fishing industry (DEAT, 2005b).

The first attempt to manage the handline fishery took place in 1940 when a minimum size limit for selected species was introduced. Due to the absence of fish species life-history information, these regulations were decided arbitrarily. The first

biological studies on a few species that were regarded as important (e.g. Seventy-four, Hottentot, Carpenter*)* commenced in the 1960s although the only resulting restrictions imposed were on the harvesting of snoek in the Western Cape (DEAT, 2005b).

The management framework introduced in 1985 included the revision of minimum size limits, daily bag limits, closed seasons, commercial fishing bans and the restriction of commercial catches. Stock assessments conducted since the 1980s indicate that most commercial exploited line fish species (with the exception of fast growing snoek and yellowtail), have been fished, and depleted to extremely low levels, with many deemed to have collapsed[18]. This in itself has had many far-reaching consequences in terms of job creation, tourism, and conservation to name but a few. The collapse of line fish stocks led to a declaration of an environmental emergency in 2000 and has resulted in a restriction on the number of persons that are permitted to commercially fish for traditional line fish (DEAT, 2004; 2005b).

The Marine Living Resources Act (MLRA) No 18 of 1998, was gazetted as a means of addressing the inequalities of the past to provide a new framework of regulation of fisheries in South Africa and calls for the implementation of a rights allocation system to regulate the use of marine resources. Rights as allocated under the MLRA are regarded as statutory permissions granted by the Minister or his/her delegate to harvest a specified marine resource for a stipulated period of time (Section 18(6)) where after it automatically reverts to the state, who may re-allocate it in terms of the applicable provisions. There are five core principles that provide guidance for

[18] A collapsed stock has been exploited to a level where the amount of sexually mature adults has dropped below a level of 20 % of the pristine stock resulting in the stock not being able to produce sufficient young and unable to adequately replenish itself.

the allocation and management of commercial fishing rights – the principles strive to complement and give effect to the objectives as set out in Section 2 of the MLRA[19]. These five core principles are, in brief, transformation, biological considerations, ecological considerations, industry, socio-economic and commercial considerations and performance, or potential to perform (DEAT, 1998; 2004; 2005a).

Rights allocation in the traditional linefishery has been done in accordance with a total applied effort (TAE). The TAE amount limits the amount of effort that may be expended in catching fish in the sector as a whole. This can involve limiting the number of fishers, fishing vessels, or fishing gear, or a combination of all three. The TAE also serves to make management more efficient. Apart from the TAE, other measures (such as bag limits for species, closed areas, limitations of the gear used and constraints on the trade of collapsed and over-exploited species) are also used as management tools in the sector (DEAT, 2004; 2005b).

The first allocation of commercial handline fishing rights took place in July 2003. Particular challenges faced in allocating the rights included the fact that many fishers that had applied were already right holders in other fishery sectors. Several fishers were also found to be weekend or part-time fishers and were in fact employed fulltime elsewhere – thus fishing was not their primary source of income. Upon completion of the process, just under 2 500 commercial line fishers were accommodated, leaving just under 1 000 crew unallocated. After extensive consultation, the balance of the crew TAE was allocated using exemptions (DEAT, 2005b).

[19] Section 2 of the MLRA covers the objectives and principles of the MLRA and deals with the need to apply an approach that strives to be ecologically sustainable, conservation orientated, precautionary in respect of the management and development of resources, in line with economic growth objectives, protect the ecosystem as a whole, preserve biodiversity, minimise pollution, achieve broad and accountable participation in the decision-making processes, obligation of national government in terms of international agreements and the need to restructure the fishing industry in order to address historical imbalances and achieve equality.

According to Sowman & Cardoso (2010) a distinct shortcoming in the current management approach to small-scale fisheries is the individual rights based approach. In light of a worldwide trend to introduce right-based fishery management systems in order to provide access to marine resources, processes used to identify the appropriate types of access rights depends on a range of factors that are often not recognised or taken into account. Alternatively, it is argued, a two-pronged approach may be more suitable – it is more appropriate to adopt individual rights systems for capital intensive fisheries whilst a collective based approach in smaller coastal fishing communities or less capital intensive fisheries may be more appropriate if certain criteria, in terms of the community, are met (Sowman, 2006; Sowman & Cardoso, 2010). The small-scale fisheries policy addresses the collective based approach highlighted by Sowman & Cardoso (2010) and seeks to "provide redress and recognition to the rights of Small-scale fisher communities in South Africa previously marginalised and discriminated against in terms of racially exclusionary laws and -policies, individualised permit-based systems of resource allocation and insensitive impositions of conservation-driven regulation" (DAFF, 2012b).

In addition to the shortcomings in management approaches highlighted above, the sectorial nature of the South African fishing industry also introduces shortcomings in the South African management approach. Small-scale and subsistence fishers' tendency to engage in an assortment of livelihood activities results in the adoption of diverse strategies in order to meet food and other basic needs. Fishers may choose to change livelihood and income generating activities during "off" seasons, time of resource shortages or when better employment opportunities arise. However, the current fisher classification and rights allocation system does not take these measures

into account. It can be argued that DAFF are not only mandated to manage the fisheries, but should also prioritise its activities and procedures with priorities dictating national policies (such as poverty alleviation and food security). Furthermore, it may be argued that the government is obliged to assist communities in the exploration of alternative livelihood options should fishers be unable to harvest a resource due to limits imposed on the resource (Sowman, 2006). With the overarching objective of fisheries management systems being the balancing of economic efficiency, social equity, and ecological sustainability, these broad objectives are often not specified to an operational level.

2.4. Risk and uncertainties

Stressors can result in small incremental changes with Folke et al. (2005) summarising this process as things moving "forward in roughly continuous and predictable ways". In contradiction to this first process of change, incremental change effected by stressors may also result in abrupt shifts that can be both disorganised and turbulent. Folke et al. (2005) summarises the consequence of these abrupt changes where "experience tends to be incomplete for understanding, consequences of actions are ambiguous and the future of system dynamics is often unclear and uncertain" (Gunderson & Holling, 2002; Folke et al., 2005). There are indications that when periods of abrupt changes within these systems are expected, it increases in not only frequency, but also duration and magnitude (Folke et al., 2005). Additionally, ecosystems' capacity to remain within desired states when faced with abrupt changes seems to have been severely reduced by human actions. This has resulted in vulnerable terrestrial and aquatic ecosystems that more easily shift towards states that are undesirable with the presence of these alternate regimes now posing challenges

to both environmental and resource management practices (Scheffer et al., 2001; Folke et al., 2004;).

The shifts described above result in the exposure of the system to both risk[20] and uncertainty. Literature consulted indicates that the fishing industry is continually confronted with high levels of risk and uncertainty. These vary greatly from risks emanating and related to the physical environment, to those pertaining to the human component of the social-ecological system that includes political and economic factors. According to Tuler et al. (2009) "those engaging in fishing activities and the communities in which they live face many and varied pressures, some of which threaten the viability of the fish population and the fishing community", thus the environment as a whole, is at stake (Tuler et al., 2009).

The importance of climate change associated risks is demonstrated by the IPCC that has been assessing not only the science of climate change but also the human exposure to its impacts and the possibilities for mitigation. Various research efforts attempt to assess the vulnerability of the human-environment systems in order to determine the current situation and in an attempt to anticipate future environmental changes. A scenario-based approach has been suggested as a suitable approach to try to ascertain which possible futures might come to fruition (Kandlikar et al., 2005). The use of such an approach in order to more effectively manage fisheries is echoed by Jarre et al. (2013) in their analysis of the interaction of natural and human drivers when examining long-term ecosystem scale changes in the Southern Benguela marine-pelagic social-ecological system.

[20] Nursey-Bray et al. (2012:753) defines risk as the "product of magnitude and likelihood of harm".

Socially and culturally constructed notions and appraisals of the world (what it looks like, should or should not look like), inform the actions and understanding of risks. The values, which may vary according to local belief systems, serve to condition perception of events and phenomena. This implies that local users will understand and know their immediate geographic surroundings and hold knowledge contrastively to external researchers. Risk studies thus need to consider cognition and personality, role and social context in order to offer an interpretation of cultural processes that frame knowledge about hazards when defining environmental risks. Additionally, perceptions of risks whether societal, individual, level of likely harm, level of risk and consequences of all these, will vary with the perceived level of exposure (Nursey-Bray et al., 2012). Ultimately, according to Nursey-Bray et al. (2012: 754) "the socially constructed nature of risk mandates an understanding of risk perception" - in essence, the actual risk as opposed to the perception of stakeholders can be two very different things. Cultural adherence and social learning is closely related to the way a risk is perceived (Nursey-Bray et al., 2012).

The fact that people tend to underestimate risk has been systematically demonstrated by risk studies (as a dimension of vulnerability assessment) (Nursey-Bray et al., 2012). How risks are interpreted are influenced by various factors that include level of knowledge, probability of the harm, ability to cope with or mitigate risk as well as the value of the resources that are threatened by the risk (Nursey-Bray et al., 2012). Decision relevant information can improve the use of a risk-based framework to conduct vulnerability assessment. This method provides the capability to clarify vulnerabilities and unequal impact to small groups within fishery communities.

In addition, this approach allows for the linkage of vulnerabilities and impacts to specific driving forces (Tuler et al., 2008).

The desire to implement more holistic forms of fisheries management has led to an increase in the number and scope of impacts to be assessed. Risk management is traditionally used to make management decisions including decisions on what needs to be managed as well as the amount of effort that is to be focused towards achieving adequate performance and the avoidance of undesirable events (Fletcher, 2005).

2.5. Risk assessments in South African fisheries

An important component of discerning between different EAF issues is the identification and prioritisation of issues by means of a risk assessment. The ERA (Ecological Risk Assessment) endeavours to prioritise management responses by pinpointing ecological risks associated with the management of major fisheries (Nel et al., 2007; Fletcher, 2005).

A project to examine the feasibility of the implementation of an EAF in the Benguela Current Large Marine Ecosystem (BCLME) of the South - Western coast of Africa (South Africa, Namibia, and Angola) was initiated by the BCLME programme, in the early 2000s. Existing issues, problems, and needs related to EAF as well as the development of different management options needed to achieve sustainable management of the resources at an ecosystem level were examined. The methodology followed by the ERA for the BCLME, closely followed the ERA process outlined in the ESD reporting framework used in Australian fisheries (Nel et al., 2007).

There are two principles, underlying the methodology used in the ERA that remain important. The process looks to firstly, establish agreement amongst

stakeholders about the identification and prioritisation of ecosystem issues an including prioritising ecosystem challenges and ensuing programmes of action. Secondly, the ecosystem is viewed in its broadest definition, including biological, social, and economic and governance inputs. This class of risk analysis involves the scrutiny of the source of the risk, its ramifications, and the likelihood that the risk may reoccur. Importantly, the process (and resultant methodology) demonstrates that human needs are to be viewed as an intrinsic component of the ecosystem approach. The methodology followed by the ERA (briefly) relies on a 3-step process (as outlined by Nel et al., 2007):

1. The identification of concerns/issues

2. Prioritisation of these concerns/issues and

3. The development and performance reports, which describe the appropriate management responses necessary to address issues.

The prioritisation of issues was accomplished by scoring the consequences of an identified risk actually taking place independent of the probability of it occurring. A risk value rating was then calculated and expressed as the product of the consequences and the probability scores. Risks and issues identified were categorised as “negligible” (0), “low” (1-6); “moderate” (7-12) “, high” (13-18) and “extreme” (score of 18 or greater). A risk value rating thus provides a way of prioritising issues. Low risk issues require little to no management action whilst a high-risk assessment requires definitive management action (Nel et al., 2007).

In terms of the ERA for the small-scale commercial hand line fishery in South Africa, 113 issues were identified. 47% of issues (risks) identified fell within the "ability to achieve" group. The "ability to achieve" group also consists of governance and issues external to the fishery (e.g. by-catch by other fisheries). 32 % of issues raised were pertaining to the ecological wellbeing of the fishery and 21% of the issues identified fell into the "human wellbeing" category. After the prioritisation of issues 38% of issues fell into the "extreme" category – this is, in itself not unforeseen, as the fishery was at the time regarded as being in a state of emergency with many important species being over-exploited. The "high' and "moderate" rated issues accounted for 15% and 22% respectively with major issues identified including the ecological wellbeing of the system, human wellbeing, governance and external impacts (Petersen et al., 2010).

2.6 Resilience

Social and ecological aspects of the linked social-ecological system are considered simultaneously by the resilience based approach to adaptation (Berkes et al., 2003) The focus of the approach is on building sources of resilience and adaptive capacity, which facilitate adaptation and does not result in further environmental degradation (Cinner et al., 2011). The concepts of resilience and complex adaptive systems are not merely concerned with the resilience to change and the preservation of existing structures, but more importantly the development of an appreciation of as Folke (2006: 259) states "dynamic and cross-scale interplay between abrupt changes and sources of resilience". Significantly, traditional approaches result in policies that try to control the change in systems that are assumed to be stable, whilst the resilience approach results in polices where the emphasis is on managing capacity of the social-

ecological system in order to according to Folke (2006: 261) “cope with, adapt to and shape change” (Berkes et al., 2003; Folke, 2006; Smit & Wandel, 2006).

Upon examination of the available literature, it becomes clear that the definition of resilience itself displays a fair amount of variability depending on the perspective applied. Begon (2006:586) defined resilience (ecologically) as “the speed with which a community returns to its former state after it has been perturbed and displaced from that state”. This is a very basic definition of the concept and can be considered too linear to deal with the complexities of the social-ecological system. The Resilience Alliance, in a workbook titled “Assessing resilience in Social Ecological systems: ver 2.0”, provides a definition of resilience that states that “resilience in both social and ecological systems is a function of the amount of change a system can undergo and still retain the same controls on function and structure; the degree to which the system is capable of self –organisation; and the ability [of the system] to build and increase the capacity for learning and adaptation” (Resilience Alliance, 2010). More significantly, resilience rationale urges us to take into account the innate uncertainty, unpredictability and complexity of the linked social-ecological systems (Carpenter et al., 2001; Berkes et al., 2003; Bennett et al., 2014b). Much work and research has to date placed an emphasis on the first part of this definition i.e. “the capacity of the system to absorb disturbance, or the buffer capacity that permits persistence” [or variations thereof – see Adger (2000) & Anderies et al. (2004)]. However, the notion of resilience is not only concerned with persistence or robustness to disturbance, but also seeks to explore and expose the opportunities that are created by disturbances. These opportunities manifest in the reconsolidation of structures and processes, the comprehensive renewal of the system and the emergence of new ranges. In this

regard, resilience may be seen as providing adaptive capacity thereby allowing for continuous development (Folke, 2006; Smit & Wandel, 2006).

The caveat to this discussion point is that although there is a changing adaptive interplay between the concept of sustaining and developing with change, too much of either may result in system collapse. This suggests that resilience may not always be a positive occurrence as it becomes increasingly difficult to transform a currently resilient system to a state that may be deemed more appropriate and suitable (Scheffer et al., 2001; Gunderson & Holling, 2002; Walker et al., 2004; Folke 2006). However, resilience remains vitally important as it is a critical element of how societies are able to adapt to variability and change brought about by stressors/hazards. The ability of all levels of society to cope and/or adapt will be severely constrained by the resilience of their networks and associations and the natural systems upon which these are dependant (Berkes et al., 2003). The greater the resilience of any system, the greater its ability to absorb shocks and disruptions and consequently, adapt to change (Berkes & Folke, 1998).

It is thus clear that the concept of resilience in terms of social-ecological health has been introduced as a means to try to understand the non-linear dynamics of social-ecological systems. These include mechanisms used by ecosystems in order to maintain themselves when faced with change and disruptions where it is acknowledged that systems are complex, non-linear, in multi-equilibrium, and self-organising and at the same time filled with uncertainty and disruptions. In this context, resilience can be seen as the “measure of robustness and buffering capacity of the system to changing conditions” Berkes (1998:12). Berkes et al. (2003) further

expands on this and reiterates that resilience displayed by social-ecological systems has three defining characteristics namely:

- "the amount of change a system can undergo and still retain the same controls on function and structure, or still be in the same state within the same domain of attraction;
- the degree to which the system is capable of self-organisation; and
- the ability to build and increase the capacity for learning and adaptation".

In terms of the first criterion, resilience remains concerned with the degree of disturbance that may be absorbed or buffered within a system that is undergoing critical changes within its functional components. The concept of disturbance is important as not only natural disturbances are noted, but also human-initiated disturbances. Any ecosystem's response to resource use and the reciprocal response of people to change in that ecosystem constitute a coupled, dynamic system that will exhibit adaptive behaviour. This brings into focus the second and third defining characteristics of resilience – the taking into account of self-organisation and learning- and serves to underscore the importance of considering linked social-ecological systems rather than ecosystem or social systems in isolation (Berkes & Folke, 1998; Berkes et al., 2003). Resilience may thus be regarded as a method that serves to present perspectives for guidance and organisation of thought. It is in this sense that there is a provision of important context for analysis of social-ecological systems (Folke, 2006). The resilience approach furthermore provides space for the creation of

integrative science and cross – and interdisciplinary analysis and collaboration on key points that are significant for the governance and management of the transition towards more sustainable developmental paths (Lambin, 2005; Folke, 2006).

2.6.1. Adaptation in the context of the resilience framework

A social-ecological system that is deemed vulnerable has in fact, lost its resilience and consequently, its adaptability (Folke, 2006). In order to deal with the interaction of gradual and abrupt changes encountered within the social-ecological system, it becomes necessary to understand and dynamically manage the variables and processes that provide a framework for ecosystem dynamics as well as the sources of social and ecological resilience. The social-ecological concept recognises that human action and social structures are integral to the natural environment and that making any sort of distinction between social and natural systems is both uninformed and illogical (Berkes & Folke, 1998; Adger, 2006). As human and natural systems are interdependent; resilience thinking demands that “how” and “whether” adaptive responses are able to maintain long-term ecosystem functioning with predictability is also examined (Berkes et al., 2003; Bennet et al., 2014b). It thus becomes necessary to provide “new” definitions for adaptations that are more suitable for the resilience framework. To this end Folke (2006: 262) defines adaptability as the “capacity of people in a social-ecological system to build resilience through collective action” whilst the adaptive capacity of any system may be seen as a reflection of the ability of social units of that system to not only anticipate change, but also actively deal with the change (Smit & Wandel, 2006; Adger & Vincent, 2005; Berkes et al., 2003). In addition, where little to no adaptive capacity is displayed by systems and people,

these entities will most likely be unable to take advantage of opportunities that are brought about by changes in the environment (Cinner et al., 2011).

The concepts of adaptation and adaptive capacity are generally considered advantageous characteristics of a system (within both the disaster and resilience contexts). That said, responses viewed from a societal perspective as positive in the short term could feed back into the ecological system and result in an erosion of the resilience of the bigger social-ecological system (Gunderson et al., 1995). An example of this is where fishers respond to declining stocks by increasing their effort through the targeting of different stocks, resulting in an increase of their range and/or by modification and/or changing of fishing gear. All the afore-mentioned responses may result in the depletion of fish stocks and may by implication increase the depletion of the marine resource at larger scales (Berkes et al., 2006; Wilson, 2006; Cinner et al., 2011). The responses can in effect augment feedbacks thereby aggravating negative trends that exist in the ecosystem and can consequently have an effect on ecosystem services and livelihoods. On the opposite side of the spectrum, fishers may choose to instead reduce effort and/or cease fishing completely. This may have a dampening effect on marine resource depletion signifying a dampening feedback and effective mitigation of ecosystem trends resulting in a decrease in fishing pressure (Cinner et al., 2011). One must thus discern amongst social adaptations that serve to weaken long-term social-ecological resilience (known as amplifying responses that result in an acceleration of resource depletion) and those adaptations that result in social-ecological resilience in the longer term (known as dampening responses that result in a decrease in resource depletion) (see Figure 2). The recognition of whether and how social, economic, or contextual circumstances may enable different responses will

provide insights into discerning whether responses can be adopted through conservation and/or development objectives (Cinner et al., 2011).

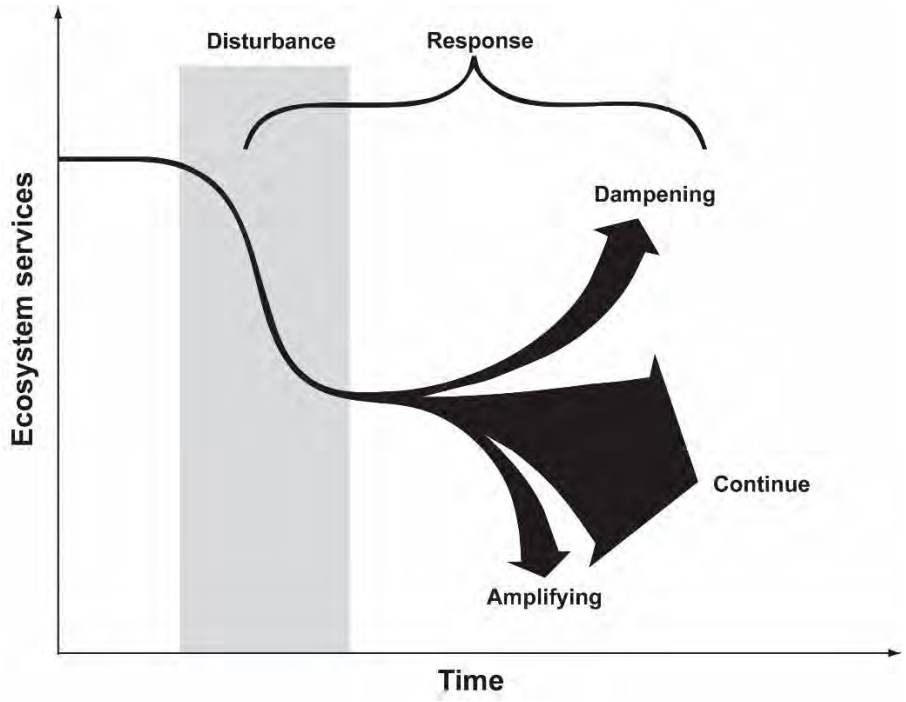

Figure 2: "Exploratory model proposed by Cinner et al. (2011) shows how fishers may respond to change. The model indicates human responses to changes in the flow of goods and services that may reinforce continue or dampen ecosystem trends. Disturbances to the flow of goods and services can be environmental, ecological, and anthropogenic and/or policy related" (adopted from Cinner et al., 2011: 8).

2.7. Reaction, coping & mitigation

Marine social ecological systems are comprised of connected and interactive biophysical (ecological) and human-social subsystems. Furthermore, ecological and societal stresses link and prompt changes that occur in marine social-ecological systems. Societies are a source of ecological stress and are required to respond to the environmental changes caused by these stresses. Evidence presented by case studies suggests that social responses to change have both shorter and longer time

contexts. Shorter time scale responses that allow the system to endure through the stresses relatively unchanged, may be thought of as “coping” (coping is an “adaptation that relies on moderation of behaviour”), whilst changes occurring over longer time scales which require more permanent changes are seen as “adaptation” (adaptation requires real change to the system). Whilst coping responses allow for a rapid return to previous conditions, adaptive responses comparatively portray a movement to new states or conditions (Berkes & Folke, 1998; Perry et al., 2011). Examples of short term responses (coping mechanisms) employed by fishing communities to marine ecological system adjustments include the intensification of fishing effort, diversification, migration and ”riding out the storm” whilst examples of longer term responses (adaptive strategies) include political reform, restructuring, capacity building and community closure (Perry et al., 2011).

Ecological and human-social fishery systems generally seem to display similar responses to the combined impacts of environmental and socio-economic stresses on these systems. It must be noted that the similarities seen between processes in a coupled social-ecological systems is in no way indicative of true similarities. For example, in the human-social system, the migration of fishers to “follow the fish” are behaviours that serve to support members of the community that do remain at home by sending remittances home. The corresponding response by the physical system is the return migration of fish populations resulting in the return of biomass and nutrients to locations where spawning takes place. It must also be noted that not all adaptive responses of human communities have a corresponding response in the physical system for example, collaborating and education (re-skilling) (Perry et al., 2011). Fishers and fishery institutions are able to interpret their experiences and thus

establish alternative theories or “belief systems”, and to restructure institutions, change behaviours, and develop new ways of interacting with their environment. Fish are only able to amend how they interact with their environment, through longer-term evolutionary processes (Berkes & Folke, 1998).

Reacting refers to an “unplanned response to an event or change” whilst coping means “passively accepting the consequences of a change or event and thus not changing behaviour to alter outcomes” (Bennett et al., 2014b). The concepts of adaptation, coping, and mitigation may be regarded as closely related, as both are needed in response to the risks posed by the impacts of stressors within the natural and social environments. Mitigation is essential to keep impacts from stressors (such as climate change) as low as possible. Mitigation and adaptation may also be related more action-specific ways and individual mitigation and adaptation behaviour often have the potential to interact with each other and offer alternatives. It is complicated to consider mitigation and adaptation as parts of an integrated portfolio of strategies, policies, and action. Mitigation and adaptation often differ in their nature, co-benefits, limits, who decide, and who pays the price versus who benefits. An example of this is that mitigation and adaptation measures tend to differ in the timing of the efforts, the geographical pattern of their effects and the sectorial focus of their responses (Wilbanks et al., 2006).

2.8. Scales of analyses

In order for communities to move beyond merely coping with environmental degradation the active rebuilding of depleted resources and eroded livelihoods (and towards the reduction or mitigation of the effects of change and decline) a multifaceted approach is required. In order to effectively conserve marine resources and manage

fisheries, it is required that the issues are focussed simultaneously at various scales e.g. local, national, and regional (Pomeroy, 2012; Bennett et al., 2014b).

An important first step when dealing with the national scale is to ensure that regulations that are imposed remain suitable for both the ecological and social contexts. Pre-existing legislation that is not fully functional should also be monitored and adapted accordingly. An improvement in the participation of research users, such as fishers, in the evolution of regulations will ensure contextual appropriateness and make it more acceptable at the community level (Panjarat & Bennett, 2012). Additionally, effective and impartial enforcement of regulations is necessary and requires an increase in monitoring, control, and surveillance including an improvement in the coordination that takes place among government agencies, an increase in physical and personnel capacity as well as the means to overcome any industry-government corruption that may exist. Additionally outreach and education programs that promote understanding of regulations will add to their knowledge and rationale used in decision-making. The establishment of mechanisms to reduce fisheries conflicts could also lead to a reduction in the "race to fish" mentality that exists in many fishing communities (Grafton et al., 2005). By implication, the overall health of the marine environment may be improved by the adoption of integrated management approaches to coastal management (Bennett et al., 2014b).

The development of "local environmental institutions and social norms, resource monitoring, feedback mechanisms, and spaces for learning" (Bennett et al., 2014b:5) are also required at the local level. Environmental policies, agencies, and institutional support from various stakeholders may play important roles in the evolution and development of institutions. Additionally, legislation and policies that

support local management and conservation initiatives are required (Bennett et al., 2014b; Johnson, 1998). Environmental education and outreach programmes should focus on applicable ways to conserve local resources, develop conservation ethics, and document local knowledge (Bennett et al., 2014b). Local fisheries associations, cooperatives and other spaces that allow for sharing, resource monitoring and the development of adaptive responses should also receive support to allow for the (re)development of these mechanisms (Folke et al., 2003; Jones et al., 2010).

Several methods are suitable to enhance the ability of households and individuals to adapt to economic and livelihood opportunities. These include "building flexibility and diversity, increased access to assets' and improved governance and leadership" Bennett et al., 2014b:11). The maintenance and development of various livelihood portfolios, which includes the development of subsistence activities, should be encouraged (Bennett et al., 2014b; Ellis & Allison 2004). The creation of mechanisms, which ensure that locals are employed within the community should be encouraged and capacity-building programs implemented to address the quality of local 'leadership and governance' structures (Bennett et al., 2014b). Other assets that need consideration when dealing with adaptation concerns at the local level include but are not limited to education levels, relationships between communities, partnerships with organisations (academic-, public- and private sectors), rights issues, gender equality concerns, credit sources and financing, financial status and community infrastructure. Both NGOs and government agencies can play a large role in the facilitation and funding of livelihood projects, the advocating for rights and the creation of necessary policies to support local development (Bennett et al., 2014b).

Therefore, it is very apparent that multiple stressors, such as economic, technical, social, and cultural factors, should be considered by adaptation projects. They may obstruct adaptation as well as serve to encourage the implementation of as many 'risk management' strategies as possible. In the context of the household, this could include (but is not limited to) diversifying livelihoods, increasing fiscal responsibility by the limitation of capital, participating in subsistence activities (such as the planting of household and community gardens), reduction of household costs, increase levels of education, migration for work and sending remittances, reliance on multiple target species, or keeping livestock where possible to name a few (Bennett et al., 2014b).

2.9. Multiple exposure and the need for case studies

According to O'Brien et al. (2004: 303), vulnerability as a theme has "emerged as a cross-cutting theme in research on the human dimensions of global changes" yet, studies regarding vulnerability to climate change have occurred in relative isolation of other stressors that may exist within the fisheries system (O'Brien et al., 2004). This highlights the importance of developing an understanding of global environmental change interactions as well as other socio-economic and political changes that continually take place at various spatial and temporal scales in order to ultimately inform policy and future adaptive strategies (Bennett et al., 2014a; Turner & Kasperson 2003; O'Brien & Leichenko, 2000).

The characterisation of the environment and the complex role of humans within the environment are complicated. The processes at work are inherently complex with the accumulated impacts of individual decisions on larger scales often regarded as the immediate cause of anthropogenic induced changes to the environment. These

individual actions are shaped by the particular social, political, economic, and environmental contexts within which they occur (An et al., 2005).

Today, it is well recognised that although prior research has focused on single scales with single stressors, communities are experiencing and exposed to multiple stressors (Bunce et al., 2010; Leichenko & O'Brien 2008; Ommer & team, 2007; O'Brien & Leichenko, 2000). The capacity to adapt to these stressors may be influenced by actions at various multiple scales (Cinner et al., 2009; Adger et al. 2005).

A case study where information is collected using a participatory framework seems to be an ideal way to gather information based on experiences of changes at the smaller spatial and temporal scales (localised and over shorter time periods). This information will not only be able to more adequately inform future adaptive strategies and policy (O'Brien & Leichenko, 2000) but may additionally contribute towards indicators of social-ecological health of the system in question. It is also important that to construct suggestions made in terms of the localised study in such a manner that it is easily implementable by the community concerned (Ommer & team, 2007). In many cases, problems or challenges that are experienced by a certain sector of society cannot and are not adequately addressed by over-arching national policies. Additionally, communities do not always possess the knowledge or tools to take preventive measures themselves so that the socio-economic impacts of variations and changes experienced within the natural environment are minimised or mitigated (Patt et al., 2010).

The concept of "double exposure" as proposed by Leichenko & O'Brien (2000; 2008) recognised that multiple stressors affect social entities simultaneously and interact to produce positive and negative results. Importantly, there are disparities in

the impacts of stressors as social entities that may be more or less exposed, sensitive, or able to adapt to multiple stressors (Tuler et al., 2008; O'Brien & Leichenko, 2000). O'Brien & Leichenko (2000) have noted the need to conduct "both quantitative and qualitative analysis in the form of case studies, comparative work and cross-scalar examinations" on exposures identified in terms of the "double exposure" framework proposed (O'Brien & Leichenko, 2000). However, although there is ever increasing work (Mubaya et al., 2012; Silva et al., 2010; Paavola, 2008) being conducted in terms of multiple exposures and double exposure, Zou & Wei (2010:919) posit that there is still "a tremendous gap between conceptual theoretical work on vulnerability and empirically based case studies". Upon examination of current available literature it becomes clear that there are few case studies available where the effects of global changes experienced by small-scale social systems, individuals and/or communities have been researched (Bennett et al., 2014b). Instead, case studies have traditionally focussed on the clarification of uncertainties in terms of global and regional models which do not serve to capture the complexity of day-to-day experiences nor the irregular distribution of vulnerabilities within diverse communities (Bennett et al., 2014b; Barnett et al., 2010; Brklacich et al., 2010). However, the need for place-based analysis that focuses on the perspective of vulnerable social entities has been highlighted (Bennet et al., 2014a). Research that focuses on local perspectives in vulnerability and adaptation is deemed appropriate as perceptions of risk may serve to determine the present and future adaptation and/or coping measures implemented and may consequently lead to actions that lead to a reduction in risk (Bennett et al., 2014b; Tuler et al., 2008). The traditional focus on structural causes, impacts, and/or responses to change may be regarded as a passive understanding of vulnerability that reduces the importance of human agency and the role it plays in the mediation and

response to stressors and/or changes (Bennett et al., 2014a). Bennett et al. (2014a & b) go further and highlight the limited amount of perception-based empirical studies available in current literature that deal with the experience of multiple stressors by local communities as well as the multitude of impacts these stressors will have on these local communities.

2.10 Concluding Remarks

To date, research conducted in the Southern Cape by Duggan (2012) has determined that the fishers there employ a diverse set of strategies in order to cope with and adapt to variability and stressors in both natural and social systems. These strategies range from launching boats in a different location, to travelling to Cape Town as crew members for other rights holders, to taking up building when the fishing is bad (to name but a few). In order to fully understand the adaptation and coping strategies employed by fishers and their impacts, participant-led knowledge will provide the basis for an analysis of both the stressors that affect changes as well as responses to these changes, in the form of reaction, coping, adaptation.

The resilience-based approach to vulnerability provides a suitable theoretical and conceptual framework for the research. In terms of the framework, vulnerability and resilience are viewed as being at opposite ends of a spectrum thus implying that as a system becomes more vulnerable to change (brought about by stressors), the less resilient it will be (Folke, 2006). It is thus also important to note that adaptation, coping and reaction (as described by Cinner et al., 2011) do not lie on the same spectrum as the vulnerability/resilience interaction, but instead serve as inputs into the resilience context (Folke, 2006). The resilience context can thus be used as an analytical approach that can further the understanding of sustainable

livelihoods (a concept that is explored further in the analysis of current adaptive strategies in Chapter 5). Furthermore, the resilience concept allows space for the development of an understanding of multiple inputs and interactions within the system at various spatial and temporal scales. In the context of this research, the participant-led case study allows for the analyses of multiple stressors currently effecting changes within the context of the small-scale commercial handline fishery in the Southern Cape coast as well as the coping, reaction and adaptive strategies currently employed by fishers. This knowledge is important for the development of a better understanding of various multi-scalar interactions to gain insight in to the fisheries system in order to inform future strategies and policy implementation.

Chapter 3 – The picture as painted by the fishers

The purpose of this section is to provide the feedback gained from interview data whilst conveying the story as told by the fishers. Analysis as well as further discussion is provided in Chapters 4 and 5.

The chapter, after a brief overview of the study area and methodology applied, presents the data in three main sections that are derived from responses to three general questions posed to participants. These questions required participants to identify stressors that cause change in the fishery system, inform on current strategies in place to deal with changes brought about by stressors, and speculate on possible viable future strategies.

3.1 Methods

The research area comprises six towns: Mossel Bay (eastern extent), Gouritsmond, Melkhoutfontein, Stilbaai, Vermaaklikheid and Witsands (western extent), with Stilbaai being the "centre" of the fishery in the region (Figure 3a and 3b). They are located within a 155 km stretch of coastline on the Southern Cape coastal region of South Africa.

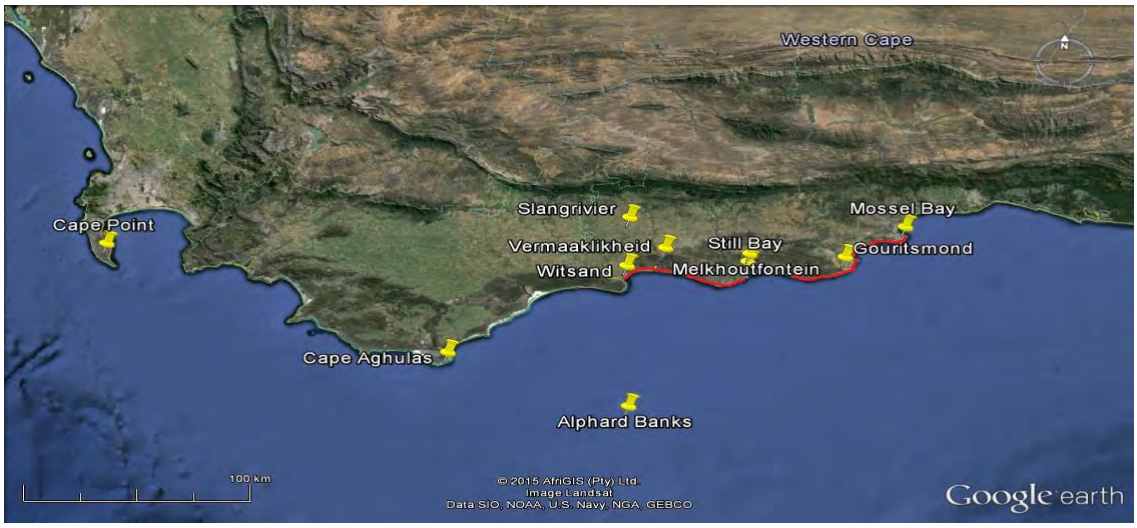

Figure 3a: Map depicting research area in the southern Cape (Google Earth, 5 February 2015).

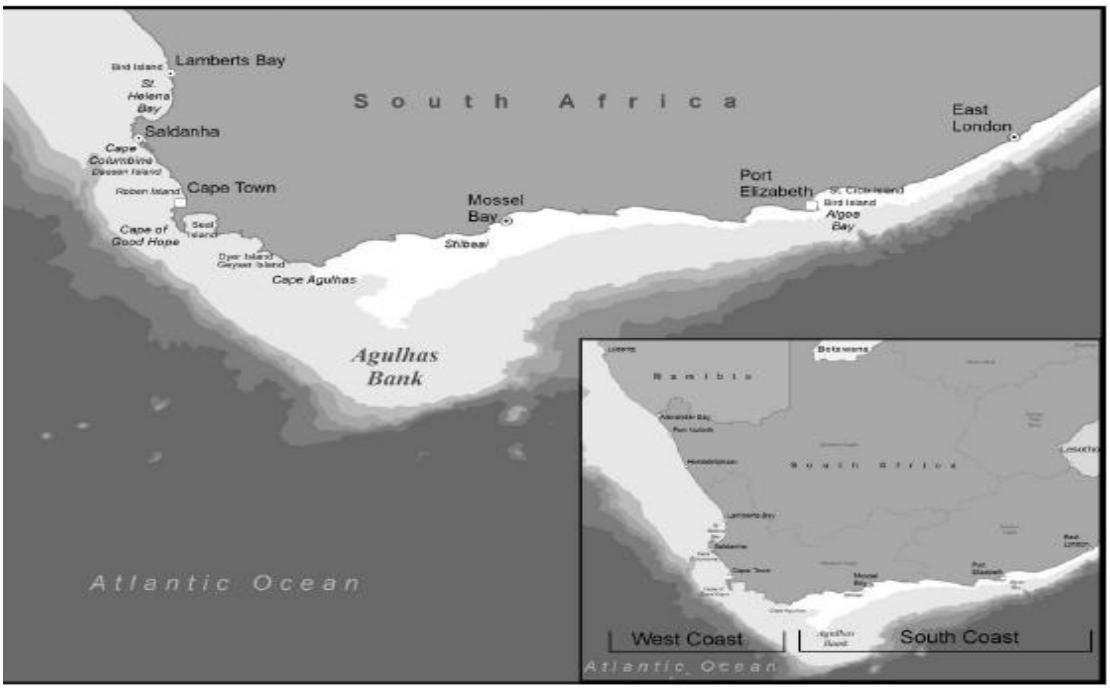

Figure 3b: Map of southern Africa showing the key geographic localities mentioned in the text (adopted from Shannon et al., 2010).

A total number of 50 participants were interviewed. This comprised 16 one-on-one semi-structured interviews, eight smaller group interviews (between two and four participants) and one larger focus group with 15 participants. The 50 participants consisted of skippers and boat owners, crew members, members from associated industry (such as local fishmongers and fishing company representatives) as well as spouses or partners (Figures 4 and 5). The sample size is approximately 30% of the total number of possible participants from the area. The number of possible participants, 150, was derived from data obtained from DAFF regarding active fishing rights for 2011.

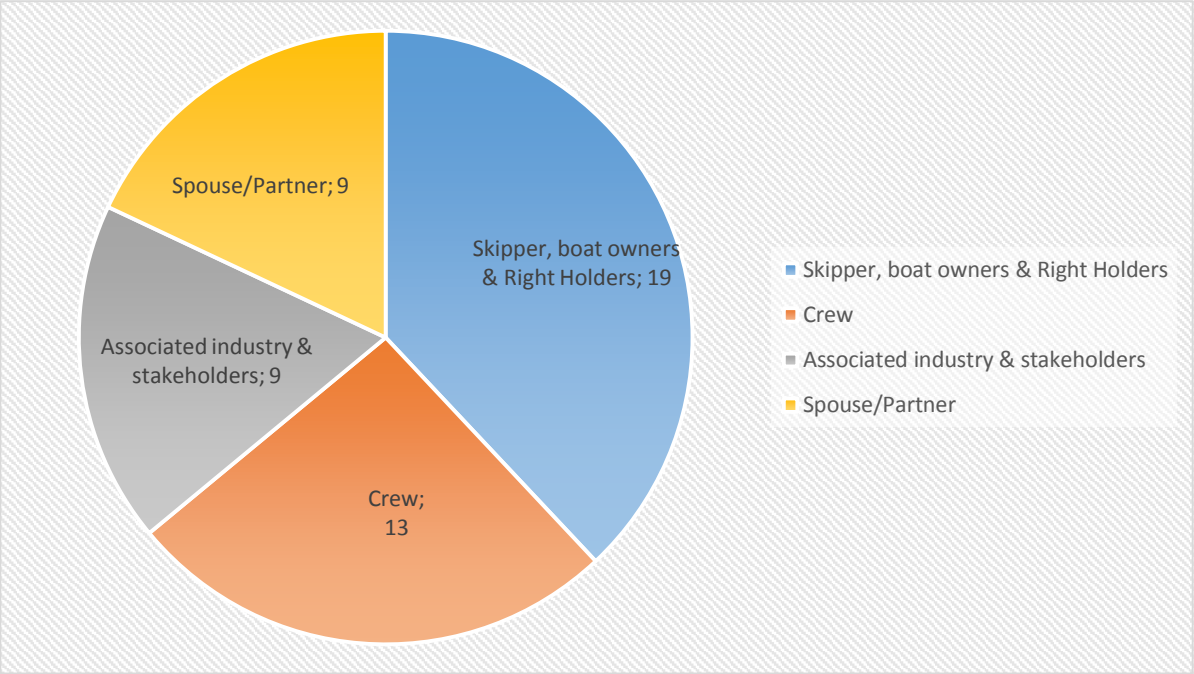

Figure 4: Composition of the total group of participants

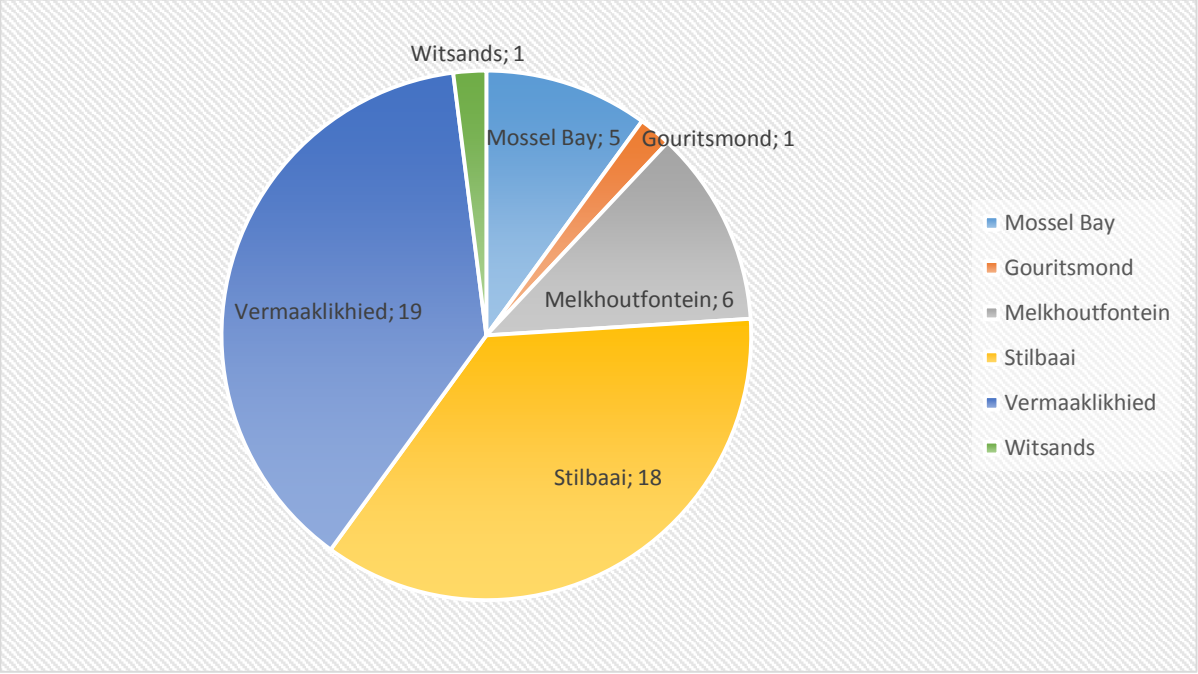

Figure 5: Composition of participants per community

Whilst every care was taken to ensure the even distribution of participants in terms of role and geographic location, this was not attainable. This uneven distribution was not seen as a hindrance as the responses by participants were consistent

throughout the research. Many skippers/boat owners and right holders effectively functioned as gatekeepers, thereby limiting and exercising tight control over access to their crew. This, along with other factors such as the stereotype that many in the area hold of scientists, possible gender bias, and a natural distrust of “outsiders” made it difficult to approach the community members who function as crew. Crew members are, however, much more mobile within the sector than the other roles and thus many (according to the majority of the participants) were not present in the area at the time of the research. These crew members were engaged in other areas and activities at that time (such as crewing on snoek boats on the West Coast as well as on yellowtail boats in Struisbaai).

The availability of the participants largely dictated the times during which the interviews were conducted as well as their duration and format. The goal was to make sure that participants were comfortable to engage with difficult, emotional, and sensitive issues. Open-ended questions were asked so that participants could select the path that the discussion would follow and to ensure the authenticity of the concept of participant-led research. Interviews and discussions were recorded where participants gave permission and were later transcribed. Anonymity was guaranteed to all participants and every care has been taken to protect their identity.

3.2. What do the fishers say?

The fishery in this area has not had a productive and financially lucrative fishing season for the last four to five years as the fishers have simply not been able to find and harvest the primary target species, Kob, in quantities that provide financial sustainability. Participants regard Kob as their most (and by some, the only) economically viable and sustainable target species and whilst other species such as

Silvers[21] (*Agyrozona agyrozona*), red fish (such as Red Roman, *Chrysoblephus laticeps*) and sharks are targeted in the absence of Kob, these are not seen to be adequately profitable or conducive to long-term sustainability of their livelihoods. Harvesting of these alternative species is seen as a way to keep things "ticking over" as the high value red fish are scarce and fishers have to travel approximately 30 km offshore to catch the relatively low value (but nevertheless overexploited) Silvers. Participants have also indicated that there has been a large attrition rate for fishers in the region over the last five to ten years with only a fraction remaining active.

Fishers attribute the recent scarcity of the resource as well as difficulties experienced within their fishery to various factors. These include climate variability (mostly SST and changes in prevailing wind conditions), prevailing economic conditions (in regional and national contexts), socio-economic conditions (including low education levels, low skills levels, poverty cycles) as well as fishing pressure exerted by their own and other fishing sectors, with specific reference to fishing methods, most notably the inshore trawl industry, which take kob as bycatch.

The remainder of the chapter is divided into three main sections and present data obtained from the interview process. The first section deals with the responses recorded in response to the question "what are those things that make it difficult for you to be successful as a fisherman?"

[21] Also known commonly as Carpenter.

3.2.1 Stressors

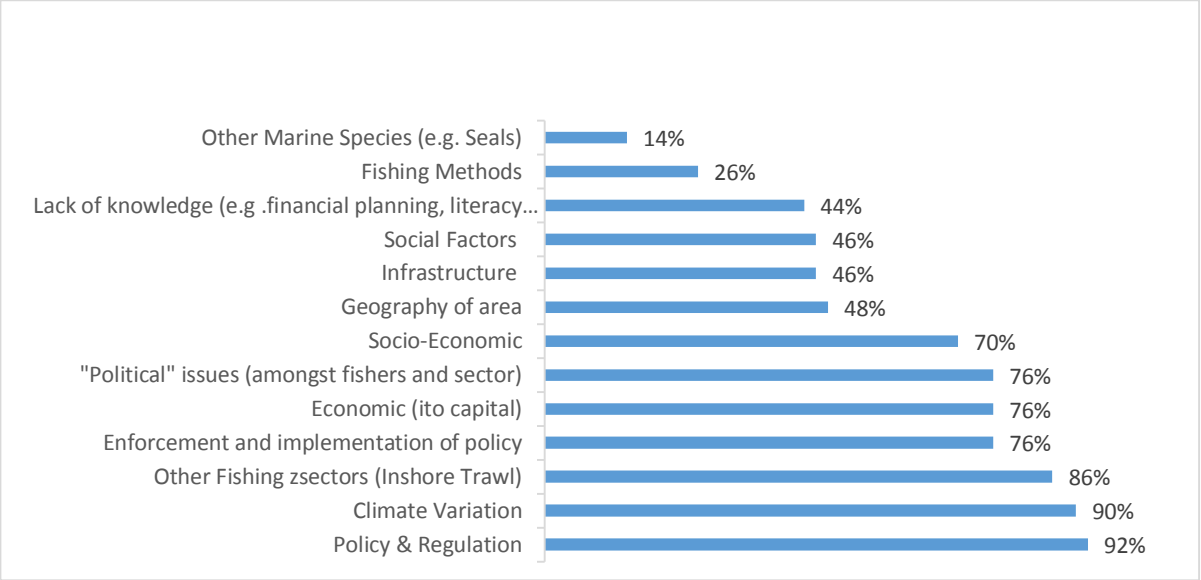

Figure 6: Stressors identified by participants

Three major groupings of stressors have been identified: the first group includes stressors that have been mentioned by more than 80% of participants and consists of policy and regulation, changes in the natural environment and impact of the inshore trawl fishery on the local handline fishery. The second group comprises stressors that were mentioned by fewer than 80% but more than 50% of respondents and include stressors such as the enforcement and implementation of policy, economic factors, and "political" issues amongst fishers. These were mentioned by about 75% of the participants. The last stressor in the group, socio-economic conditions was mentioned by two-thirds of the participants. The last group consists of stressors that can be seen as less important to the fishers, as less than 50% of participants mentioned them. These include the geography of the local area, infrastructure, social factors, lack of knowledge (in terms of financial planning), fishing methods (such as the practice of *riemhou*)[22] and the impact made by seals and sharks. It must be noted that some of

[22]" R*iemhou*" is a fishing technique used where the boat is not anchored, but instead "follows the fish" by keeping the engines running in low revolutions to ensure forward motion and continual manoeuvrability so that the boat stays thereby increasing the odds of catching them (see Duggan et al ,2014 for a more detailed description).

these “smaller” stressors have a strong association with place and thus a large percentage of participants residing in a particular location may have answered positively with no repetition of the stressor between places. Statistics of the stressors by place are included in the Appendix.

3.2.2.1. “Major” stressors

Changes in the natural environment

“Die weer patroon het baie verander, dis die een ding wat ek kan agterkom. Die weer wat ons gewoonlik in June, Julie en Augustus kry, die weer wat ons nou gehad het was basies die teenoorgestelde van daardie tyd. Nou Augustus maand begin die Suid weste weer eers. Die patroon van die weer het verander.”[23]

- *Skipper, Melkhoutfontein (2013)*

“Die afgelope 3/4 jaar het die weer heeltemal verander. Die weer patroon is nie soos gewoonlik nie. Nou kry jy in die somer maande die Weste weer. Die afgelope tyd het ons maar gesien die hitte. Kyk ons kry baie warmer dae as wat ons voorheen gekry het.”[24]

- *Skipper, Stilbaai (2013)*

“Say in the last seven – eight years we have had a lot colder water where in the winter your temperature will be 12-14 degrees and in the summer months it goes to 19 degrees. But with all the thermoclines we have had in the past it is pretty cold on the bottom. The last two years we have seen a definite climb in the water temperature. So the water was 15-16 degrees and then in the summer it got to 20-21. In the last year, we had 17-18 degrees in the water and it is already now 21 degrees. So for that you need different conditions, so you need a lot more westerly weather. When the water is incredibly warm you need the South Easter to blow to cool the water down, and it has only been blowing in bits

[23] "The weather pattern has changed a lot, that's the one thing that I can tell. The weather we normally (have) in June, July and August (and the) the weather we (have just) had was basically the opposite of that time. Now the south westerly’s begins in the month of August. The pattern of the weather has changed.

[24] "The last 3/4 years, the weather changed completely. The weather pattern is not as usual. Now you get the westerly weather in the summer again. The last time we have seen the heat. Look, we get more hot days than we previously received. "

and pieces. But we have had predominately Westerly weather which is good for later in the season. It seems that we could have good fish in March."

- *Skipper, Mossel Bay (2013)*

Change in the natural environment, and more specifically observed weather and climate, was identified as a stressor by 90% of participants. The fishers regard it as the stressor that has the most direct impact on their ability to carry on with day-to-day fishing activities. The weather/climate stressor has two main facets - firstly, the more direct impact that daily weather conditions have on the ability of fishers to proceed to sea and secondly, the longer term impact that climate fluctuation (whether cyclic or anthropogenic in nature) has on the overall conditions in terms of SST, winds, currents and rainfall.

Prevailing wind conditions (and general longer-term trends) have a direct influence on sea state and participants have noted a decrease in available sea days per month. In Mossel Bay and Stilbaai where more formal infrastructure is in place, harbour with a breakwater, the impact of sea state on day-to-day operations is somewhat diminished. Fishers are required to enter open seawater through the river mouth in all the other towns in the research area. The prevailing sea state and wind conditions have a large impact on river mouth conditions and it is often dangerous for fishers to navigate these waters in order to go fishing. In these towns, participants have indicated that lack of infrastructure exacerbates the weather component and impacts more severely on available sea days.

Fishers maintain that in order for the Kob to migrate inshore at the start of the spring season, where they are reported to spawn, certain prevailing conditions are needed, which would normally start in September. Fishers also highlight that weather

(and accompanying water temperature fluctuations) has direct bearing on the behaviour of the fish. In general, fishers observe that wind direction and prevalence has shifted recently. The exact time frame attributed to the "most recent" past differs from person to person with the consensus, in the cases where exact time frames have been described, being that changes observed have been most notable in the last four to five years. Wind direction (SE vs SW) and changes in the seawater temperature seem to influence the abundance of fish in a specific area, a fact mostly mentioned in reference to the Stilbaai/Vermaaklikheid area. The amount of rainfall received, whether high or low, also has perceived impacts on the availability of fish where, apart from Mossel Bay, all towns in the area are situated on or near a river estuary. This seems particularly true in terms of Witsand where the participant specifically indicated that he has noticed a general link between rainfall and fish prevalence in his area of operation and specifically mentioned that fish did not seem to bite after periods of heavy rains.

Many attribute the unusual weather to anthropogenic climate change. In opposition to this, there are some of the more veteran participants who have indicated that climate has a cyclic nature, that there have previously been years in which the fishing was as bad as it is now and that the situation will stabilise once the climate moves out of its current cycle. Notably, there seems to be no consensus in terms of whether it is cyclic variability or unidirectional change, although many fishers have also indicated that the fishing has never ever been this bad, whilst attributing it to the "weird" weather experienced in the last four to five years.

In addition to atmospheric weather conditions and fluctuations, many participants have noticed a marked rise in water temperature in recent years,

particularly in 2013. In addition to this, some participants have noticed that the Kob do not seem to respond well to increased water temperature as it seems to make the fish “lazy” and not “in the mood” to eat.

Policy & regulation (including enforcement and implementation)

“Nou wil ek weet hoekom gee hulle nie vir ons ’n harder lisensie vir winter nie. Dat ons dit kan verkoop. Sodat as jy nie vanaand geld maak nie dan eet jy darem nogsteeds. Ons het al vantevore aansoek gedoen, maar dis afgekeur” [25]

- *Vermaaklikheid focus group (2013)*

“Eerstens die mense is Afrikaans hier, en die vorms is Engels. En ek moes met hulle sit en die vorms invul vir die aansoek vir ’n permit en die goed wat die mense nie verstaan nie. En voel dat hulle maak dit so onmoontlik vir die arme plaaslike mense, te ingewikkeld vir die mense vir die ou wat die permit probeer kry, want daar is niemand wat deur die vorm met hulle hardloop nie.”[26]

- *Spouse, Vermaaklikheid (2013)*

Participants identified policy and regulation as a major stressor with 92% of the participants indicating a positive response thereby making it the factor that may pose the biggest challenge to fishers (based on their perception). The fishery in the region falls into management area B, Cape Infanta to Port St Johns. Fishers are thus not permitted to travel South West to go fish for other linefish species in the more productive waters of the Western Cape, as this area falls into a different management zone. Even if they are able to do so, as in the case of snoek, it is not seen as an economically viable option. In addition, the length of a ski-boat may not exceed 10 m and boat size plays a role in limiting the range that they are able to travel at sea in

[25] "Now I want to know why they did not give us a harder license (to use) in winter. That we can sell. Therefore, if you do not make any money tonight then at least you can still eat. We have previously applied, but it was declined”.

[26] "First, the people here are Afrikaans, and the forms are (in) English. And I had to sit with them and filling out forms for the application for a permit and the things that people do not understand. I feel that they make it so impossible for poor local people, too complex for the people; for the guy who tries to get the permit because there is no one to run through the forms with them."

order to reach target species such as Silvers. The fishers in Mossel Bay have managed to circumvent this problem somewhat by upgrading to larger deck boats instead of the (faster) ski boats, discussed in more detail in Chapter 5.

The implementation and enforcement of policies are also named as playing a large part in creating uncertainty within the sector. The majority of participants indicated that communication from "the Department"[27] was insufficient and at some times, completely non-existent. They furthermore indicated that their thoughts and opinions about matters were never solicited, and by implication not taken into account. There are also specific communities that feel particularly marginalised by DAFF. Participants in Vermaaklikheid told me that meetings (such as roadshows) are always held in Melkhoutfontein and that they are never informed timeously about these meetings.

An additional frustration mentioned by my research participants with DAFF is the bureaucracy associated with securing rights to fish commercially. The research took place in the midst of the new fishing rights application cycle[28] and the last interviews were conducted when adjudication had already taken place. At the start of the study, there was much scepticism regarding the practicalities of the process as it was, seemingly, initiated late by DAFF. Skippers, although uncertain to an extent, were tentatively confident that their current rights would be reallocated. However, the application process itself caused much discontent, as it was laborious and some fishers, especially those with a lower literacy level, were uncertain of how to complete the forms. This was particularly true for participants from Melkhoutfontein and

[27] Fishers tend to refer to the Department of Forestry and Fisheries (DAFF), fisheries branch as "the Department" or its previous name, "MCM" in the conversational context.

[28] Commonly referred to as FRAP 2013

Vermaaklikheid. The forms which were in most cases only available in English and not the predominantly spoken Afrikaans, were also not seen as user-friendly and did not consider varying literacy levels. Limited guidance was provided in order to facilitate the completion of documentation and communication regarding the process was deemed inadequate. Another source of frustration was that the department did not have staff to assist and provide guidance in the towns where they live. Instead, if they required such guidance, they would have had to travel to either Mossel Bay or Cape Town and many of the applicants, in particular, those from Vermaaklikheid were unable to travel due to lack of funds and/or transport.[29]

Although participants indicated knowledge of the new Small-Scale Commercial Fisheries Policy[30] (SSFP), participants indicated that they had very little knowledge and insight into the purpose and details of the policy. Several participants, particularly those from Melkhoutfontein and Vermaaklikheid, carry some sort of knowledge about proposed community quotas that may come into effect after the SSFP has been implemented. Information regarding the SSFP its goals were distributed to those community members that attended a meeting in Knysna in the first half of 2013, but participants were not able to provide an exact date on which this meeting took place. The few participants that did attend the meeting seemed unable (or unwilling) to share details about discussions emanating from it. They did however indicate that many questions regarding implementation of the SSFP remain unanswered or unclear, as this information was not clearly communicated in the meeting. It is noteworthy that participants who reside in Melkhoutfontein do not think that community quotas are a

[29] The outcome of the allocation process was (contrary to promulgated policies) only disseminated to fishers on the evening of 31 December 2013, with many getting notice of termination of allocation, a mere two hours before such termination took place.

[30] No 474 of Jun 2012

feasible option as a fishery co-op that was previously established within the community had failed and now is completely defunct. Exactly what transpired is not clear, but there are many allegations of mismanagement and financial misconduct that have been levelled at various role players.

Impact of inshore trawl fishing sector

"Wanneer hulle sleep; sleep hulle kabeljou, soles, stokvis en al daai goed. Die kabeljoutjies bly dan dood agter. So help hulle uitroei."[31]

- *Skipper, Melkhoutfontein (2013)*

"What's been happening in the past because of the bad sole and hake industry inshore, the trawlers have been instructed by their owners to target bycatch and that bycatch is 99% line fish which the trawling industry is targeting and has always targeted. So they are wiping out the stocks before the fish can come to spawn, and that is one of our major problems".

- *Skipper, Mossel Bay (2014)*

The inshore trawl industry that operates in the area was been mentioned as a stressor by 86% of participants. In this region, the handline and inshore trawl sectors overlap even though their target species differ. Although the inshore trawl fishery is able to land kob as by-catch, the landing of by-catch is currently not sufficiently regulated. Agulhas Sole (*Austroglossus pectoralis*) catches have not been good in the recent past (and have not been for some time) and the handline fishers allege that, as an alternative, these trawlers are effectively catching large parts of the kob population before they can migrate to the inner reefs, where they are targeted by the handline fishers. Participants voiced much concern regarding the alleged illegal dumping of bycatch by the trawlers. Additionally, the fact that they trawl in between

[31] "When they trawl, they trawl Kob, Sole, Hake and all that stuff. The small Kob remains behind, dead. So they help wipe them out."

the reefs where they operate and the impact of the trawling method on the reef habitat and the fish population (with no way to regulate the size of the catch that is landed) was also flagged as an important component to this stressor. Other allegations include the practice of “double bagging” the trawl net (to decrease the net size) and trawling “in tandem’ to increase the swath of the nets/trawl. Trawlers also attract seals during hauling (due to discards) and seal behaviour and abundance are a huge concern for the handliners. The participants believe that handline fishing is more environmentally friendly as they are able to employ catch and release methods as opposed to trawlers that frequently land juvenile fish.

3.2.1.2. “Mid-range” stressors

Economic & Socio-economic factors

“Die petrol prys ook vreeslik gestyg en dit veroorsaak nou dat ons onkostes baie hoër is as in die verlede. Die aas wat ons moet aankoop raak ook net al hoe duurder, en kwaliteit swakker. Dan kry ons glad nie 'n goeie prys vir die vis nie. Jy kan by die hawe gaan kyk waar hul vis verkoop, hul verkoop dit vir R75 en ons kry net R32 per kilo, ek praat nie eers van die ander spesie soorte nie. Dit is regtig 'n skande waarmee ons tevrede moet wees.

Dan kos dit ook baie geld om die boot in stand te hou, kort kort is daar iets fout. Dan betaal ons 'n hele paar duisend op verskeie permitte, lisensies, levies, survey, VMS maandelikse gelde, hawegeld, ens. en dit moet betaal word al kan jy nie op die see kom om vis te vang nie. Die boot eienaar het baie meer onkostes as die vissermanne self. Dit beloop duisende Rande per jaar.

Ek kan een voorbeeld noem. Vir die 8 dae wat die vissermanne see toe was, het hul altesaam so R10 000 in lone verdien maar die booteienaar het 'n minus van so R5000. Dit

is erg hoor. Verlede belastingjaar was daar nie een maand wat ek geld gemaak het nie, ek moes elke keer inbetaal."[32]

- *Rights holder, Stilbaai (2014)*

"En die bote wat staan, staan; want daar is nie geld om die bote te koop nie."[33]

- *Crew, Melkhoutfontein (2013)*

Access to capital is another pertinent issue raised as it resonates throughout the research area and the various roles found within the sector. The majority (76%) of participants indicated this was an important stressor with the biggest positive response coming from the skipper and rights' holders (89%) and crew (100%) grouping. Significantly, two out of three participants in the spouses group also identified this factor. Participants cite the cost of fuel, bait (per box) and maintenance on gear as contributing factors that add significantly to pressures that are driving up the cost of living on a day-to-day basis. What is noteworthy is that fishers have indicated that whilst the input costs are constantly rising, the price of kob per kilo has, stayed the same over the last five years. The fishmongers, who buy the fish from the fishers and resell it with a considerable mark-up, determine the price of the fish; not the fishers, who carry the input costs. High start-up costs have also been cited as a large factor that make it difficult for new entrants (specifically from previously disadvantaged communities) to enter the fishery – gear (boat, outboard motors, safety equipment, GPS, fish finder, radio) require a large capital investment and most people

[8] Petrol prices also rose terribly and causes that our costs are far higher than in the past. The bait we buy is only becoming more and more expensive and the quality, poorer. Then we do not get a good price for the fish. You can go to the port and see where they sell fish, they sell it for R75 where we get R32 a kilo, I do not even speak of the other species varieties. It is really a shame what we have to be satisfied with.

It costs a lot of money to maintain a boat, something's constantly wrong. Then we pay a few thousand for several permits, licenses, Levy's, surveys, VMS monthly fees, port charges, etc., and these must be paid even if you cannot come to the beach to fish. The boat owner has much higher expenses than the crew does. This amounts to thousands of Rands per year.

I can name one example - for eight days the fishermen went to sea they earned R10 000 in wages altogether, but the boat owner has a minus of R5 000. It is bad. In the last fiscal year, there was not a month that I made money; I had paid in every time.

[33] And the boats that stand, stand. Because there is no money to buy the boats.

do not have access to the amount of capital required. Banks are, furthermore, not willing or able to extend loans as fishers struggle to earn a consistent income.

Eighty nine percent of the participants felt that prevailing socio-economic conditions (within the community and individuals) is a stressor in the regional fishing system. Importantly, most of these responses were recorded in Vermaaklikheid and Melkhoutfontein, which are the two previously disadvantaged communities in the study area where the legacy of the racial segregation of Apartheid still plays a large role in these two communities today. Many participants from these communities have indicated a reliance on government grants (disability/childcare grants) as well as spousal/partner income to survive when income derived from fishing is insufficient. It was furthermore stated that alternative employment opportunities are also scare and that many employers do not want to employ fishers, as they know that as soon as there is fish to be caught, the fishers will return to fishing and suddenly leave their employ. Another important factor (that contributed to the economic and socio-economic conditions) identified by participants, is the lack of financial planning skill levels. Many participants (in all roles and by their own admission) are in need of proper training and skills development in terms of how to manage money, plan for the future and, in the case of rights holders, run a small to medium enterprise.

Conflict and distrust amongst fishers that stem from political issues

"Ons leef elke dag langs mekaar maar ons leef elke dag mekaar verby".[34]

- *Skipper, Stilbaai (2013)*

[34] We live next to each other but we live past each other on a daily basis.

The “politics of the day” seems to play a large role in the region with many participants (mainly from Vermaaklikheid) complaining of racism within the community and sector within which they work. Political discussion mostly centred on the 2013 fishing rights and allocation process (FRAP 2013) as well as the implementation of the SSFP, with both these policies seeking to address inequalities created by Apartheid. When dealing with the FRAP 2013 (and the issues emanating from it), it must be borne in mind that 2014 was an election year and that government had to demonstrate that they were “doing the right thing” in terms of transformation. Many participants saw the balancing criteria and the subsequent weighting as a tool to give rights to previously disadvantaged members of the community in an effort to garner votes for the election. Some crew members interviewed also indicated that one only sees politicians addressing the issues and needs of fishers in their community when it comes to election time with some indicating a large amount of disillusionment with the status quo.

The implementation of the SSFP seems to place the focus on pre-identified previously disadvantaged communities and will result in fishers from these identified communities being included in the “community quota”. Participants were not clear on which communities were identified as well as the exact mechanism by which this will take place. Participants from “white” communities (such as Stilbaai) feel directly threatened by the SSFP as they assume that, due to the “politics” of the day and the drive to build a fishing sector more representative of race, they will be automatically excluded.

Notably, every single crew member that participated indicated that this conflict and distrust between fishers was a stressor in their opinion whilst only about three quarters of partners/spouses and the skippers group indicated the same.

3.2.1.3. Lower range stressors

Seals

"Die ander ding is dat daai trawlers lok massas en massas robbe, so selfs as die trawlers nie hierso is nie sukkel jy om die vis uit die water te kry - hulle eet vir jou op, hulle gee jou nie 'n kans om die vis uit die water te kry nie, want al daai robbe kom na jou toe wat by die trawlers gevoer word."[35]

- Skipper, Stilbaai (2013)

The Witsand and Mossel Bay participants have explicitly highlighted the role played by seals. Participants feel that their population numbers are out of control and that seals are overly destructive - they report that the seals catch the fish whilst on the hook and then just leave it after biting it once in addition to following the boats around. Although only 14% of the participants indicated that this was a problem in the various interviews, many more did acknowledge, in conversations on the side that seals may play some sort of role. Noteworthy is that, even in on the side conversations, fishers remained reticent to attribute specific blame to this stressor and merely regarding it as contributing factor to other, larger stressors.

[35] "The other thing is that those trawlers attract masses of seals, so even if the trawlers are not here you are struggling to get the fish out of the water - they eat from you, they do not give you a chance to get the fish out of the water, because all those seals that are normally fed by the trawlers come to you [when the trawlers are not there]".

Fishing methods and other impacts that result in habitat destruction

"Maar vandat hulle met die riemhou storie begin het is dit 'n gemors."[36]

- *Skipper, Stilbaai (2013)*

There are two overarching strategies employed by skippers when fishing – the practise of "*riemhou*" versus the practise of anchoring. When employing "riemhou" the boats motors are left running and the boat moves with the shoal of fish as they swim over the reef. Fishers who practise this method say they are able to optimise the amount of fish caught, as they are able to follow the fish. These participants maintain that the fish do not stay on the reef for the same long periods as in the past, and have exposed a belief that the shoals of fish are generally smaller. Those who chose to anchor their ski boats (the older and more traditional generation of skippers) say that the practise of "riemhou" disturbs the fish as the noise from the running outboard motor scares the fish away and makes them restless. Opponents to anchoring say that the anchors damage the reef. Whilst this is certainly a contentious issue amongst participants, only about one quarter formally indicated that this was a problem/stressor.

Infrastructure

Apart from the infrastructure to launch boats, other infrastructure problems mentioned included facilities ashore to store and process daily catches (that are controlled by fishers and not by other entities). The lack of facilities for the manufacturing and storage of ice is also a problem in Witsand where one participant noted that if he could proceed to sea with ice, he would do that because this would

[36] "But since they started Riemhou it is such a mess"

guarantee a better product. Infrastructure was not perceived to be a problem in some towns/places, with only 46% (23 respondents) of all participants indicating this as a problem. Importantly, those who responded positively to this question were from the towns of Vermaaklikheid, Witsand and Gouritsmond with 18 of the 23 positive responses emanating from Vermaaklikheid. This indicates that it is an extremely important stressor within this particular community.

Organisational factors

"Basies het ons ons komitee wat vir Stilbaai verteenwoordig dan gaan hulle af na Kaapstad toe, daar kom geen terugvoering na die vissermanne self nie, geen terugvoering.[37]

- *Skipper, Melkhoutfontein (2013)*

Ons het mos 'n forum gehad maar met die forum, al die geld het mos weg geraak. So toe val alles nou 'n bietjie plat want die mense wat glad nie geld gehad het nie ry skielik grand karre[38]

- *Skipper, Stilbaai (2013)*

Ons sit met 'n lyn vissers forum wat vir ons ook niks eintlik beteken nie. Want alles wat gebeur en alles wat hulle hoor bly tussen hulle en dit word nie gedeel nie. Ek kan nie onthou wanneer laas ons 'n vergadering gehou het nie" [39].

- *Skipper, Stilbaai (2013)*

The fishers themselves acknowledge that they are a generally distrustful body of people and that they do not always work well together as a whole. This seems to be exacerbated by the current situation of resource scarcity where the competition for available resources is steadily rising. When the study started, the fishers had no formal organisation or associations that were functioning efficiently in order to provide

[37] "Basically, we have our committee that represents Stilbaai then they go down to Cape Town, there is no feedback to the fishermen themselves, no feedback."

[38] "We did have a forum but all the money's gone. So that fell apart because people (in charge) who do not normally have money are all of a sudden driving new cars."

[39] We have a line fishers forum that does not mean anything (for us) because they keep everything they find out or are told and don't share it. I can't remember when last we had a meeting."

them with a platform to negotiate and voice concerns. When asked whether such formal associations would help strengthen their position, participants responded positively, but added that it would never happen because of the distrustful nature of the fishers and all the "internal" politics. Notably, although there was a general acknowledgement of this problem in side-line conversations, less than half of participants identified it as a stressor in the interviews. Most of these positive responses emanated from the "skippers" and "associated industry groups" with 58% and 56% respectively, identifying it as a stressor.

Geographical location of the town

"Ons is vêr weg. 35km is baie. As ons wil dorp toe gaan dan moet ons R300 betaal om tot in Riversdal te kom".[40]

- *Spouse, Vermaaklikheid (2013)*

"In Witsand self, wat ons groot problem is, ons moet deur die riviermond gaan, so ons is nie soos stilbaai wat 'n hawe het nie, so daar is heelwat dae wat die vis daar is maar die swel is groot so ons kan nie deur die mond kom nie."[41]

- *Skipper, Stilbaai (2013)*

The region, with the exception of Mossel Bay, maybe regarded as peri-urban and rural; the towns are geographically isolated and far apart. To this end, 48% of participants indicated geographical location/isolation as a stressor, and more notably, 85% of positive responses emanated from the crew group. This is significant because all but one of the interviewed crew live in Melkhoutfontein and Vermaaklikheid. In the case of Vermaaklikheid, the town is quite a distance away from any other town, with no tarred access road, public transport or any sort of infrastructure, such as a shop,

[40] "We are far away. 35 km is a lot. If we want to go to town then we have to pay R300 to get into Riversdale."

[41] "In Witsands, what our big problem is, is that we need to enter the sea via the river mouth, we do not have a bay or port like in Stilbaai, so there are many days that the fish there but the swell is big so we cannot exit through the mouth"

available to them. This places a lot of strain on community members as they struggle to go about their day-to-day existence. Whilst there is one community member that has access to a motor vehicle, he charges a large amount of money to take people to Riversdale to do shopping. A housing project, started years ago, is now defunct because the administrator allegedly misused the funds meant for the provision of housing. The participants also live quite a distance from the sea and access to the sea using the old path along the river has now been restricted by fencing that has been erected by farmers in the area and access to fish in the river itself has also been revoked by means of policy restrictions.

In the case of Witsands, the community where the crew live (Slangrivier) is some 30 minutes' drive away from Witsands, and thus the participant needs to spend two hours a day driving back and forth to fetch and drop his crew which leads to increased cost and loss of sea time.

3.3. Coping and adaptive strategies

Participants were asked to provide information on alternative activities that they employ in order to either cope or adapt to changes brought about by the stressors discussed above. An important factor that must be borne in mind throughout this discussion is that fishers are not allowed to have formal alternative sources of income as stipulated by their permit conditions, and, subsequently, fishers become more involved in the informal economy. Additionally, the range of economic activities that can be undertaken is, due to the nature of the area, limited, and the prevailing high unemployment naturally provides additional constraints on the possible employment opportunities. Almost all participants indicated that their spouses had some form of income, be it through formal or informal employment and that this

income contributes greatly to their daily survival. There was also a high dependence on the national social grant system by members of the communities, particularly those from Vermaaklikheid and Melkhoutfontein.

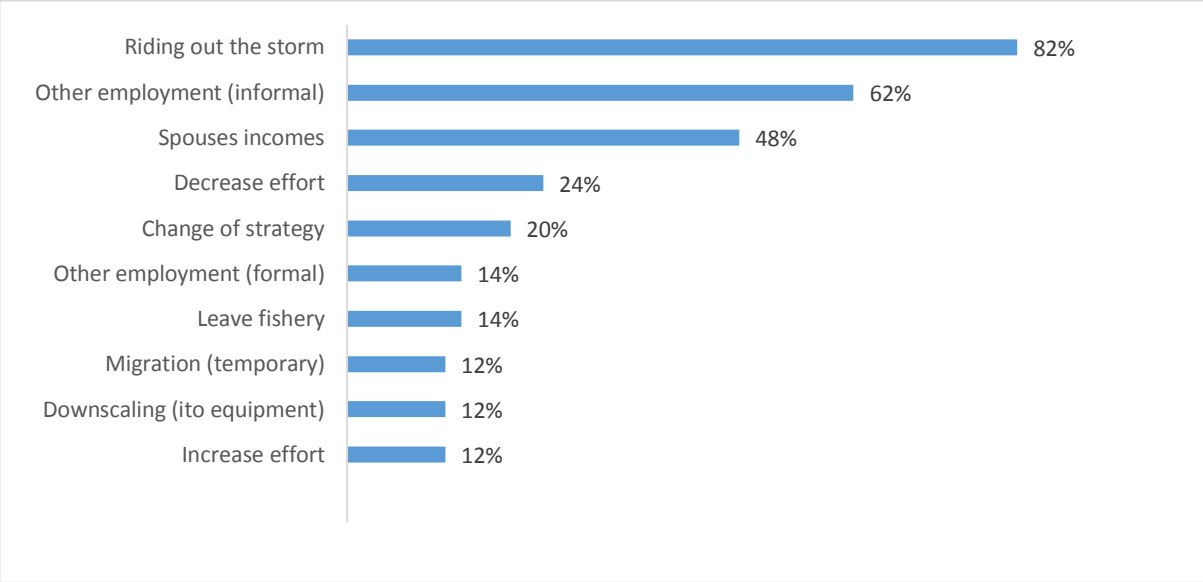

Figure 7 – Current coping and adaptation strategies in use

A wide range of strategies (Figure 7) is currently being employed by participants to change. The most prominent of these is "riding out the storm" with 82% of participants citing this as their primary coping strategy. Alternative, informal employment and spousal income were identified by 62% and 48% of the participants respectively, as other strategies in use. Other less prominent strategies, those mentioned by fewer than 25% of participants, include an increase or decrease in effort, change of strategy, temporary migration, downscaling, alternative formal employment and leaving the fishery.

"Riding out the storm"

82 % of the fishers who participated (especially in Stilbaai, Melkhoutfontein and Vermaaklikheid) seem intent on just employing the "riding out the storm' strategy

where they are just trying to get by on a day to day basis. Many of the participants in these three towns proceed to sea whenever the opportunity presents itself providing they have money for fuel and bait. If there is no Kob available in the area, alternative species such as Silvers, red fish and sharks are harvested. There is, however, a large associated cost to catching Silvers, although the fish have a relatively low value and limited market demand in South Africa. Sharks are also targeted, but this is also a low value product and fishers have noted that the abundance of the sharks caught for commercial gain also seems to be declining.

Increase and/or decrease in effort

"Ek is aan die gang, ek het n sisteem wat vir my werk. Daar is tye wat ek sal vier dae in n maand see toe gaan in plaas van 15 keer. Dit help nie dat jy elke dag see toe gaan nie." [42]

- *Skipper, Witsand (2014)*

Whilst the majority of the fishers seem to be trying to just maintain the status quo, a small portion (12%) are in fact, increasing their effort. This is accomplished by targeting the slower growing, territorial red fish in the absence of Kob whilst proceeding to sea at every possible opportunity.

In direct contrast to the fishers who increase their effort, 24% are actively decreasing their effort, only proceeding to sea on the days where they are certain that conditions are most conducive to landing a profitable catch. They rely on knowledge of local weather and sea conditions as well as feedback received from other fishers who have been at sea, to select the days on which to fish. The main idea is to

[42] "I'm on the go; I have a system that works for me. There are times I will have four days in a month that I go to sea instead of 15 times. It does not help to go to sea every day."

decrease wastage of limited resources such as petrol and bait. This strategy allows the fishers to stay engaged in the fishing industry whilst minimising some of the associated risk as long as the maintenance costs of the standing craft are limited. They deem this as an acceptable status quo as it enables them to keep on fishing. The ability to keep on fishing is very important as fishing is regarded by all as a way of life and not merely a job.

Other employment (formal and informal)

"Ons as vissermanne mag nie 'n ander inkomste inkry nie, maar van hulle help maar by bouwerke, want hul weet as die vis weer loop kan hul steeds see toe gaan."[43]

- *Rights holder, Stilbaai (2013)*

"Sam[44] *himself did the spray jobs this year so we employed one or two guys this year to help us. We try when (or what is supposed to happen), when the fishing is good, we are supposed to pack away money. Literally, Sam ties his own boat up, um say from July to especially end of August. And that time he will do building and refurbishments. And then he will get his crew in to help with the fibre glassing and spraying and that is how it is actually supposed to work."*

- *Spouse, Stilbaai (2013)*

Very few fisher folk (only about 14% of participants in this study) seek alternative, formal employment. This is mainly because they have permit conditions to adhere to and that there is a general job scarcity within the economy. Many crew members have indicated that builders (one of the most common employment opportunity available in the area) do not really want to employ fishers as they are seen to be unreliable employees – as soon as the "fish begin to bite" the fishers will be gone and the builders will need to recruit more workers. In the case of participants from the

[43] "We as fishermen may not have other income, but some fishermen help with construction projects because they know if there is fish to be caught, they can go to sea".

[44] Name changes to protect identity of participant.

more affluent towns (Mossel Bay, Stilbaai, Witsands, Gouritsmond) many of the participants' spouses were employed thereby supplying the "steady" income to the household.

Most alternate employment opportunities are informal opportunities with 62% of participants using this strategy in conjunction with other strategies such as 'riding out the storm". The type of alternate opportunities available show a certain amount of variation. In the towns of Melkhoutfontein and Vermaaklikheid many crew members engage in wood gathering activities as well as informal garden maintenance work. Garden maintenance work is more readily available as an option to participants that live in Melkhoutfontein, as they are much closer (with easier access) to a larger town with more inhabitants and thus opportunities. Employment opportunities in Vermaaklikheid and Stilbaai arise in the holiday periods when holiday makers seek additional help.

Some of the participants in Stilbaai engage in a range of activities that draw on previous experience such as the maintenance of boats and trailers (for both fishers and the general public) and a panel beating service for vehicles. These fishers tend to employ their crew when they require assistance.

Spousal income

"…most of the woman have a sort of a job. Most of them."

- Skipper, Vermaaklikheid (2014)

Spousal income forms a large part of the strategies employed by the participants with 48% indicating that this is relevant to them. This is however, an underestimation of the significance of this strategy as most rely on some sort of

spousal income as support even if it is not a planned or acknowledged strategy. Spousal income, whether through formal and informal employment, is more stable and consistent and if it were not for that, many fishers in the current climate would most probably be forced to leave the fishery. Many spouses in the town of Vermaaklikheid and Melkhoutfontein engage in informal employment as domestic workers and with some also being eligible for government social grants, whilst spouses from Mossel Bay, Stilbaai and Witsand seem to be engaged in more formal employment or the management of their own small business enterprise.

Migration (temporary)

"Die ding is so, as die vis swak raak, dan vat die visserman sy mandjie en hy gaan Mosselbaai toe of hy gaan Knysna toe, so daai ou is nooit gebind op die boot nie, verstaan jy, as dit sleg raak dan stap hy aan."[45]

- *Skipper, Witsand (2014)*

Fishers are able to travel to Cape Town to catch snoek (*Thyrsites atun*) in the winter when there is no kob in their own region[46]. It must also be borne in mind that crew members are much more transient than the rights holders and skippers and are able to move between areas to crew on different boats. However, most participants indicated an unwillingness to employ this strategy as it is not necessarily financially viable; less than one eighth of all participants indicates that this is a strategy that they employ or are willing to employ. This is mainly because of additional costs incurred – not only must the household and family at home be maintained, but also the fishers are required to find accommodation and buy food where they are fishing. Snoek is a

[45] "The thing is that as the fish becomes scarce, then the fisherman takes his basket and he goes to Mossel Bay or Knysna , so that guy is not tied to the boat, you understand, if it gets bad then he walks. "

[46] Permit condition for the hake handline allows the right holder to target Hake in the area bounded by Cape Infanta and Port Alfred. Additionally, hake handline right holders are permitted to target Snoek in the area bounded by Port Nolloth and Cape Recife. Prior to FRAP 2013, all traditional linefishery rights holders in the research are were also allocated a hake handline right.

high quantity, low value fish and the money made by migrating temporarily to catch it is not viable for most participants. Participants also indicated that an unwillingness to migrate temporarily simply because of a sense of wanting to be "home".

Leave Fishery

"Finansiering is die grootste rede in die hele bedryf. (Dit kos net te veel geld) as die staat net, al gee hulle vir jou 50c goedkoper op brandstof dan maak dit 'n man se lewe baie makliker. En dit is eintlik die grootste ding. Die Finansiering. Want niemand het geld vandag om see te toe te gaan nie". [47]

- *Skipper, Stilbaai (2013)*

Three of the participants had opted to leave the fishery to pursue other careers due to the resource decline. An additional five participants indicated that leaving the fishery was an option that they were willing to consider and pursue. Whilst it was not possible to speak to many of the fishers who had already left the fishery, all indications were that it became too difficult to make ends meet. One indicated that he had forecast the decline to an extent and indicated that he wanted to engage in activities that would be more sustainable, such as running fishing charters.

Change of fishing strategy

"We have had to change our way of fishing, the ski boat's running costs are ridiculously high (as we know), and the brunt of us are onto deck boats, which are tied up in the harbour and currently we are fishing 81 nautical miles out on the Alphard banks because that is the only place that we can edge out a living,.."

- *Skipper, Mossel Bay (2014)*

[47] "Financing is the main reason [for choosing to exit the fishery] in the entire industry. It just costs too much money. If only the state could subsidise the fuel, even if only by 50c, it would make a man's life much easier. And this is really the biggest thing. Financing. No one has money today to go to sea."

In contrast to trying to "ride out the storm", 20% of participants indicated that they have made more long term, permanent changes to the way that they fish in order to achieve long-term sustainability within the sector. This was particularly true in the case of the fishers who operate from Mossel Bay, where everyone had indicated that long term and permanent changes of their fishing strategy has been effected. This has mainly been possible due to a change in craft: 4 out of the 5 participants in this area operate deck boats instead of ski boats. This increases their range, the amount of days that they can spend at sea and allows them to make use of a subsidy offered for diesel by government, thereby limiting fuel costs. In terms of the increase in range, they are now able to fish from fishing grounds (such as the Alphard banks) that were previously inaccessible to them. Although there are accounts of outboard driven ski boats, being towed to the banks, fishing there and then returning on their own steam, this poses huge safety risks. Deck boats are also able to withstand more adverse weather and sea conditions as opposed to a ski boat and with fishers' accounts of fewer "sea days" being available as opposed to previous years; this gives these fishers a large advantage. Another participant from this area operates a ski boat (as opposed to a deck boat) that has an inboard diesel engine thereby ensuring that he limits his fuel and to a certain extent, engine maintenance costs. Naturally, there are disadvantages to operating a deck boat or diesel-driven ski boat instead of a ski boat with an outboard motor, the biggest being that they cannot travel at the high speeds of ski boats.

Downscaling

"Sê nou ek vang 50 kg met 'n klein skuit en ek vang 50kg op die groot skuit dan beteken dit dat ek nie geld maak op die groot skuit nie."[48]

- *Skipper, Melkhoutfontein (2014)*

[48] "Suppose I catch 50 kg with a small boat and I caught 50 kg on the big boat then it means that I do not make money when I use the big boat "

Large boats with big outboards can go faster and further, but the running and associated maintenance costs place a burden on the boat owner. This burden has been counteracted by a small fraction of the participants (11%) who have opted to buy and operate smaller boats and engines. Although their range, amount of catch that can be landed and crew carried is greatly decreased, they are able to curb fuel and maintenance costs as well as capital costs if they need to replace an engine.

3.3.1 Possible future strategies

In order to round off the discussions, participants were asked to identify areas where they thought things could be changed or put in place to improve their circumstances and livelihoods. Notably, as fishers believe that fish stocks and thus the status quo will return to normal, apart from fishers that had already abandoned the fishery, not many had given much thought to options outside the fishery and getting information required much prompting. The most significant answers were concerned with issues of policy and regulation and included suggestions such as increasing the number of species that may be harvested for commercial gain, re-defining their areas of operation, and halting the inshore trawl industry in the area. Other alternatives that were discussed included aquaculture, marketing and distributing their fish themselves (thereby cutting out the middle man) and the development of harbour areas to include small businesses (such as a fish and chips shop) run by fishers or spouses/partners. It must be stressed that the answers provided from the participants were, as with the current strategies, likely constrained by permit conditions. As an example, capitalising on the tourist season by providing charters may be a viable option, but current permit conditions do not allow it, so it is not considered as a viable option. Additionally, current adaptive options available to the fishers are at this stage severely constrained

by prevailing economic conditions in general, the inability to access capital investment needed for some of the larger projects as well as policy and regulatory issues and education and skill levels of fishers in general.

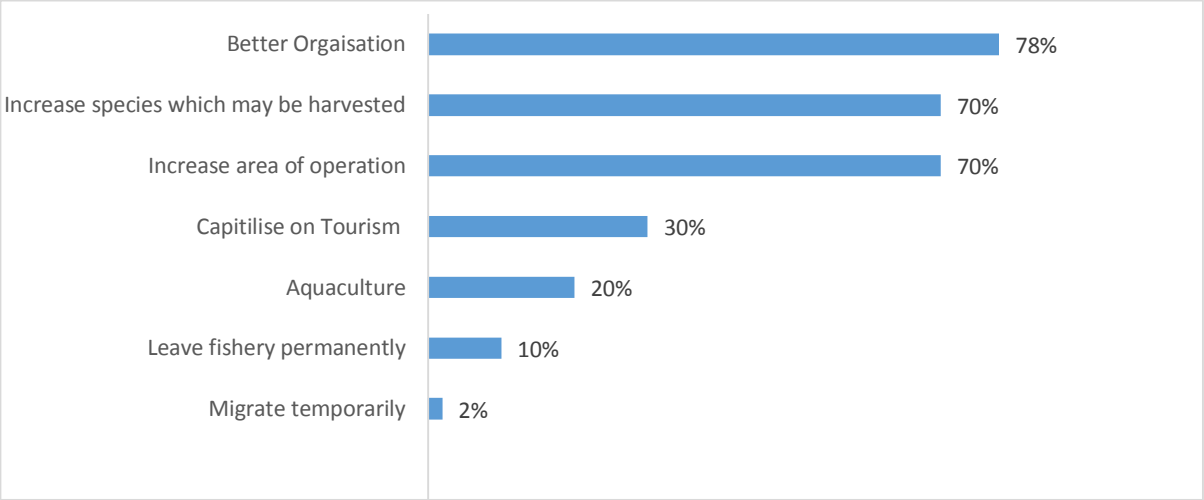

Figure 8 – Possible future coping and adaptation strategies that may be considered.

Participants were asked to provide possible future strategies that may be considered viable for future implementation (Figure 8). Categories identified emerged because of coding of interview data. Better organisation (and the ensuing benefits) amongst the fishers themselves was considered by 78% as the most prominent future strategy. Increasing the number of species that are permitted for harvesting as well as an increase in the area of operation (both via adjustments to policy) was mentioned by 70% of participants. Other less frequently mentioned future strategies include aquaculture, temporary migration, and leaving the fishery permanently. Capitalising on tourism was seen to be a viable future strategy in places that have a strong tourism industry (e.g. Stilbaai) indicating a strong variation among place.

Better organisation amongst the fishing community

"My long term goal is to seriously try and get a cool room, a blast freezer and market my own fish"

- *Skipper, Mossel Bay (2014)*

"… it has never been necessary to have a strong association, we [the association] never even needed a bank account until last week."

- *Skipper, Mossel Bay (2014)*

The handline fishers of the region have historically, not been formally organised in terms of associations. However, it is notable that even when the fishers' organisation is not perceived to work effectively, the need to organise was recognised, with 78% of participants identifying better organisation as a possible future strategy. The options explored and discussed in terms of future strategies and better organisation centred around the fact that better organisation will give the fishers more bargaining power (in terms of giving the fishers of this sector a voice when negotiating with other sectors and government). This may allow them to explore options regarding the marketing of their own fish in order to "cut out the middle man', thus allowing the fishers to benefit more directly from the sale of the fish. Whilst acknowledging the need for better cohesiveness as a community of fishers, many participants did express their doubt as to whether this type of engagement was possible in the long term, citing the stereotypical mistrust amongst fishers as the biggest barrier to such engagement.

Increase of the parameters that will allow for continued engagement in the fishery

"hulle kan nie vir by goed aansoek doen soos mossels of so (iets) nie, wat hulle bygee is die stok vis", …..." maar die ding is daar is nie stokvis nie en daar is nie kabeljou nie"…"nou dat dit swakker is nou kan jy darem mossel uithaal"[49]

- *Rights holder, Melkhoutfontein (2013)*

[49] they cannot apply for things like mussels or so (something), what they (the department) give is a hake license "....." but the thing is that there is no hake and no Kob "...." now if it (hake and Kob) is weaker, at least you can still go and get mussels [if you get a right]".

"As ek nou spesifiek na 'n plek kyk soos Arniston, dit is nie eintlik in die winter afhanklik van die vis vang self nie, want hulle gaan hengel, hulle vang een of twee galjoene of hulle haal oesters uit. Dit is 'n alternatief en dan kan jy ten minste die pot aan die gang hou…"[50]

- *Skipper, Melkhoutfontein (2013)*

"… ons area gebonde. Die vis loop in Struisbaai, ons mag nie vang nie. Ons gaan dood van die honger en hulle rol in die geld." [51]

- *Skipper, Melkhoutfontein (2013)*

"Aquaculture is 'n groot ding. Dit is die antwoord vir die kus op die oomblik."[52]

- *Participant, Gouritsmond (2013)*

Parameters that may be adjusted or expanded in terms of possible future strategies include increasing the number of species that may be harvested as well as an increase in the area of geographical area of operation (both requiring policy changes) and the possible future participation in aquaculture. Seventy percent of all participants have indicated that an amendment to the right conditions is needed so that a wider variety of species may be caught commercially. Participants also indicated that even an expansion of species for subsistence purposes would be helpful, as this will allow them to, at least, put "food on the table". Participants have raised their concern that the right to harvest species from the sub-tidal zone (such as Oysters) for commercial gain are given to "outsiders" who do not reside in the towns in the area. However, this contradicts participants' desire for an expansion of their area of operation into areas where they would be seen as "outsiders" *e.g.* overlap with places like Struisbaai (see below).

[50] "If I am specifically looking at a place like Arniston, it is not actually in the winter dependant on the fishing itself, because if they go fishing, they catch one or two galjoene or they collect oysters. It is an alternative and then you at least keep the food on the table."

[51] "... we are area bound. The fish are in Struisbaai, we may not catch it. We are dying of hunger and they are rolling in the money.

[52] Aquaculture is a big thing. It is the answer for the coast at the moment.

The increase in the number of species that may be harvested is strongly linked to a sentiment that the area of operation should be increased. Seventy percent of participants feel that they should be able to operate along a longer stretch of coast (especially further south-west) so that they could have the opportunity to harvest more species (they especially want to be able to travel to Struisbaai to catch Yellowtail (*Seriola lalandi)* when available). Twenty percent of the participants, from Gouritsmond, Stilbaai, and Melkhoutfontein, feel that aquaculture may provide a viable future option to supplement income whilst allowing the fishers to stay in the fishing sector albeit in a different form. In order to start and operate a fish farm, a large capital investment is required and many participants expressed a certain amount of scepticism regarding the start-up costs and skills needed to operate such a venture.

Capitalise on Tourism (e.g. development of harbour)

"Hul kan gerus die Stilbaai hawe opknap wat nou al vir baie jare so 'n seer oog is en soos jy noem dat die vissermanne voorkeur daaruit kan kry."[53]

- *Right's holder, Stilbaai (2014)*

The possibility and feasibility of capitalising on the tourist industry that exists in Stilbaai is one of the future adaptation strategies that came to the fore during the study with 30% of participants indicating that this could be considered a future option. Notably 50% of all participants from Stilbaai indicated that this is a possibility. Tourism is thus not seen as a viable option in towns that do not currently have a big tourist industry. During my study, the harbour in Stilbaai was severely underutilised, although subsequent to the interviews an upgrade of some of the facilities was undertaken at the beginning of 2014. The exact nature of the proposed upgrade was not known at

[53] They should renovate the Stilbaai harbour that has been for many years an eyesore and (as you mentioned) then the fishermen can get preference (for businesses).

the time that the research was conducted but the hope amongst participants was that the area could be developed further to include a fish shop run by fishers and their families in order to provide an alternative income during the holiday seasons. This also includes possibly running charter services for tourists (although this would need an amendment of permit conditions) and the direct marketing of fresh fish to the public.

Leave the fishery permanently

"Toe ek sien in wat se toestand die see bronne is, toe het ek dadelik opgehou. Toe het ek begin verander en charters gedoen en vis release."[54]

- Participant, Gouritsmond (2013)

Five of the participants interviewed, who are still actively participating in fishing activities are considering leaving the fishery. One of the spouses has indicated that she hopes her husband leaves the fishery and will encourage it, whilst two skippers who have recorded positive answers in this category have already left the fishery. These two fishers are engaging in other activities, one operates a fishing charter and has various other small business interest, whilst the other has launched a subsistence chicken farm with the assistance of a programme offered by the agricultural section of DAFF. It must be noted that some fishers admitted in more informal conversations that they might have no choice but to exercise this option in the future should the status quo not change drastically, but have made no mention of concrete plans for alternative income.

[54] "When I saw that in the state's ocean resources were in, I immediately stopped fishing. Then I started to change and started with charters done and catch and release fishing."

Migrate (temporarily to target alternative species in other areas)

"…ek sal snoek vang op die weskus. Maar dit is maar vir 2 of 3 maande van die jaar."[55]

- Skipper, Stilbaai (2013)

As mentioned previously, temporarily migrating to other areas is not a strategy that is considered as a viable present day strategy and very few fishers actually consider it, with only one participant of the entire group indicating a positive response. It must however be borne in mind that this excludes participants who already employ this strategy (see 2.2.5 above). People do not want to move away from their support structures and are worried about the cost implications, so this option seems to be (gauging from the responses) one of the last exercised and only if absolutely necessary.

This chapter provides an overview of data obtained from study participants as results from the interview process and offers unique insight into the day-to-day experiences of this group of people in the context of the small-scale commercial handline fishery. Analyses and discussions of the stressors identified by the fishers are included in Chapter 4 of this thesis whilst analyses and discussion of current adaptive strategies implemented is discussed in Chapter 5. It is, in the ensuing chapters, important to bear in mind that as this is participant-led research only those factors identified by fishers are included in the discussions.

[55] "…I'll be catching snoek on the West Coast, but it's only for 2 – 3 months of the year."

Chapter 4 - The difficulty of fishing as a livelihood in an ever-changing world

4.1 Vulnerability, multiple stressors, and scale

Vulnerability is a cross-cutting theme within the research on the human dimension of global environmental change (O'Brien et al., 2004). Whilst traditionally studied in isolation from other stressors, more recent vulnerability research has shown that stressors that give rise to vulnerability commonly encompass a wide range of factors, which include both micro- and macro level changes to social and environmental systems (O'Brien et al., 2004; Bunce et al., 2010). Changes at smaller scales, such as the household, may manifest as either gradual changes caused by stresses/stressors or sudden shocks/perturbations[56] (Bunce et al., 2010). Notably, stressors in an ecosystem may lead to an increase in vulnerability to external environmental variability (Garcia 2003).

Various studies of multiple stressors have highlighted the situational and contextual factors and the relative importance in the configuration of the local developmental environment (Reid & Vogel, 2006). The impact of responses to these stressors may be shaped and mediated by, according to Bunce et al. (2010), a "range of social, cultural, economic, technological, political and institutional factors" with previous studies emphasising that individuals are at any point in time affected by and responding to more than one, single-source stress . Whilst vulnerability can be (and has been) defined in various manners by various authors (Adger, 2006; Eakin & Luers, 2006; Füssel, 2006), studies that have been carried out in the African context have

[56] See glossary of terms and abbreviations

brought to the fore a need to conceptually capture the changing nature of risks (Devereux & Maxwell, 2001; Francis, 2002; Ziervogel & Calder, 2003). Additionally, contextual factors that influence these risks, the human capacity to respond, and the reason behind variation in how people respond to shocks and stressors needs to be captured (O'Brien et al., 2009). Studies conducted thus far in Southern Africa (Ziervogel and Calder, 2003; Eriksen et al., 2005; Reid and Vogel, 2006; Ziervogel et al., 2006; Eriksen and Silva, 2009) have shown that in terms of livelihoods, there are clear risks posed to social units that are unable to cope with multiple stressors, let alone adapt to them. The exposure to both single and multiple stressors is of real concern as food security is strongly influenced by factors such as political, economic, and social conditions, especially in developing countries such as South Africa (O'Brien et al., 2004). The interactions between stressors may have unexpected outcomes for both well-being and livelihoods and consequently, serious implications for efforts to reduce vulnerability. Furthermore, stressors and the interactions amongst them have the potential to remain hidden thereby spreading across various scales and leaving social units subject to the risk of double or even multiple exposure (O'Brien & Leichenko, 2000). This will result in the effect of a stressor being felt more than once through different pathways.

The development of an understanding of the exposure and sensitivity of stressors across scales, paired with effective action, may be key to reducing vulnerability in an effective manner. In order to provide due consideration to why people are affected by and unable to cope with stressors it is necessary to move beyond assessments of vulnerability that are based on processes and outcomes seen to be in a linear relationship (Bunce et al., 2010). Where traditional approaches focus on single, physical stresses that produce multiple outcomes, Turner et al. (2003) have

proposed a sustainability/vulnerability framework that seeks to analyse elements of a bounded system at a particular scale (Adger, 2006). This is done, as Cutter et al. (2008: 598) state, by using a "place-based approach to locate local vulnerability within the larger contexts that influence it". The framework proposed by Turner et al. (2003) maintains that there are certain elements that are integral to an extended vulnerability and sustainability assessment, which must be included in any vulnerability analysis seeking to advance sustainability. The first element of a vulnerability study as proposed by Turner et al. (2003:8075) is that of "multiple interacting perturbations and stressors/stresses and the sequencing of them". This element is echoed by Hjerpe and Glass (2012), who hold that the explicit recognition of multiple stressors and socio-economic stress is essential for successful adaptation planning and policy. This chapter seeks to address this first element by dealing with the stresses and perturbations (stresses) identified by the study participants.

The knowledge required for the frameworks discussed above and knowledge gathered as an consequence of implantation of these frameworks, coincides with requirements set by the successful implementation of EAF as the adoption of EAF requires that the scope of fisheries management is significantly broadened. In order to establish the required knowledge, it is necessary to develop an understanding of many areas - ranging from the impact of fisheries on the ecosystem, to social, economic and governance aspects of the system (Dörner et al., 2014). Furthermore, sustainability of the small-scale fisheries may also be difficult to achieve as policy implementation is complicated and data availability relatively poor (FAO, 2012). The absence of detailed climate models and social-ecological data for the local scale at which this research takes place is an example of this lack of data availability. The exploration of the local perceptions of multiple stressors as well as responses to them

provides insight into how communities conceive and respond to locally defined risks and stressors (Bunce et al., 2010).

4.2 Observed changes in the selected marine environment and coupled fishery system.

The first group of stressors[57] identified by participants speaks to changes that have been observed in the natural system (with specific relation to both the physical and biological environments), with 90% of participants identifying the observed variation within the natural system as a very important and pertinent stress. This may be attributed to the fact that whilst the observed changes occur at various temporal scales, daily impacts have been reported with a strong link between the ability to proceed to sea and the abundance and behaviour of target species in various areas of operation. Interview data suggest that no single driver of change is identifiable, but rather a collection of stressors that show a great amount of variation at both temporal and spatial scales. What is noteworthy is that the theme running through responses given by the participants is one of change; a system that seems to be in constant flux and variation that can pose a threat to the livelihoods of all participants in the small-scale commercial line fishery who operate in the area. This is in line with the definition of stress[58]. Such a slow, continuous stressor results in a consistent and slowly increasing pressure exerted on the system.

Human activities continue to cause changes to marine environments on both global and local scales (Perry et al., 2010; Hutchings et al., 2012). Coastal systems

[57] This group of stressors includes observed perceived changes and variation in daily weather patterns (including abnormal maximum atmospheric temperatures, abnormal and unseasonal prevailing wind conditions as well as rainfall patterns), sea state, sea temperature and Kob behaviour in terms of distribution and abundance. This variation and/or changes have been identified as a deviation from the norm was noted over varying temporal scales.

[58] See glossary of terms and abbreviations

are exposed to a plethora of human-facilitated pressures that are both climate and non-climate related. These will drive change over multiple spatial and temporal scales and affect not only the marine environment, but more profoundly, the communities that interact with it (Ommer and Team, 2007; Perry et al., 2010; Jarre et al., 2013; Mead et al., 2013). Large scale stressors globally that may be linked to climate change (in terms of the physical marine environment) include changes in ocean temperature (including SST), large scale circulation patterns, stratification and nutrient availability whilst non-climatic stressors globally, include phenomena such as ocean acidification, pollution, habitat alteration and destruction, coastal eutrophication, the spread of invasive species and fishing pressures. What is important to note is that it is difficult to predict how different habitats may respond to these stressors, especially at smaller, localised scales. While there are quantified data available on global scales for some of these stressors, the regional impacts are not easily identifiable (Moloney et al., 2013). For the Southern Benguela in particular, interannual decadal-scale changes in winds, SST, bottom oxygen and primary productivity have been documented (Howard et al., 2007; Blamey et al., 2012; Hutchings et al., 2012; Jarre et al, 2015).

4.2.1 Variability and the physical component of the system

The consensus amongst participants is that it is getting warmer (both in terms of air and sea water temperatures) and the prevailing wind conditions are unseasonable (with accounts of winds arriving late and shifts between south easterly and south westerly winds). Due to wind conditions not being “right” the sea state seems to be generally deteriorating with reportedly fewer available sea days[59] per month. It must be borne in mind that due to current economic conditions (mainly the

[59] According to fishers’ records their completed catch returns also reflect this decline in sea days

price of fuel and bait), fishers by their own admission only proceed to sea on days where the conditions are deemed to be either perfect or near–perfect when the likelihood of landing adequate catches is higher. This is a prime example of a case where adaptation has occurred in reaction to the effects of multiple stressors.

Participants framed their concerns about environmental stressors in terms of climate change and did not give a clear indication whether the effects of other drivers within the system are taken into account when such evaluations are made[60]. Another significant factor is that there is some variation within the participants' responses as to the nature of the variability, which makes it more difficult to determine the exact temporal scale on which the variation takes place. It is thus impossible to deduce whether the observed variation may be attributed to gradual, decadal scale changes, which has occurred in the long term with effects only being noticed now, or whether this variation has recurred over longer time scales. The temporal scale, on which the variations described are observed, is important as the absence of long-term datasets for the eastern and central Agulhas Bank in particular, is a source of uncertainty and hampers the ability to link changes observed to causal factors (Moloney et al., 2013).

A small number of "older generation"[61] participants have explicitly indicated that they regard the current variation as being cyclic in nature whilst stating that they had observed such conditions before. However, other participants indicated that although they had seen the same type of variation before, present events appear to be more extreme, such as higher maxima and stronger winds, thus suggesting that normal cyclic variation had become more extreme. This is consistent with general climate

[60] Changes caused by climate change will likely have the most profound impact on human and earth systems in the foreseeable future and it is regarded by many as the single biggest threat faced by human kind today.

[61] Whilst the exact age of the "older generation" fishers are not known, these were the group of fishers that were generally older than 45, but more significantly, have been involved in fishing for a couple of decades.

change expectations where increases in maxima within normal variability ranges are predicted for many world regions. It was, however, not observed in datasets of geostrophic winds and upwelling calculated from them, on the Agulhas Bank (Blamey et al., 2012). The overwhelming majority of participants indicated that changes noticed had taken place over the last two to three years and highlighted a direct correlation between the time that Kob catches started to diminish and variations were noted. Significantly, they pointed out a direct link between the variation observed and climate change, explicitly stating that it "must be climate change". However, it is unclear how much participants actually understand about anthropogenic climate change and how much of this positive response is "driven" by what they see on the news or read in the newspaper. This is an important fact in itself, as the failure to recognise climate drivers will hamper their ability to adequately respond to this stress. Research conducted in Thailand by Bennett et al. (2014b) found that a general lack of knowledge of climate change meant that individuals and households were more likely to react to stressors instead of adapting via active management of the risks and/or planning for climate change. This uncertainty regarding the source, depth and context of the fishers' knowledge of climate change warrants further research, which falls outside the scope of this dissertation.

It is almost impossible to attribute the variation noted and reported by participants to any one forcing or stressor. This is a highly complex system and whilst we do have adequate knowledge about the interactions and interconnection of system components on larger scales (Hutchings et al., 2009; 2012; Jarre et al., in press), there is little to no understanding of what exactly may or may not be happening on the smaller scale. Small-scale interactions are important to this natural group of people as it is small-scale interactions and impacts that will directly influence their daily lives

and livelihoods (Ommer and team, 2007). However, in order to try to gain some understanding of interactions and impacts at the small-scale, it is important to unpack some of the changes at the larger scale at which most scientific data is obtained and available.

The BCLME[62] (Figure 3b) displays a high amount of variability and consists of four near shore subsystems of which the Agulhas bank found off the Southern Cape coast is one (Hutchings et al.. 2009, Jarre et al., in press). The continental shelf of South Africa widens west of East London and east of Cape Point and forms the "roughly triangular" Agulhas bank, which extends approximately 250 km off the coast of Cape Infanta (or 135 nautical miles within the 200nm exclusive economic zone). The research area of this study, and coupled fishing activities of fishers, is found in the inshore of part of the Agulhas bank. The hydrology of the Agulhas bank is primarily driven by the wind regime, the Agulhas current that runs along the shelf break as well as the seasonal overturn of shelf waters (Jarre et al., in press). Analysis by Rouault et al. (2009) (using satellite and modelling studies) indicates a strengthening of the Agulhas current's flow over the past 25 years, which results in warmer offshore water. Subsequent analysis conducted by Rouault et al. in 2010 using OISST[63] temperatures confirmed offshore warming and inshore cooling thereby corroborating findings by Roy et al. (2007). More recent analysis conducted using pathfinder[64] data (v 5.2) does not confirm these results but rather indicates that there exists a consistent warming trend across all seasons with general warming most distinctive in the early Southern

[62] The Benguela Current Large Marine Ecosystem (BCLME) is one of four large marine ecosystem boundary current systems that is dominated by coastal upwelling and is a very productive region that sustains important fisheries for Angola, Namibia and South Africa (*http://www.benguelacc.org*).

[63] OISST – in situ and satellite SSTs plus SSTs simulated by sea-ice coverage. Resolution ¼ x ¼ defined observations made daily with the dataset running from 1981 (*http://www.ncdc.noaa.gov*).

[64] Pathfinder – AVHRR Satellite date. 4km x 4km resolution. Updated every 5 days with the dataset running since 1981 (*http://www.ncdc.noaa.gov*).

hemisphere summer months (Blamey et al., 2015). These more results seem to be corroborated by the observations of the fishers interviewed who have indicated that an increase in water temperature has been observed in the recent past.

There is a considerably larger disagreement between the signals of the different data sets for the Agulhas Bank area than for the other subsystems of the Benguela (Jarre et al., in press). In light of this discrepancy, it is almost impossible to say what exactly the interplay and trends are in relation to sea temperature found in the greater Agulhas bank. In light of the above, it becomes very difficult to make any sort of inference in terms of the trends of SST noted by fishers. The observed discrepancy in water temperature datasets described above is the subject of ongoing research, which includes collaborative research with commercial handline skippers in the Stilbaai area (Greg Duggan, PhD in prep.). Additionally, this discrepancy draws attention to a mismatch of data when considering different scales and is a prime example of the problem of scales mismatches resulting in knowledge gaps at the scale of the operation of their fishery.

4.2.2 Variability and the biological component of the system

Fishers benchmark the variability they experience in terms of the impact on Kob catches. Although Kob is not the only line fish species available for exploitation, it is the most commercially viable and thus the primary target species of the commercial handline fishery in the area. Other species such as Silvers and other reef fish (such as Red Roman) are targeted in the absence of Kob. Red fish such as Red Roman are more valuable, but less abundant. Kob are reef associated fish with large home ranges and are known to retreat down the shelf in winter as the mixed bottom layer retreats, returning to inshore waters when the coastal upwelling resumes in the

summer (Griffiths, 2000). Participants from Melkhoutfontein and Stilbaai referred to this migration from the “outer” to “inner” reefs throughout the study. Fishers expect the fish to migrate onshore at the start of austral spring (September) for the start of what is termed to be the ”season” and expect the fish to remain in this area until austral autumn (April/May) of the following year. The fishers regard this deviation from the “norm” as a symptom of changes that have and continue to occur in the physical environment in addition to fishing pressure from other sectors.

The deviation from what the fishers regard as the “norm” in terms of distribution and behaviour of Kob may not necessarily be a disadvantage for the fish species itself as one can argue that if the fishers are not able to “find” the fish where they expect to find it, the amount of fish caught will decrease. It may rather be that the fishers are now inconvenienced by the deviation from the norm as finding and targeting the fish becomes more difficult (and thus more frustrating). It does not mean the fish are not there anymore, in fact a stock assessment report for Kob on the South Coast by Winker et al. (2014) suggests an recent (albeit small) recovery of Kob stocks on the south coast.

The change in distribution and behaviour of the Kob noted by participants is possibly a consequence of a recent ecosystem regime shift that has taken place in the Southern Benguela. The southward and eastward shift of small pelagic fish in the late 1990s/early 2000s is thought to have been brought about by changes in environmental drivers and subsequently intensified by fishing activities (Coetzee et al., 2008). Watermeyer (2015), who reports changes in the distributions of predatory fish in general, has recently investigated the ecosystem consequences. Her findings also corroborate ethnography by Duggan (2011) concerning reports of changed Kob

behaviour, related to changes in their prey to sardine and anchovy, which move rapidly. Furthermore, fishing pressure exerted by the inshore trawl fishery operating in the area may also be contributing to the perceived shortage (and near absence) of sole and inshore Cape Hake (*Merluccius capensis)* stocks in the area (see below) (Greenston, 2013). Once again, the causality of the change experienced is uncertain and extent to which these changes are climate-induced or due to fishing pressure remains unclear.

The pertinent issue at stake is once again one of scale, where system components, interaction and impacts have to date, largely only been investigated on larger scales (Hutchings et al., 2012) with smaller scale interactions and impacts of large scale changes on smaller scales still largely unknown, particularly on the south coast.

The result is that interactions and variations on smaller scale, although poorly understood and studied, are not considered in decision-making processes, which, in turn, result in "bad-fit", over-arching policies and decision-making processes influenced by information based on generalised large scale interactions (O' Brien et al., 2004). The analysis of adaptation, coping and reacting measures currently implemented by participants in Chapter 5 demonstrates the extent of variation found within small-scales.

4.3 Policy & regulation (including enforcement and implementation of policy and regulation)

The issue of policy and regulation was deemed by participants to be the most important stressor on the human-social component of the fishing system in the area

with 92% of respondents' referring to this stressor. This comes as no surprise as the participants have in the past (and continue to have) over-riding negative experiences when dealing with policy and regulatory issues. Participants blame government and departmental incompetence for these bad experiences, but the problems experienced by them are more complex than meets the eye.

In South Africa, the utilisation of marine resources is regulated by the MLRA through a sectoral rights allocation system. Rights for the regulation of the domestic industry were initially divided into three sectors – recreational, commercial and subsistence (Van Sittert et al., 2006). These rights are regarded as statutory permissions granted by the minister or his/her delegate to harvest specified marine resources for a stipulated period of time (see section 18(6)) where after it automatically reverts to the state, who may re-allocate it in terms of the applicable provisions. There are five core principles (transformation, biological considerations, ecological considerations, industry, socio-economic and commercial considerations and performance, or potential to perform) that provide guidance for the allocation and management of fishing rights. These five principles strive to complement and give effect to the objectives as set out in Section 2 of the MLRA[65] (Government Gazette, 1998; DEAT, 2005).

The process followed for the initial rights allocation process for the commercial line fishery were described and discussed in chapter 2. The traditional line fishers were subsequently granted medium term rights (for a period of 8 years) that expired

[65] Section 2 of the MLRA covers the objectives and principles of the MLRA and deals with the need to apply an approach that strives to be ecologically sustainable, conservation orientated, precautionary in respect of the management and development of resources, in line with economic growth objectives, protect the ecosystem as a whole, preserve biodiversity, minimise pollution, achieve broad and accountable participation in the decision-making processes, obligation of national government ito international agreements and the need to restructure the fishing industry in order to address historical imbalances and achieve equality.

at the end of 2013. Any fisher who wanted to continue fishing (bearing in mind that due to various factors a large amount of attrition had taken place over the timespan of the right) was required to re-apply for rights in the new allocation period. The fieldwork for this study took place in the midst of this re-application process. As the previous allocation process was fraught with inconsistencies and allegations of unfair practice, participants did not see the application process in a positive light from the outset. It must be borne in mind that this negativity did not only emanate from the past experience with the rights allocation process, but also with administrative matters and requirements set out for the current process as per the "Draft revised Traditional Linefish Policy on the allocation and management of fishing rights: 2013" promulgated by DAFF.[66]

This policy sets out two groups of criteria for allocation. The first evaluation criterion seeks to exclude anyone who has, in the current cycle, not complied with regulations set out in the permit conditions, anyone deemed to pose a so-called "paper quota risk", more than one right per household, not made use of an allocated right (in current allocation period), where no personal involvement in the harvesting of the resources has taken place by the right holder and where no access to a vessel can be proven (DAFF, 2013).

The second set of criteria, referred to as "balancing criteria" called for the evaluation of applications by means of a weighting system in order to allow for an assessment of the strength of individual applications. The first of the balancing criteria

[66] At the completion of the 2013 FRAP only 215 of the available 450 rights were allocated. With almost half of the 215 being new entrants, the balance was reportedly reserved for community rights' allocations resulting in the majority of current rights' holders losing their rights. This causes much outrage and resulted in legal action against the DAFF. The process was found to be marred with inconsistencies and allegations of corruption and was eventually declared invalid in April 2014. Fishers have been granted exemption to continue fishing until a new Right allocation process can be implemented. Information on a new process is not yet forthcoming.

evaluated was the aspect of transformation where race and gender were given pre-defined scores. Other transformation criteria evaluated included the following:

- the percentage of "black"[67] persons and women involved in the management of the enterprise and in the employ of the applicant,
- compliance with skills development laws,
- the investment made in further training,
- profit sharing with the crew,
- corporate social investment,
- investment in the fishery (including investment in vessels, equipment and/or fish processing initiatives),
- fishing performance,
- job creation (with those providing employees full time secure employment,
- medical aid and pension,
- safe working conditions and other employment benefits being rewarded),
- where applicants are from a traditional fishing community and can demonstrate more than 10 years involvement in the fishery,

[67] The terminology used to discern between racial groups in this thesis, although terminology used to enforce racial segregation in the Apartheid era, is prominently and officially used in post-Apartheid South Africa to discern between racial groups. The identification of racial group remains necessary as an important tool to facilitate processes imposed by policies and legislation that strive to "write the wrongs of the past" and the non-derogatory use thereof an accepted norm in South African society.

- historical involvement and reliance on the fishery as a primary source of income (DAFF, 2013).

These balancing criteria were a source of immense ire for many participants. These frustrations were firstly issues that relate to practical arrangements preceding the actual allocation. The requirement to provide evidence of compliance was seen to make the process unnecessarily laborious. Participants complained that the forms were too long, not available in all official languages and did not cater for varying literacy levels. Many participants, particularly those from Vermaaklikheid, indicated that they had to seek help in order to complete the forms as they were too complicated and in English. Participants were also frustrated that DAFF did not make personnel available to explain the forms and assist in completing them. Although applicants could have travelled to the regional DAFF office in Mossel Bay to obtain this help, not all participants have the means (transport, or money for transport) to travel that far and the overwhelming majority of participants felt that the DAFF should have instead made representatives available to each traditional fisher town.

The second and more pertinent set of frustrations were the requirements set by the balancing criteria themselves. Participants felt that many of these criteria should not be applicable to them as they do not run large enough enterprises or generate enough income to put them in the position to be able to implement most of these measures. The issue of contribution to pension funds and medical aids schemes was mentioned specifically. Skippers noted that even if they are in a position to pay this to the crew, the nature of the fishery, where the crew is able to move around between boats, would make the implementation nearly impossible to manage. Various skippers indicated that they had set up such saving plans for crew, but that many of the crew themselves failed to manage their plans and let it lapse when moving between boats.

It must also be borne in mind that a general lack of skilled crewmembers was identified as a stressor (see below), thus competent crew is in demand and crew are more likely to move around between boats as required. The ensuing discussion with skippers and crew alike, indicated a generally held opinion that the administration of pension schemes, medical aid schemes, unemployment insurance fund (UIF) etc. should not rest with individual right holders, but rather be centrally managed (maybe within DAFF) to ensure continuity of such schemes when crew move around between different boats. The issues highlighted with the balancing criteria, may be a symptom of another underlying problem. The fishery is currently regulated as a commercial fishery in terms of the 'Policy for the allocation and management of commercial fishing rights in the traditional line fishery" (DEAT, 2005b). However, the characteristics displayed by this fishery is not one of a commercial fishery, but rather one of a small-scale fishery (see Chapter 2).

The formal regulation of small-scale fisheries is a new development in the South African policy landscape. The MLRA and subsequent rights allocation processes did not offer a sufficient regulatory framework to deal with this group of fishers as introduced in Chapter 2.

Although the mechanism of implementation is not clear at this stage, this policy signals a paradigm shift towards a more people-centred governance approach, recognising that fishers' rights are human rights as well as the important role that marine resources can play in "poverty alleviation, economic development and the realisation of human rights" in the South African (Sowman et al.; 2014:32). The policy seeks to do this by moving away from the individual rights-based approach

implemented in other sectors to a community-centred approach where community rights will be allocated to community-based legal entities (Sowman et al., 2014).

The policy further makes provision for current rights holder to apply for the so-called “community quotas” thus current rights holders. However, current small-scale commercial rights holders will be required to relinquish their commercial rights should they wish to be included in the “community quota”. What is of concern to the current cohort of fishers is that communities seem to have been pre-selected based on a definition of “traditional” that in itself is contentious. It must however, be noted that should fishers choose to partake in the community right, they will have to forfeit their commercial line fishery right and therefore effectively, make a choice as to which type of fishery they wish to engage in.

The conversations surrounding fishing rights have a distinct political slant. Current regulatory frameworks and policies place much emphasis on the transformation of the industry to include previously disadvantaged persons with a lot of focus falling on traditional fishers. The term “traditional’ fisher appears to be reserved (from the side of policy implementation) for South Africans who would have been classified as previously disadvantaged, effectively leading to the exclusion of fishers who, although from European descent, have a strong family history with the fishing sectors in question. Fishers have openly questioned how the department and policies are defining the term “traditional” and are of the opinion that whether someone is regarded as a “traditional” hand line fisher has got nothing to do with race. In light of this, the assumptions made by many of the fishers from traditionally “white” communities, such as Stilbaai, may be excluded from the small-scale fishery rights allocation process. One may argue that these fishers should be able to continue in

the commercial line fishery as they are currently doing. However, this may result in the continuation of the current situation where some small-scale fishers are regarded and managed as full-scale commercial fishers.

From my results, it emerges that the fact that these fishers are regarded and managed as fully commercial fishers, is a significant contributory factor to many of the policy-related stressors highlighted by the fishers. The demands made by regulation to obtain and keep rights place a heavy financial burden on fishers who operate in a system that is under increasing pressure. This pressure emanates from factors such as dwindling target species stock levels, increased strain on the physical marine environment, predictions of climate change to have a greater local impact in the future and fish price increases not matching other inflation linked pressures. It thus seems unfair and impractical to regard them as commercial fishers, where they are effectively expected to compete with much larger companies, with much more resources, for resources in the same geographical areas of operation. The handline fishers feel that they are not able to compete in terms of tonnage delivered, are not able to ensure consistent supply of fish, have inadequate storage facilities and little access to distribution routes and offset points. That been said, a historical overview of the economic conflicts in the fisheries of the South African South East Coast *circa* 1910 – 1950 by Visser (in review), indicates that this "conflict" is in fact, an old discussion that has become part of the historical context of the fisheries in the area.

My results show that the small-scale commercial line fishery in the southern Cape is in effect operating within a policy gap or vacuum as none of the policies that have been promulgated cater for their specific sectorial needs, thereby making it extremely difficult for fishers to comply with the "balancing criteria" that have been set

out. The inability to regulate this particular fishery in a sustainable manner may ultimately lead to the eventual demise of the sector as fishers, unable to meet the criteria when renewing rights, will be forced to exit an already declining fishery. However, as stated above, the fishery continues to operate to date despite all indications that these regulatory issues have a strong historical context. This would suggest that this is an extremely resilient fishery as it has managed to survive despite all the challenges posed by regulatory and policy issues. Whilst this is true, the number of fishers actively participating in the fishery has steadily dwindled and even the most resilient of fishers may find it impossible to continue in the fishery far into the future. This may happen before an adequate set of management objective are agreed upon for this fishery, taking into account the new objectives under the SSFP and the existing trawl fisheries as well as other relevant fishing sectors.

4.4 Other fishing sectors (Inshore Trawl)

A majority of participants (86%) have indicated that the inshore trawl fishery has a severe impact on the line fishery in the area. The largest impact identified by participants was the impact on available Kob stocks, followed by the impact of trawling on the benthic habitat, with specific reference made to reef health, as well as the impact that discards have on the marine environment and the behaviour of marine mammals such as seals. The inshore trawl fishery and ensuing issues evoked some of the most emotional responses from fishers thereby confirming the historical conflict between the two fisheries (Attwood et al., 2011; Visser, in review). Research conducted by (amongst others) Greenston (2013) and Attwood et al. (2011) corroborates the opinions expressed by the linefishers to a large degree.

The South African inshore trawl fishery was pioneered at the start of the 20th century as a mixed fishery and today operates mainly in the area between Cape Agulhas and the Great Kei River, targeting either shallow water hake and Agulhas Sole or a combination of the two species (DEAT, 2005a; Attwood et al., 2011). Vessels are limited to a maximum of 30 m in length and are excluded from fishing in bays, but trawling generally takes place at depths of 80 m – 110 m (Attwood et al., 2011). Trawl catches are diverse and landings include several non-target species as bycatch[68] (Walmsley, 2007). Although recent indications are that the inshore hake and sole stocks on the Agulhas bank are not showing signs of collapse, the impact the sector has on the populations of non-target species in the shallow waters of the Agulhas bank, particularly pre-recruit Kob, is a cause for concern (Attwood et al., 2011; DAFF, 2012).

The biggest concern with the inshore trawl is that total allowable catches (TACs) prescribed for the inshore trawl fishery only include tonnage for the target catch with no current limit being set on the amount of bycatch that may be landed. Indications are that 42% of the total catches landed are non-target species with a large portion of this bycatch marketable with a value that comprises 15 - 30% of the total product value. The handline fishery, although not regulated by a TAC has strict size limits imposed for target species whilst no such restriction exists for the inshore trawl fishery (due to the non-selective fishing method). Current data suggests that whilst the catch quantities for Kob and the inshore trawl sector are similar, most of the catches landed by the inshore trawl sector are under size, in terms of the size determined for the handline sector (Attwood et al., 2011). Furthermore, as the tonnage

[68] Bycatch may be defined as “that part of the gross catch which is captured incidentally to the species toward which there is directed effort. Some, all or none of the bycatch may become discard catch” – Saila, 1983 p 1 (See Walmsley, 2007)

of bycatch landed is not yet regulated, inshore trawl fishers may be tempted to target bycatch species instead or to dump Kob caught as discards (Greenston, 2013).

Participants expressed strong opinions that the inshore trawl is targeting Kob as the Agulhas Sole and shallow water Hake stocks available in the area are seen as having severely declined. Whilst this decline is noted in practice and "on the ground", an overall decline in fish stocks in both the shallow water hake fishery and the Agulhas Sole fishery has until recently not been echoed by data obtained from observer records and stock surveys (Attwood et al., 2011; DAFF, 2012). Additionally, Kob stock abundance predictions by Winker et al. (2014) suggests that Kob stocks have indeed displayed a small amount of recovery on the Southern coast (in contrast to previous years), although it is important to note that it is still regarded as over-exploited. This, very slight, recovery is however, not reflected in the experiences of the participants, as they have, in the recent years, recorded some of the worst catches yet. Although participants are quick to point out that declining catches are a consequence of the activities of the inshore trawl, it is near impossible to corroborate this at present. Given the historical conflict between the two fishery sectors, the question that begs asking is whether participants are giving other stressors due consideration when attributing blame for perceived fish shortages.

The matter of bycatch in the inshore trawl industry is currently receiving attention from scientists and managers alike. Attwood et al. (2011) suggests, "revisions in the management of the fishery could be considered under the headings of (i) revised quota management (ii) area/time closures and (iii) gear modifications". Greenston (2013) in her master's dissertation, assessed whether an individual transferable quota (ITQ) system could be used to manage the inshore trawl industry

on the south coast. She suggested that precautionary upper catch limits (PUCLs) assigned to either clusters of boats or rights holders may be a way to implement this ITQ system in order to more effectively manage bycatch (Greenston, 2013). The implementation of a PUCL for the fishery is currently entering a pilot phase. Whilst this will help increase sustainability of the inshore trawl fishery and should relieve pressure on fish stocks, it is unclear whether a reduction of impacts will be noticed and acknowledged by the line fishery over the long term.

Another pressing concern raised by participants is the fact that the trawlers are landing the catches from the outer reefs before the Kob are able to migrate towards the coast, towards the so-called inner reef, at the start of the season (spring). The perception is that the trawlers are effectively interfering with the natural migratory pattern of the fish. It becomes clear from discussions that the operating area for these two fisheries appear to overlap to a certain extent (Attwood et al., 2013; Visser, in review). Attwood et al. (2011) indicates that the extent of the overlap between the two fisheries is not fully understood and suggests that there may be a seasonal separation in catches between the two fisheries (Attwood et al., 2011). However, what must be borne in mind when considering the issue of overlapping target areas, is that the handliners have in recent years increased their range by buying bigger boats that can travel significantly further. This quite possibly and inadvertently, results in an increase in the area of overlap in a situation where competition between fishers are ever increasing in the face of fish stocks that remain over exploited.

In addition to concerns raised about the direct effect of the inshore trawl on available fish stocks, participants also raised concerns regarding the impact of the fishery method on the greater marine, and fishery, system. Trawling as a practice,

and more specifically bottom trawling, has impacts on both biological and structural levels. Studies have indicated that bottom trawling can have a negative impact on habitat structure and complexity by removing slow-moving or attached organisms and smoothing of the sea-floor. The reduction of habitat complexity may lead to increased predation on juveniles of harvested species. Studies conducted in the Gulf of Mexico have demonstrated that comparisons between unfished and heavily trawled areas showed that the direct removal of biological (e.g. sponges, anemones etc.) and sedimentary (e.g. sand waves, depression etc.) structures leads to a reduction in habitat complexity. Although the long-term effects and impacts of repeated trawling and recovery time are not well understood (Grekov & Pavlenko, 2011), they have been demonstrated for South African waters by Atkinson et al. (2011). Participants also have strong opinions about the effect of discards on reef health as they are concerned that the presence of decaying matter will negatively affect reef health.

Failure to satisfactorily resolve issues surrounding bycatch will lead to further conflict among the handline and inshore trawl fishery in the area as the impact of the inshore trawl fishery on Kob stocks may lead to further curtailment of hand lining activities. What becomes clear from the above discussion is that inshore trawl fishers should be engaged in this debate in order to offer their perspectives on these issues. This will serve to balance the discussion and is therefore an area where further research should be conducted to gain a more holistic understanding of the interactions between the two fisheries.

4.5. Stressors less mentioned

Many of the stressors less mentioned have a direct link to social and economic factors and conditions. As stated in the introduction of this chapter, it is of the utmost

importance to develop an understanding of the interactions of not only changes in the physical environment but also of social, economic, cultural and political changes that occur at multiple temporal and spatial scales (Ommer & team, 2007; Tuler et al., 2008; Perry et al. 2010, 2011; Bennett et al., 2014a). Hjerpe and Glass (2012: 4471) state that the omission of socio-economic stress "leads to critical weakness in local adaptation strategies." In this context it is important to recognise that whilst these stressors were mentioned less often by participants this group of stressors is of no less importance than previously discussed stressors and will lead to an increase in vulnerability and a decrease in adaptive capacity (Bennett et al., 2014a).

4.5.1. Economic considerations

The lethargic national economy (set within the backdrop of a post-recession global economy that remains extremely volatile) forms the background to many challenges highlighted by participants as both consumers and fishers. Bennett et al. (2014a) notes that "increasing household costs may be as related to increasing local desires and expectations as to increasing costs at both the local (e.g. water, food) and global (e.g. gas, food, supplies)". The cost of fuel, bait and the maintenance of boats and motors adds significantly to other pressures that are already driving up the cost of living on a day-to-day basis (food, inflation, cost of debt). Whilst the fishery input costs are constantly rising, the price of Kob per kilo has stayed the same over the last five years. The price of the fish is determined by the fish mongers (who buy the fish from the fishers and resell it to merchants or on behalf of the merchant) and not the fishers that carry the input costs. This phenomenon is not only true for this group of fishers, but also for fishers in other areas of the world. Tuler (2008: 177) comments in relation

to US fishers that “the cost of fuel insurance, gear[69] and bait have all gone up, while the price of fish has not” whilst a study conducted in Thailand by Bennett et al. (2014a) describes the same situation where incomes in coastal communities do not seem to be keeping up with rising costs.

Many participants view this fishery as a single species fishery (as discussed earlier in the chapter). This view (in itself) is somewhat misguided as there are numerous other species targeted by the fishers in the absence of Kob – these include the so-called red fish (including red Roman), sharks and Silvers. The retail price of Silvers is significantly lower than that of Kob and is thus not considered as particularly commercially viable. Output costs to harvest some of these species are significantly higher. In the case of Silvers fishers travel about 30 km by sea in order to harvest these fish). This in itself places severe limitations on the fishers when stressors within the system forces changes in both the natural and social environments.

High start-up costs also make it difficult for new entrants (specifically from previously disadvantaged communities) to enter the fishery– gear costs a lot of money and most people do not have the necessary capital at their disposal. Banks are not willing to lend money as fishers struggle to earn consistent income. Firstly, legislation makes it very difficult to get access to credit from banks if no steady income can be proven (in terms of the National credit act of 2007). Furthermore, the inability to access credit services provided by formal economic institutions opens the door to unscrupulous micro lenders who then provide financing at interest rates that are excessively high, effectively creating a debt-trap for people that cannot afford the credit. It is however, unclear how prevalent the use of the micro lenders is in the

[69] Boat, outboard motors, safety equipment, GPS, fish finder, radio etc.

research area. Not only do fishers struggle to access capital, but in light of recent downturn in catches, many are struggling to find capital needed to meet day-to-day running costs.

Many participants have indicated that they are advanced money for bait and fuel by one of the middlemen operating in the area. This adds to an already perilous situation – currently fishers are not landing decent catches and do not necessarily make enough to cover running costs and take home a decent living wage. Having to pay back loans incurred to cover petrol and bait places an additional burden on the livelihood of especially the skipper as he is the one that bears that responsibility for the running costs and this situation has the potential to become a debt trap. One middleman maintains that he lends the money to fishers, not to burden them (the loans are interest free as far as I could ascertain), but because he recognises that he will not have any product to sell if fishers can't go to sea due to lack of funds for fuel (petrol) and bait. Fishers operating deck boats and diesel engines feel that they are in a better position than the fishers that operate ski boats with outboard motors as diesel is subsidised by the government, as a tax deduction, whilst petrol is not. How much better off they are remains unclear as running a diesel engine may be cheaper on a day-to-day basis, but all indications are that maintenance of these engines is more costly, although maintenance intervals appear to be larger. Many participants have indicated that their present financial situation leads many fishers to neglect the maintenance of their engine and once something breaks (such as an outboard engine), they are unable to fix and/or replace it, thus resulting in the cessation of fishing activities of the skipper and his crew until they are able to make the repairs. The present economic situation can thus be seen to be contributing to keeping already poor fishers trapped in the cycle of poverty. Furthermore, economic stress may lead

to decisions, such as failing to maintain gear, which can result in making individuals and households more vulnerable to stressors in the biophysical environments over long time periods (Bennett et al., 2014a).

4.5.2 Socio-economic considerations

Poverty and fisheries are intrinsically linked when dealing with a development discourse where the enduring narrative is that “people are poor because they fish” and the dependence on fishing seen as a cause of poverty. However, no clear and systemic relationship between poverty and fisheries has yet to be defined and fishery households are not necessarily the poorest of the poor (Béné and Friend, 2011). What remains clear is the small-scale fisheries in particular is a livelihood that is characterised by a tradition of adapting to changes on both social and natural environments although rural coastal communities are coming under new types of social and economic pressure of late (Salmi, 2005).

The possible effects from the additional afore mentioned (socio-economic) pressure becomes increasingly clear when dealing with Vermaaklikheid (and to a lesser extent, Melkhoutfontein). Both these communities are traditional “coloured” communities where the influence of Apartheid on the spatial development of the South African landscape is very apparent. The prevailing socio-economic conditions in these communities are not always good with a large dependence on government grants and services (such as the provision of water, housing, sanitation, and electricity). There are some significant contrasts and similarities between the two communities with the Vermaaklikheid community presenting the most similarity to a stereotypical fishing community typically described (Béné and Friend, 2011). Pauly (2007) holds that marginalisation may be viewed as a dimension of poverty that is relevant to fishing

communities in particular mainly due to their geographical and political isolation. This marginalisation takes many forms but is often a variation of combined, social economic and institutional processes (Béné, 2003).

Vermaaklikheid has only two access roads (both untarred) and is situated quite a distance from what would be considered as its economic hub (Riversdale). It is considered a hamlet[70] that was not surveyed as a town in its own right during the 2011 National census. In contrast, the town of Melkhoutfontein[71] is considerably bigger, geographically closer to an economic hub (Stilbaai) with greater accessibility due to adequate infrastructure in terms of access roads and the provision of transport (Vermaaklikheid thus much more geographically remote than Melkhoutfontein).

Within both communities, as with many traditional ""coloured"" communities in South Africa, there are low formal education levels (with many participants from these communities not having completed Grade 12) and low skill levels in terms of alternative skills (as opposed to fishing in the case of the fishers). According to Béné and Friend (2011), remote rural areas (such as Vermaaklikheid) may be "characterised by high transaction costs, dysfunctional transport and communications systems, limited or non-existent access to markets and the low provision of government services and infrastructure (especially health care and education)". This rings especially true in the case of Vermaaklikheid as all the stressors mentioned by participants fit into these general categories. What is very clear in light of participants' inputs is that the geographic location and infrastructure of Vermaaklikheid has a distinct impact on the

[70] The hamlet of Vermaaklikheid has been incorporated into the sub place no 1750031 in 2011 national census carried out by Statistics SA. This "sub place" comprises an area of 124km² and a population of 356 people (population density 2.87 per km²). There are a total of 99 households in this area (household density 2.80 per km²)

[71] Melkhoutfontein comprises an area of 0.93km² with a population of 2533 people (population density 2710.09 per km²). There are 614 households in the area (household density 656.93km²)

socio-economic conditions as well as the day to day functioning of the community. These include a lack of access to public services and transport, no easy access to shops and no public schools (although a privately-funded school has been established by one of the residents in order to provide this service to the community). These characteristics may be true for all the communities in the region to a certain extent as the distance to the nearest metropolis (~400km) also lends a certain amount of remoteness to the area as a whole with the interaction between the region and the metropolis pointing to a classic core-periphery interaction (Baldwin et al., 2001). The relative remoteness of the area as a whole also has an effect on available formal and informal job opportunities. Although official statistics show that the unemployment rate in this region is lower than national and provincial averages, it must be noted that unemployment statistics only take active job seekers into account. Fisher folk that are not fishing are also not likely to be actively looking for other employment and do not regard themselves as being unemployed or a job seeker. The relatively low employment statistics do not take into account discouraged work seekers and those that are surviving on government grants and thus the amount of people that are economically active, but not employed, is most probably considerably higher that the official rate.

4.6. Concluding remarks

Although participants were not asked to rate the impact of stressors, it became clear, through conversations with them, that certain stressors were regarded as more significant than others. Although the exact interactions and interrelationships of the various stressors highlighted in the previous section remain unclear at present, it is possible to highlight some examples of multiple-stressor interactions.

The increase in the fuel price previously described, leads to less disposable capital being available and in turn affects the fishers ability to perform the required maintenance. This in turn, may lead to a compromise in safety standards resulting in an increased susceptibility to weather stressors, e.g. if the engine is not performing optimally, the sea conditions the boat is able to navigate is impacted. In this case, an economic stressor has effectively resulted in a safety stressor thereby making fishers more vulnerable to weather stressors. However, the increased input costs such as fuel also has a dampening effect on effort and leads to a decrease in over-fishing. This permutation may be extended even more as the decreased effort will lead to a decrease in income and thus the economic situation, of the fisher will continually worsen.

The fishers from Mossel Bay that operate deck boats have overcome overfishing in their immediate area of operation by increasing their range. The bigger boats mean that they are able to operate in rougher sea conditions, but they also require a bigger good weather window as they stay at sea for a couple of days on end. The overfishing stressor has thus led to a vulnerability to longer-term weather conditions and in turn, has led to added pressure on fish stocks, previously not exploited by this sector. The added dimension to this scenario is the handline fishery which has by increasing their ranges, increased the area of overlap between the handline fishery and the inshore trawl fishery, potentially adding to the conflict between the two fisheries.

In their study of vulnerability to multiple stressors in coastal communities (with particular reference to the Andaman coast of Thailand) Bennett et al., (2014a), provide an extrapolation of their findings in order to explore the interaction between stressors

on the ability of households and communities to adapt. This extrapolation includes economic stressors that may lead to the abandonment of environmental risk mitigation behaviour, that other stressors identified but rated lower would lead to an increase in vulnerability and a decrease in adaptive capacity; and lastly, that the economic stressors when combined with the biophysical stressors may lead to a significant decline in the quality of individual and community life. This is particularly true for the more vulnerable households and communities where less options are available.

Although it is not within the scope of this study to investigate all the linkages and interactions, the examples of multi-stressor interactions highlighted are an indication that the interactions found and described by Bennett et al. (2014b) also exist in the South African context and is an area of investigation that requires further research.

Chapter 5: Reacting, coping and adaptation

5.1 Introduction: livelihoods and resilience in context

The livelihood perspective has been increasingly used since the 1980s by development geographers in an attempt to analyse poverty, vulnerability, and marginalisation at the "geographical scale of experience" (Taylor, 1982; Marschke & Berkes, 2006). More recently, it has been emphasized that livelihoods are not only complex, but also dynamic and concern not only individuals, but also households or groups that are trying to make a living in order to meet various nutritional and economic needs whilst coping with uncertainties and responding to new opportunities (De Haan & Zoomer, 2003; Marschke & Berkes, 2006).

Traditional livelihood approaches tend to view the poor as passive victims of structural constraints and focus on material aspects of life using specific, locally bound human-environment interaction perspectives (De Haan & Zoomers, 2005; Marschke & Berkes, 2006). The contemporary approach recognises that a livelihood is multi-dimensional and covers economic, political, cultural, social, and ecological aspects. Moreover, there is a recognition that modern livelihoods are based on a range of assets, income opportunities, as well as product and labour markets that are located in different places and scales, which in turn interact with other places (De Haan & Zoomers, 2005).

Chambers and Conway (1992:6) suggest, "a livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities, assets, and entitlements, whilst not undermining the natural resource base". The analysis of livelihoods as a whole allows for an escape from characterizing

people as only “fishers”, “farmers” or “housewives” but instead allows for the fact that, in order to survive in modern, challenging conditions, people and households can hold diverse sources of support Kirby et al., 2001). Livelihood analyses are also particularly useful in the research area of this study as the concept functions equally well for urban and rural areas as well as for households that access both rural and urban contexts (Kirby et al., 2001).

Very few livelihood studies have, to date, addressed the issue of how livelihoods “can cope and recover from stresses and shocks” and the resilience analysis that would be needed to do so (Berkes et al., 2003). Stresses and perturbations that impact livelihoods are the result of interactions between global forces and local contexts whilst economic and policy drivers as well as fluctuations in resource abundance, seasonal cycles and changes in access serve to create conditions that challenge rural households in particular (Marschke & Berkes, 2006).

Turner et al. (2003) describes a stress as a continuous or slowly increasing pressure that falls within the range of what can be considered as normal variation whilst a perturbation is a significant spike in pressure that moves beyond what can be considered the normal range of variability. Whilst stressors and perturbations may fade and life may appear to return to “normal”, this type of “equilibrium thinking” (De Haan 2000: 348) fails to promote the development of an understanding of how households respond and adjust to change (Marschke & Berkes, 2006).

Stresses and perturbations may be examined by analysing livelihood strategies in an attempt to add options and build the buffering ability of the system. It may be useful to examine responses in terms of building capacity to deal with any future change and subsequently, study strategies that could foster and/or augment resilience

(Folke et al., 2003; Marschke & Berkes, 2006). The resilience perspective presents a lens through which to explore not only stresses and shocks, but also understand livelihood dynamics. Resilience in this context is seen as a reference to the "capacity of social entities to both live with the change whilst continuing to develop" (Folke, 2014). Being future-orientated, it is used to characterize the system's ability to deal with change on various scales. Change and restoration furthermore cultivates innovation in resilient social-ecological systems (Folke et al., 2002; Marschke & Berkes, 2006).

The resilience displayed by a system can be seen as both a positive and negative attribute. Whilst resilience will ensure some kind of continued existence of the social entities as they absorb multiple stresses and perturbations, systems that display too much resilience may continue to cope and mitigate thereby resisting long-term adaptation, even if such adaptation will result in a more desirable state (Cinner et al., 2009). Vulnerability and resilience can be seen to be on two opposite ends of the same spectrum – the less resilience displayed by the system, the more vulnerable it becomes to change (stresses and perturbations) (Berkes at al., 2003). Folke (2006: 262) defines adaptability as the "capacity of people in a social-ecological system to build resilience through collective action". Adaptation, coping, and reaction should not be viewed as lying on the same continuum as the vulnerability – resilience interaction, but instead as an input into the resilience context. The concept of resilience can be used as an analytical approach that can further the understanding of livelihoods with specific consideration given to the dynamics of how people make a living, as well as the various characteristics of complex adaptive systems with particular reference given to scale and uncertainty.

While the investigation of adaptation of the biophysical system in the research area falls outside the scope of this research project, there are some parallels and discrepancies that have been highlighted in terms of the relationship between biophysical and human-social adaptations in Chapter 2. The present chapter seeks to provide an examination of different coping and adaptive strategies currently employed by participants within the realm of the human component of the social-ecological system at the household and community levels within the research area. Furthermore, the potential impacts and consequences of the strategies are explored and possible future options discussed.

5.2. The handline fishery of the Southern Cape

Participants were asked to provide information on alternative activities they engage in to cope with diminished income derived from fishing. This was accomplished by asking, "Wat is dit wat julle doen om die pot aan die kook te hou[72]?" Importantly, it must be borne in mind throughout this discussion that permit conditions stipulate that fishers are not allowed to have alternative sources of income and as a result they become more involved in the informal economy to secure a sustainable livelihood. Some participants were also not very forthcoming about providing details of current strategies. The reason for this may be twofold: these participants may not want to be seen as contravening their permit conditions, but it also became clear during the interview process, some participants have not given alternative livelihood activities much thought. Even though they may engage in adaptive behaviour, they may not cognitively attribute decisions as responding to change. Other important

[72] What do you do to keep the "pot on the stove boiling"? This is a direct translation from an Afrikaans saying and is the same as saying what is it they do to put food on the table.

factor that have a bearing on this discussion and must be borne in mind throughout is relative geographical remoteness of the area when considered in relation to the closest large city (Cape Town), the role that played by social grants, spousal income and available employment opportunities[73] (see Chapters 3 & 4).

Three main responses were identified within the research area: (i) those communities that seem to be adapting in the long-term, (ii) those that are coping, and (iii) those that are merely reacting. It is important to note that the strategies employed display a large amount of spatial variation between different towns in the research area.

5.2.1. The business-oriented fishers: Mossel Bay, Gouritsmond, and Witsand

This group is set apart by the fact that changes made seem to be longer-term strategies associated with adaptation. These changes are, however, not strategies that may be completely irreversible although any attempt at reversal may have unexpected and negative consequences and may come at great cost to the fishers. It was difficult to source traditional commercial handline fishers, to participate in the study in the Mossel Bay area. What was once a thriving, inshore handline fishery has been reduced to a shadow of its former self. It is not clear exactly how many fishers are currently active in the area and data obtained from DAFF do not reflect rights holders and boats registered specifically in Mossel Bay. Participants recount that in 2001 about 150 ski boats were launched out of Mossel bay on a near daily basis. This

[73] Census 2011 data obtained from Statistics SA indicates following employment data for the all the towns within which research took place: 32, 8% of participants indicated that they were employed, 34, 6 % indicated "not applicable"; 24,8% of individuals are not economically active; 5.9 % indicated they were unemployed and 1,8 % indicated that they were discouraged work seekers. Whilst the unemployment rate is significantly lower than the national and regional average, only 32, 8 % of the sample indicated that they were in fact, employed. It is furthermore unclear what activities the 34, 6% that indicated not applicable are engaging in thus implying that the official unemployment rate in these towns may be severely underestimated.

was prior to the first “new” rights allocation process and by implication; the group probably consisted of not only commercial handline fishers, but also recreational and part-time commercial fishers. Current estimates by participants were that there are approximately 10 to 11 small-scale commercial linefishers fishers still active in the area.

The historical context of the town’s fishery is very important when trying to understand recent observations, especially those associated with the size of the fishery. In 1926/27 Mossel Bay had about 5,838 residents of whom 800 were dependant on the fishery industry altogether, including more industrialised fisheries and those employed to process catches (Visser, in review). Visser in her review of economic conflict in the fisheries of the South African South East coast *circa* 1910-1950 paints a picture where the inshore handline fishery in Mossel Bay became increasingly threatened by not only the inshore trawl industry, but also large corporations and diminished support from government and policy makers. This resulted in the marginalisation of the small-scale commercial handline fishers in the area in the 1950s. Visser provides a succinct overview of political changes that took place over the period 1910 - 1950 whilst preceding reviews by Van Sittert (2002) amongst others, document the continuance of the changes effected by politics and policies, especially in post-apartheid South Africa.

Leaving the fishery is a long-term and permanent adaptive strategy where fishers have made a conscious decision to pursue other opportunities. It is not clear whether the attrition should be attributed to stressors such as those identified and discussed in Chapters 3 and 4 or whether it is as a result of marginalisation documented by Visser (in review) or a consequence of a combination of both factors.

The decision to leave the fishery may be regarded as a form of restructuring. This type of restructuring may eventually lead to a form of community closure[74] (Berkes & Folke, 2003; Ommer & team, 2007; Perry et al., 2011). Notably, restructuring also takes place because of political change in the fishery system (Perry et al., 2011). Although an in-depth analysis of these changes does not fall within the ambit of this discussion, it becomes clear the restructuring of the small-scale fisheries system in Mossel Bay may have been necessary to ensure sustainable livelihoods. In this context, restructuring refers to alternative employment opportunities and structure of the fishing industry in the area (Ommer & team, 2007). Examples of restructuring from case studies by Perry et al. (2011) include shifting within a specific industry or to alternative industries and other forms of employment. Employment shifts can involve moving from local small boat and inshore fisheries to crew on larger, offshore vessels or the development of other maritime activities such as aquaculture or fishing tourism. In Mossel Bay, current industrial activities include the petro-chemical industry, tourism, general "light" industry[75], agriculture and industrialised fishing[76]. Shifting to these alternative activities may make it difficult to return to the fishery if licences (and rights), boats and equipment were sold (as corroborated by other case studies, e.g. Tomberlin, 2001; Pollnac et al., 2008 and Perry et al., 2011). What is clear is that, should the current high rate of attrition continue, or the already aging fishers retire, it may not be all that long before there are no traditional small-scale commercial handline fishers operating out of this area. One may then be faced with a scenario akin to

[74] The community in questions is a community of fishers as opposed to a community found within the geographic confounds of a town.
[75] light industry refers to less capital intensive and more consumer orientated activities such as the manufacture of clothing
[76] http://www.Mossel Baymun.co.za/ accessed 27 Nov 14

community closure[77]. The persistent scarcity of Kob as well as an increase in input costs, an increasingly rigid policy and regulatory framework as well as a severe shortage of new entrants to the fishery (especially in terms of crew) outlined in the previous chapter may well represent the severe crisis that signifies the shift toward community closure. It must however be noted, that should this community closure take place, it will not be a sudden catastrophic event such as in cases noted on the west coast of South Africa in connection with ecosystem regime shifts that took place in the 2000s (Jarre et al., 2013). In contrast to the West coast, the shift to other activities in the Southern Coast is rather manifesting as a slow attrition of fishers on longer temporal scales.

Fishers that are still active in the area appear to be who have adapted efficiently to change, as they appear to be operating economically viable small businesses that seem more stable. In lieu of this, this group of fishers may be more assured of a sustainable livelihood when compared to others in the research area. It becomes important to discuss and analyse why these fishes are able to manage their fishery in an economically viable manner, when so many others that operate in the same climate are not able to do so. The first important factor to consider in this context is the transition, by all skipper bar one, from ski boats to deck boats.

The introduction of ski boats in the commercial handline fishery is regarded as one of the most important factors in the development of the industry post-World War 2 resulting in the transformation of the industry, especially since the 1970s (Visser, in review). Ski boats allow for greater mobility and quicker access to resources, as

[77] Community closure happens because of mass out migration as well as slow irreversible depopulation and represents a fundamental change that is consequent upon the recognition of severe crises from which recovery is not likely possible (Perry et al., 2011).

fishers are able to travel faster across the water and require significantly less capital investment than a larger deck boat. However, the use of ski boats poses its own constraints: the volume of catch they are able to carry is limited, they generally have no space for ice or any refrigeration capability and are constrained in terms of the sea state they are able to operate in as well as the range, especially as trips are mostly "day trips".

Deck boats on the other hand are slow, potentially very expensive to acquire and require a longer window of "good weather" to undertake a successful fishing trip. However, their range is significantly further than the ski boats; they are able to operate in rougher weather and to undertake trips spanning three to four days. The conditions on-board are, however, not conducive to staying at sea for these periods as amenities available are basic to say the least. Policy dictates a maximum boat length of 10 m and participants claim that there is no space to install toilets and/or showers on boats this size. The installations of these amenities are in fact dictated by regulations of the South African Maritime Safety Authority (SAMSA), and the continued failure to do so is, according to the participants, in direct contradiction to these regulations. The participants have indicated that they intend to petition DAFF to extend the permissible boat length to 12 m instead.

Participants have indicated that to their knowledge only a single handline fisher operating from Mossel Bay uses a ski boat fitted with an inboard diesel engine. Current deck boat owners indicate that although they have also previously made use of ski boats, they shifted back towards deck boats due to the "the ridiculously high running costs of ski boats", as one fisher put it. The shift towards engines that use

diesel as fuel is a clever diversification[78] strategy that stands these fishers in good stead. The reason for this is multi-faceted: diesel is subsidised by government for certain sectors, including the agricultural sector, and users are able to claim back the value added tax (VAT), currently set at 14%. The use of diesel does not only lead to a reduction in input costs but also allows participants to circumvent significant capital outlays required for expensive outboard engines and the associated rigid maintenance regime. Diesel engines, though more expensive to maintain, require less maintenance and users maintain that they are less "finicky". In an economic climate where raising capital for investment in craft is already overly very challenging let alone the cost implications for continued maintenance of outboard motors, the benefits of using diesel engines far outweighs the risks in the eyes of these fishers.

Diversification not only manifests in the choice of craft or fuel, but fishing is subsequently now extended to other previously, less exploited habitats. Fishers have adapted to resource scarcity in their immediate geographic area of operation by extending their range to the Alphard bank[79]. Diversification is also evident in the targeting of other fish species (such as Silvers) in the absence of the target species despite the lower price. It is important to note that the use of the deck boats is not only a form of diversification, but is also an example of an "intensification of effort" (Perry et al., 2011).

Although an intensification of effort is generally linked to fishing 'harder" on the same stocks in the same area (Perry et al., 2011), it may include the extension of

[78] Diversification can be defined as "the process by which…household construct an increasingly diverse portfolio of activities and assets in order to survive and improve their standard of living" (Ellis 1999:2). Diversification can take place within or outside the fishery.

[79] The Alphard bank is an offshore shoal found on the shallowest peak of the centre of the shelf that forms the Agulhas Bank (Lutjehorms, 2006). The shoal is found at longitude of 35˚02'00'' S & latitude 25˚52'00 E (approximately 62 km offshore of Cape Agulhas) with an approximate water depth of 20 m (although surrounding water falls within the 80 m – 100 m isobaths.

fishing trips on both temporal and spatial scales (at an increased expense) and fishing in poor weather, which could increase the risk for injury and fatality. Although fishers claim to have fewer available sea days and thus may not feel as if they are intensifying effort, targeting previously unavailable stocks, such as the Alphard banks, coupled with the increased capacity of the deck boats signifies an intensification of effort. Whether this a sustainable long-term strategy remains unclear as an increase in effort will negatively affect the biophysical environment as fishing pressure rises.

The ability to implement a big shift such as a change of craft (as these fishers have done) can be regarded as an amplifying adaptation that is associated with higher expenditure and likely, greater economic wealth, in other words, they need access to capital required effect the change. This is consistent with risk and economic behavioural frameworks where wealth tends to reduce risk aversion (Binswanger, 1980, 1981; Wik et al., 2004, Cinner et al., 2011). In terms of the needs of the fishers in Mossel Bay, the use of deck boats provide a good solution to the problems experienced within their local context and appears to be the best available adaptation strategy within the fishery.

It is not easy to attribute definitive reasons for the type of diversification and the amount of restructuring that has, and still is, taking place in the Mossel Bay linefishery. There are however, clear attributing factors that all play a role to varying degrees. Although not explicitly stated by the participants interviewed, the availability of sufficient alternative employment is probably the reason that such a large amount of fishers have decided to leave the fishery and cause it to restructure in the way that it has. The fishers who remain engaged in commercial activities, have diversified in a way that is unique within the study region, as this diversification has taken place within

the context of the fishery. The first example of diversification displays is the move from ski boats to deck boats. In order to implement this strategy, fishers need access to sufficient amounts of capital. It is unclear from interview data how participants raised the required capital, but it may be safe to assume that the general business-like approach displayed by the group would have played a large role. The transition to deck boats is also a business-oriented decision that is indicative of the way that the participants approach and view their fishing activities. The fishers also directly acknowledge that in order to survive they need to manage their fisheries as a business and they view their business acumen as central to their survival. Why this business acumen is not evident throughout all the towns in the study area remains unclear. In terms of Mossel Bay, it may be a case that competition that stems from the proximity of larger more industrialised fisheries has necessitated that the handline fishery in the area adopt more structured business practices from the onset, in order to secure and maintain market share. The role played by the relatively advanced state of infrastructure development encountered in Mossel Bay is important. Fishers from other towns who want to change to deck boats would have either to commute to Mossel Bay or move there permanently as it is the only town in the research area that has suitable berthing available. Whilst the context and scale of the town has a distinct influence on how fishers choose to manage their rights, one cannot ignore the impact of experience and life histories.

It may also be suitable to view the capacity for informed decision-making and ensuing business acumen in the context of South Africa's history of racial segregation and its after effects. This group of participants are all white men and it may be assumed that they have had access to a relatively good secondary school education, and even tertiary education. Additionally, most of them would have had to do

compulsory military service upon leaving school. Thus, many influences, outside the fisheries context, may have shaped the way these fishers think and act. This serves as an example of the importance that context has in day-to-day decision-making. Whilst it is impossible to analyse individual life histories and their impact within the context of this dissertation, their importance in decision-making must be acknowledged and kept in mind.

Apart from the business acumen displayed by this whole group in general, the sole remaining ski boat operator has intensified his effort. He capitalises from the benefits he gains from the use of an inboard diesel engine as described above and intensifies effort by actively targeting the slow growing red reef fish (such as Red Roman) found in the immediate geographic vicinity when Kob is absent and thus ensures that he spends every available moment at sea. This individual also displays contradictory characteristics in terms of his willingness to work with others. To a certain extent, he is a “lone wolf”, with his work ethic and sheer intensity of effort setting him apart from most participants in the research area. He also seems very uninterested in engaging with the more “political” issues that generally plague the fishing community at large although he has very well constructed theories regarding interactions that are at play. This fisher displays little to no cooperation with other fishers to make “finding the fish” easier and thus he does not necessarily benefit from the support of social networks amongst fishers that many other rely on in order to secure their sustainable livelihood (see Duggan et al., 2014). This is however, not necessarily indicative of an unwillingness to share information, but may be due to a certain amount of isolation brought about by the fact that he is the sole ski boat operator in Mossel Bay. A similar situation exists for the participant from Witsands and he acknowledges that whilst the lack of competition for the resource is welcomed,

it would be easier to “find fish” if there were other fishers in the area with whom he could cooperate.

The ski boat operator from Mossel Bay employs the adaptation of fishing methods as another strategy. His use of *“riemhou”* (described in chapter 3), requires great skill and has become hugely popular amongst many of the younger skippers (Duggan et al., 2014). The ‘older generation’ and other opponents to this method have indicated their displeasure at this method as they feel that continuously running engines will chase the fish away. Fishers have the opinion that they do not regard this as a sustainable fishing method as the fish will move away, from the anchored boat, when they have had enough to eat, thus ensuring that the fish, as one participant stated, “live to see another day”. Whilst it is impossible to resolve the debate within the scope of this dissertation, it is clear that for the fishers who employ it, the option remains a highly successful, if more costly strategy.

This participant was the only fisher within the entire group who has indicated a willingness to migrate and shift his target area should the fishery in his current area of operation become unsustainable[80]. This fisher is also one of very few fishers who displays forward thinking by having a “plan B” and “plan C” in place. Whilst all the Mossel Bay fishers have already adapted in the longer term, the deck boat operators do not appear to have another alternative strategy in place should the operation of deck boats become unsustainable (if, for instance fishing on the Alphard Banks were to be prohibited). This lack of another, alternative strategy also came to the fore when voicing concerns over the outcome of the rights allocation process. This underscores the point that even when adaptation has taken place, the constant flux of the system

[80] Out-migration, along with restructuring may also serve to also foster community-closure (or some form thereof).

requires that fishers remain dynamic and proactive in their responses (such as displayed by the ski boat fisher who already has “plan C” in place).

The town of Gouritsmond has also seen a large attrition of handline fishers and it is unclear exactly how many fishers remain active (some participants from other areas have indicated that there seems to be two or three skippers that are still fishing). The participant from Gouritsmond is no longer involved in commercial fishing after having surrendered his right some time ago as he regarded it ecologically unsustainable to carry on with fishing commercially. He has diversified outside the fishery by capitalising on tourists that seasonally visit the town. This is accomplished primarily through the operation of fishing charters during the holiday season and interests in other businesses such as holiday letting. He also displays a keen interest in aquaculture. This type of diversification is a prime example of diversification of economic activities in order to establish a steady stream of alternative income sources (De Haan & Zoomers, 2005). This is in direct opposition to the diversification displayed by other participants in this group who have all diversified within the sector.

As an interesting point, this participant was not always a fisher and was previously a successful farmer. He moved to Gouritsmond and took up commercial handline fishing as a form of retirement. The choice of town is telling – Gouritsmond is a small, holiday town with few permanent residents and there would thus be considerably less ‘competition’ from other commercial fishers in the immediate vicinity. Gouritsmond is also relatively close to Mossel Bay and the convenience that the larger town offers and essentially allows one to have the best of both worlds in terms of convenience and a quiet, rural town setting. Additionally, Gouritsmond offered this participant other business opportunities, such as holiday letting, a café and fishing

charters, upon which to capitalise. The decision to exit the fishery timeously affirms this participant's keen business sense and acumen – as soon as he noticed that fishing would not provide the desirable income, he exited the fishery and diversified outside the fishery. Once again, the life history and knowledge held by the individual has played an important role in his decision-making processes.

The sole participant and still-active handline fisher in Witsand manages to ensure a sustainable livelihood by implementing a number of measures that together allow him to continue to earn a living primarily derived from his fishing activities. Apart from spousal support that provides a form of steady income, and diversification in the form of activities such as helping farmers chase baboons off their farms, this fisher is set apart from all study participants in the way that he manages his fishery business. He made a conscious decision to create a close corporation[81] (cc) with his crew as named shareholders in 2005. A profit share agreement was also put in place. The close corporation bears the cost of "boat rental" and other related expenses. Profits after salaries are kept in a business bank account and paid out periodically in accordance with the shareholders agreement. This ensures that there is still a small stipend available for the shareholders on a monthly basis during the off-season. Although it is not always enough money to sustain the fishers completely throughout the off-season, it does partially contribute to the sustainability of their livelihoods.

This strategy allows this fisher to manage his fishery as an effective, accountable business and has stood him in good stead during FRAP 2013. Apart from

[81] A close corporation is a simplified and flexible business (as opposed to a company) and is ideally suited to small businesses. The ordinary person is be able to draft the necessary papers and register the corporation by her/himself. Although a close corporation is required to have an Accounting Officer, audited financial statements are not required. Members of CCs do not all have to take an active role in the running of the business although; the "members" are also often the managers of the business. (http://www.cipro.gov.za/products_services/close_corps.asp accessed 23 January 2015)

the procedural and administrative problems encountered with the process on the whole, this fisher was able to score more than enough points in order to be reallocated his right as he was able to prove compliance to balancing and evaluation criteria (see Chapter 2)[82]. He was able to do so because of the fact that he has the cc, which proves that it is not impossible to comply with these criteria. It appears that while navigating policy and regulation may be challenging (due to various reasons already described in Chapter 4) there may be other factors at play, which complicate stresses caused by policy and regulatory challenges. This "complication" and their implications become more apparent when dealing with the strategies employed by the second group of fishers, and will be discussed in the next section.

Importantly, Witsands has a strong fishing history and unlike the other towns in the research area, it started out as a town where fishing was always the primary livelihood activity. This is in direct contrast to specifically Stilbaai, Melkhoutfontein, and Vermaaklikheid where the primary livelihood activity was agriculture with fishing very much a secondary activity (see Visser, in review). What is today known as Witsands was the south-western corner of the farm Westfield. The then owner, Capt. Benjamin Moody, allowed farmers and town folk to camp in the dunes during the holidays. Around 1900, permission was given to fishers to erect permanent fishing cottages in order to allow them to more easily pursue their profession. The demand for plots grew and the land was eventually sold off and progressively developed into the popular holiday resort that it is today[83]. The participant from Witsand is directly descended from one of the fishers for which the original fisher cottages were built. He

[82] This participant was able to prove investment, BEE status, donation to charity, tax compliance etc. - all criteria most other fishers had problems ensuring compliance.
[83] www.overberg.co.za/content/157/28 accessed 27 November 2014

returned to the area to take up commercial fishing in 1996 after spending his early career in different employment. The experienced gained by his previous employment, coupled with his strong fishing history heritage may be the key to his continued survival in a town where all the other fishers have already exited the fishery. Witsands is a very small town, with one shop and a single petrol pump. Most motorists need to travel to nearby Heidelberg to fill up with fuel and purchase basic groceries. The town is essentially, still the holiday town it was 100 years ago, albeit with a few more houses. Opportunities to diversify outside the fishery are very rare and many fishers have had to move away from Witsands once they exited the fishery.

South Africa's Apartheid past has shaped the spatial development of South African resulting in most "white" towns having analogous "coloured" or "black" communities in the proximity of the "white" communities. Witsands has no such town in close proximity and crew members reside in Slangrivier, some 32 km away. Slangrivier was not previously considered part of the research area due to its relative geographic remoteness from the coast. There is thus no primary data available from these fishers. The town will be included in further research endeavours as it forms an integral part of the fishery system in Witsands.

The lasting impression created by this first group is that they display a large amount of business acumen compared to other groups and the assumption is thus made that this business acumen is what sets them apart in their relative success as fishers. The question that begs asking is why these fishers are able to adapt successfully to the same stresses that are felt by all throughout the study area?

The handline fishery in the area has been forced to develop and co-exist with the local trawl industry (Visser, in review). This close existence may have forced the

handline fishers of the area to adapt relatively quickly and consistently in order for them to be able to compete for available resources. This competition may make this group more resilient and "in tune" to changes and quicker to respond to these changes. Fishers may possibly have been forced to take a more business-like approach in their profession to compete and occupy their niche successfully. This experience, together with the fact that many of the fishers who all claim to have a strong, traditional fishing background that would have shaped the life histories of the fishers in the area with cultural and social norms, may be dictating current responses[84].

There is much variation in the degree of responses both within this group and in contrast to other groups. Just as the degree to which responses that can be applied by different countries varies because of differences in development statistics, similar differences occur in the event of available responses amongst and within communities. Studies of the impact of the cod collapse on health and social wellness in Newfoundland have found that social capital (defined as social support, trust, leadership and civic engagement) helped to account for the higher dependence on social assistance, lower median family income and greater outmigration in one community compared to another (Perry et al., 2011). Household and community level decisions regarding investments, reduced dependence on external initiatives and stronger contacts with local decision-making is important when examining why towns respond differently to the same stressors. The fishers of Mossel Bay, in contrast to the rest of the fishers in the region, seem to be a relatively tight-knit group, involved in

[84] The definition of a "traditional background" is however, unclear. Fishers seem to lay claim to having a fishing background regardless of the type of fishing that has been engaged (in notably recreational vs commercial). Any contradictions between different definitions applied (especially those applied by policy makers) leads to dissatisfaction and animosity. Clarification of what criteria fishers impose in order to be classified as a fisher may provide valuable insight and inform into how "traditional' fishers are classified and should be classified. This issue will become particularly important when the small-scale fisheries policy is implemented where the allocation of community rights hinges on the "traditional" fishery town and where the definition as it now stands will result in many of the fishers that regard themselves as traditional fishers, being excluded due to limitation in the way the term is applied.

local and national associations and they display a culture of teamwork. This is also true for the participant from Witsands – although he is the sole fisher in the town, he networks closely with the Mossel Bay fishers. As these two towns are geographically quite far apart, one can assume there is certain amount of like-mindedness within this group that allows for its cooperation. This cooperation may be one of the most distinguishing factors of this group and may be a significant contributor to their relative success.

A caveat to this interpretation is that this group of fishers is the remnant of what was once a considerably larger group (as is the case in the whole research area). It is thus safe to assume that the remaining fishers (throughout the research area) are an exceptionally resilient group. This group of fishers has indicated a strong dependence on their own knowledge systems as well as each other, in contrast to requiring external support from NGOs and government, to effect changes that allow them to continue fishing as a livelihood. Additionally, and of critical importance, is that the ability to adapt is shaped by local socio-economic considerations (Smit & Wandel, 2006; Coulthard, 2008). Specific socio-economic conditions dictate not only specific response but also the broad adaptive grouping (as seen in this first group of fishers) (Cinner et al., 2011). This manifested in the manner in which this group has been able to diversify within the fishery. It must be noted that the inability to access capital and resources needed in order to effect changes or conduct maintenance (described in Chapter 4) , is seen by the majority of fishers as a large stumbling block when trying to adapt to change, or even cope on a day to day basis. Whilst the ability to access physical capital brought fruition to the adaptive strategies employed by this group, it is the social capital and knowledge held that would have brought about the recognition of the need to adapt. The recognition of a problem and the ability to forecast and

evaluate the change noted (which is the first step in the process that leads to the eventual decision to adapt) is not only the first step in building resilience, but may be the most important.

5.2.2 Stilbaai and Melkhoutfontein

In contrast to the first group described in the preceding section, the second group of participants tend to react to change. Reacting can be defined as an "unplanned response to an event or change" (Bennett et al., 2014b:4). This is, however, a generalisation and there are those that do implement longer term and permanent strategies. As a precursor to the discussion, it is important to note that socio-economic conditions in the two towns are in stark contrast to each other, but a limited sample and distribution in terms of participants from Melkhoutfontein make it impossible to discuss Melkhoutfontein separately. There are, however, many reasons why it is justified to group these towns together. The fisheries of the two towns are intrinsically linked as they make use of the same facilities, sell to the same suppliers, and display a similar developmental trajectory (Visser, in review). Crew members mostly live in Melkhoutfontein whilst Stilbaai provides many of the diversification opportunities for those fishers from Melkhoutfontein especially concerning alternative employment opportunities. However, impacts of stressors are felt differently by the two towns and the capacity to respond is largely influenced by socioeconomic factors such as access to capital, knowledge base (education level), alternative skill set etc. (Smit & Wandel, 2006; Coulthard, 2008). Lastly, whilst an argument could be made to group Melkhoutfontein and Vermaaklikheid together available opportunities as well as the developmental challenges experienced by these two towns differ vastly.

The fishery in the towns of Stilbaai and Melkhoutfontein display the same attrition of fishers described in the previous section. This attrition is reflected in the fact that DAFF records indicate 16 active rights in Stilbaai and Melkhoutfontein during 2011 and by the end of 2013/beginning 2014, when the interviews were conducted, only about half of these vessels seemed to be active. Interview data suggests that many fishers who were allocated rights in 2004 and 2006, were not "traditional"[85] fishers and not originally from the area. In light of this, what may be seen as a high attrition rate, may just be those "new commercial entrants" who have left the fishery after being unable to "make it". This suggests that many of these new entrants were not necessarily competent in the fishery or conditions therein and thus more vulnerable to the constantly changing environment. Participants in the research expressed an opinion that many of these fishers entered the fishery during a fishery "boom" period and thus thought they would make "easy" money with relatively little effort. This is particularly true in the case of the hake handline right. However, once fish catches started dwindling, these fishers did not have the knowledge or resources to cope with the variation and ended up leaving the fishery. As it is doubtful whether these fishers will return (or be able to return) to the fishery it becomes important to bear in mind that this is considered a long-term adaptation which could ultimately lead to a form of community closure. This community closure would, as with the case of Mossel Bay, be a slow ongoing process that most probably already started in the 1970s (see Visser, in review) with the hake and kob "booms" providing a brief reprieve.

Current adaptive strategies employed fall into the broad categories of diversification outside the fishery, riding out the storm and a decrease of effort. The

[85] It is unclear whether these fishers were new entrants, previous part time, or recreational permit holders that wanted to make the shift to commercial fishing.

Stilbaai and Melkhoutfontein fishers are faced with infrastructure constraints when considering available options. Not only is berthing for deck boats not available, but facilities for the processing, storage and distribution of fish are also limited. The geographic remoteness of the town (in relation to Cape Town, as the main offset point for most of the fish, with Johannesburg and Durban, which is even more geographically removed, providing alternative offset points) adds another challenging aspect.

Fishers from these two towns make use of a diverse range of strategies to ensure that they are able to survive on a day-to-day basis. Whereas fishers in the previous group have very similar strategies that focus on improving their fishing efficiency, this group has diversified by using other skillsets to earn alternative incomes. Apart from spousal support and reliance on government grants where applicable, fishers in these two towns generally have other “plans to make money”.

The resources available (with specific reference to capital and skills) play a large role in how fishers choose to deal with change. Based on resources at their disposal, it is possible to identify two sub-groups within the larger group. The first group are fishers that have other, alternative income sources (such as pension, investment income, rental income, more formal secondary livelihood activities) and seem to have had, or still currently have, access to larger amounts of capital, through financing, sale of businesses, (early) retirement or severance pay. The income generated has provided a certain level of financial security when income derived from fishing is not sufficient. Almost half (46%) of the total active fishers in the overarching group have indicated that they have previously engaged in other full-time economic activities before making the decision to start fishing commercially. By implication,

these fishers also have alternative skill-sets that can be used. The importance of alternative skill-sets is demonstrated in the secondary livelihood activities fishers engage in. These activities includes fixing boats and outboard motors, panel beating and spray painting services, renting out accommodation, subsistence farming, bee keeping and operation of boat charters in other areas of the coast. All of these activities have the ability to generate decent amounts of income in contrast to informal, unskilled employment. This opportunity to access alternative sources of income has allowed these fishers to effectively "ride out the storm" as they do not feel the need to make long term plans to adapt even if they have the resources at their disposal to do so. An example of this is that these fishers opt keep on using a petrol outboard motor as opposed to a diesel inboard engine even though they bemoan the cost of petrol.

The second subgroup has limited access to stable alternative income sources and have been fishers for all of their working lives. In contrast to the first group, this group does not have, nor have they ever had, access to large amounts of capital. As they have always fished, they also do not have an alternative skillset to draw upon and although some have made the effort to remedy this, many are forced to take up unskilled, informal employment opportunities. As employment opportunities within these communities are limited, the temporary nature of alternative employment should, in principle, suit fishers, as they want to be able to go fish whenever they want to do so. Local business owners display some resistance when it comes to employing the fishers, as they want employees that are guaranteed to come and work every day. These types of employment opportunities are not necessarily high paying or sustainable and include activities such as gardening, painting, construction work and employment within other fishing sectors such as the trawl industry. This makes for a group of fishers that engage in a "hand-to-mouth" existence where tomorrow will take

care of itself. This is however, a generalisation and there are fishers that do try to plan ahead and save money for unforeseen circumstances. What is clear is that the strategies are constrained by financial resources and fishers may find themselves unable to adapt to changes even if they wish to do so.

The group from Stilbaai and Melkhoutfontein displays an immense amount of optimism in terms of the longevity and sustainability of the industry (see Chapters 3 & 4), although the presence of alternative strategies may be indicative that the need for an alternative strategy is also recognised. This optimism juxtaposed with the existence of alternative plans reveal that the prevailing strategy may well be to "hope for the best and plan for the worst". These "planning for the worst" strategies are not long-term strategies, and thus fall into the realm of reacting and coping. The behaviour observed here rests on the supposition that fishing will always remain their primary source of income and fishers explicitly state that they do not wish to do anything but fish. The long-term sustainability of this strategy must be called into question as many of these fishers' livelihoods are only really secured when a consistent and substantial income can be derived from fishing as the primary source of income

This research was preceded by four to five years[86] of some of the consistently worst Kob catches in recent memory. Fishers who had saved funds and made contingency plans have depleted their financial reserves and indicated that it was becoming more and more difficult to find the money needed to proceed to sea. Fishers thus currently display a marked decrease in effort and carefully select days on which to go fishing where the decision hinges on the probability of a good catch. Although fishers do target less lucrative fish in the absence of Kob (see Chapter 3 and 4), this

[86] The exact period varies between participants' responses

comes with significantly higher costs, and fishers struggle to make a profit or even "break even". This has resulted in many fishers' resorting to borrowing money from other fishers and/or the intermediaries that buy the fish (see Chapter 4). Once daily catches are weighed and earnings calculated, the intermediary first subtracts money owed to him before paying the balance to the skipper. The skipper is obliged to pay the crew members their agreed upon percentage first and is left with little to no profit and may be forced to take another loan to proceed to sea again. These loans, although helpful in the short term, run the risk of becoming debt traps for the skippers if catches landed remain bad. The willingness of the intermediary to help the fishers is not only based on personal relationships with the fishers, as he regards many of the fishers as his friends and vice versa, but also on the recognition that he has no chance of making money if the fishers are not able to go to sea[87].

The Stilbaai/Melkhoutfontein group also appears to display less business acumen than the group in Mossel Bay. This manifests in how the management of the right is approached and the approach is markedly more casual than that found in Witsand and Mossel Bay. This seems to be substantiated to a certain degree by the fact that most fishers did not score well in terms of balancing and evaluation criteria. The case of the fisher from Witsands underscores the fact that, although not always entirely appropriate for the sector, these criteria do not disadvantage the fishers as much as they like to believe, as it is possible to comply and score relatively high. The failure to secure a right is a cataclysmic event forcing fishers to either diversify outside the fishery or continue fishing, albeit, illegally, as indeed some threatened to do once the outcome of FRAP 2013 was announced. Notwithstanding shortcomings in

[87] Merchants interviewed also indicated that due to downturn in fishery they were also struggling to pay bills. They have expenses even if there is no fish (unlike fishers) - the water, electricity, and rent of business must still be paid. Larger company operating in Stilbaai harbour may find it easier to absorb these losses as they generally have access to larger amounts of capital.

previous and current allocation processes, much of the uncertainty and ensuing risk could have been avoided if these fishers had put themselves in a position where they were able to prove compliance to the various criteria. Some of the participants went as far as to say that many of their colleagues viewed FRAP 2013 as a formality and expected that the status quo would be maintained and it seems that a certain amount of complacency may have crept in. One cannot overlook the fact that as fishing-derived income declines, many fishers may not have been financially secure enough to comply with the requirements that have financial aspects attached to it. If more capital had been continually reinvested back into the business, as in the case of the participant from Witsands, they may have found themselves in a better position to increase their overall scores. The failure to manage their right in an organised and formalised manner makes them more vulnerable to changes on multiple scales: not only are they generally unable to sustain themselves and the crew in the "off season", they also place themselves at risk in terms of policy and regulatory requirements.

The question that begs asking is why there is such disparity between how this group and the Mossel Bay group chooses to react to change? The answer to this question may well lie within the social context and life histories that shape communities. Historically, inhabitants from Melkhoutfontein and Stilbaai were never "just fishers" and instead there was engagement in a wide range of activities. In fact, agriculture was once the primary livelihood activity with fishing in the Goukou River merely a secondary source of food and income (Visser, in review). Generational fishers were thus probably taught that engagement in a wide range of alternative economic activities helps to secure one's livelihood and thus the decision to diversify outside the fishery. This is corroborated by Visser (in review) who describes a behavioural pattern that displays distinct similarities to what is seen today. The towns

of Melkhoutfontein and Stilbaai, although very similar in origin to Mossel Bay, are on different development trajectories, mostly influenced by infrastructure[88].

The appropriate question may be: why does this group choose to implement temporary, short-term strategies as opposed to the long-term adaptive strategies seen in the first group? Is it because fishers choose to stick to what they know or is it because they do not have the knowledge to do otherwise? Upon engaging with the fishers from these towns about possible interventions, they seem to have a very negative outlook and instead of seeing solutions, they tend to highlight barriers to any alternative strategies proposed. The possible reason for this reticent approach displayed towards change may not be linked to knowledge, but may be rather indicative of resistance to change in general. The marginalisation of small-scale commercial fishers has, in terms of regulation, resulted in a policy vacuum that has existed for decades thereby creating a "grey area" of sorts. The implementation of the MLRA and the ensuing regulatory climate has steadily been closing this gap resulting in the "grey area" gradually disappearing. Once the SSFP has been implemented, this last bit of "grey area" will have disappeared. The current small-scale commercial rights holders will be forced to choose between staying in the commercial fishery that will require them to comply with current regulations where a business-oriented approach will ensure a sustainable livelihood or to become part of a community right as set out in the small-scale fisheries policy. Fishers do not really want to have to make this choice and if it were up to them, many fishers may want to maintain the current status quo as they have become adept at navigating this "grey space". While one must not ignore the challenges with the implementation and regulation of policy (see chapter

[88] Examples of infrastructure related problems are the transportation of fish (railway vs road) and having to proceed to sea in flat bottom boats via the dangerous and unpredictable river mouth (Visser, in review).

2), the animosity emanating from the fishers may well be due to a certain amount of resentment that stems from the fact that it is DAFF that is forcing this unwelcome change upon them.

This group does, however, display more resilience than the other identified groups. This statement is based upon the fact that the system "state" is always able to return to the beginning state, as strategies employed result in temporary changes. However, as Folke (2006) posits, whilst resilience is a good thing, too much may be detrimental as it prevents the systems from changing when it actually should. This is particularly true in the case of this group where the underlying sentiment is that the "fish will come back". That said, it is important to bear in mind that diversification options and opportunities available to fishers are somewhat limited. Many of the fishers from Stilbaai that have made the decision to leave the fishery have also made the decision to leave the geographic area to pursue other opportunities due to a lack of adequate employment opportunities. The same is not true for Melkhoutfontein where the sense of community and being "from there" is much stronger than in Stilbaai. Participants from Melkhoutfontein explicitly disregard the idea of out-migration as a long-term strategy because Melkhoutfontein is their home and always will be. There is thus a strong sense of place and belonging that is incidentally, echoed by the participants from Vermaaklikheid. Whilst the reasoning is not the same as in Melkhoutfontein, the Stilbaai fishers who are still actively fishing do not currently regard out-migration as an option. Importantly, this view is linked to the belief that the fishing will be able to continue as before. However, one may argue that the fishers in Stilbaai can afford to hold this view as alternative incomes and activities described above do help to "prop up" the business in the short term. They are thus not really feeling the long-term effects of fish scarcity now and when they start to think they will

need to change, they catch enough fish to reinforce the belief that the fish will come back. In light of this, it becomes clear that this group indeed may well indeed be an example of a system that displays too much resilience and one cannot help feeling that real and lasting change is needed to guarantee the longevity and sustainable future of this particular community of fishers.

5.2.3. Vermaaklikheid

The last group comprises the fishers that reside in the hamlet of Vermaaklikheid. Vermaaklikheid, situated on the banks of the Duivenhok River, is comprised of mostly holiday homes that are surrounded by agricultural land[89]. The participants from this area are all from the coloured community that reside on what is known as the "koppie"[90]. This is a primarily subsistence fishing community that previously fished in the Duivenhok river as well as from the shore at Puntjie. Current fishing activities are limited to acting as crew for the three small-scale commercial boats that operate in the area.

Strategies employed to deal with change are similar to those used in other towns and can be broadly characterised as diversification, riding out the storm and restructuring although opportunities for diversification and restructuring are severely constrained. While some of the constraints emanate from the rural nature of the town, and accompanying lack of infrastructure and development, social and economic conditions, such as poverty and education levels, also play a big role. Severe

[89] Statics SA in the 2011 national census included the hamlet within "small area" no 175 0031 which comprises 124 km ², has 99 households and a total population of 356 people. It is a large area with a small population density (2.87 km ²) and can be classified as rural.

[90] Small Hill

constraints are thus placed on the ability to implement adequate coping and adaptation strategies, resulting in a true “hand to mouth” existence.

The community expresses a large measure of hopelessness when considering their present and future situations. They feel powerless to solve their problems at both the community and individual level and are waiting for someone (or some government entity) to swoop in and “fix it”. How this could be accomplished is unclear, but what it is clear is that these are, understandably, highly emotive issues for the community. These types of emotive responses will influence what communities discuss and plan for and may undermine their ability to adapt to and/or cope with those stressors that seem to be less “blameworthy” but more quantitatively important, such as climate change (Bennett et al., 2014b). This manifests as a fixation on the role of government in problem creation and providing solutions. While policy and regulatory issues play a role in the community’s ability to sustain livelihoods, government is not able to do anything about most of the stresses identified and thus their ability to address these issues severely impaired.

There is very little written about Vermaaklikheid and its history although the census 2011 data does shed some light on the prevalent economic conditions in the “small area”. Income data paint a gloomy picture of the hardships faced by communities within the area: 51,7 % of census 2011 respondents indicated that they had no income[91], while 26,7% indicated an income of less than R 1600 per month. Additionally only 11% of census respondents indicated that they were formally employed, while 32,47% indicated informal or private household employment. However, when asked about their type of employment, 56,41% of respondents were

[91] Respondents were asked about steady monthly income.

recorded as “not applicable” thus making it difficult to make inferences regarding their current economic activities. Although the census data is the most up to date and comprehensive local context data available at present, there seems to be some “gaps” present when looking at some of the permutations in terms of employment statistics, especially as so many responses were recorded as “not applicable”. The development of local context indices that will prove to be more useful is the subject of ongoing research in the research area.

South Africa’s Apartheid legacy has resulted in an uneven distribution of resources amongst racial groups that is still very evident within communities such as Vermaaklikheid. Poor fishing households still have a legacy of poverty with limited access to education and resources that are required to fulfil basic human needs (Isaacs, 2006). As in the case of Melkhoutfontein, there is also a strong dependence on some form of social grant as a steady income source although most struggle to survive on these as their primary source of income. One must then wonder why there is such a dependence on government grants and why this hamlet is on such a different development trajectory in relation to other towns in the research area.

Vermaaklikheid is geographically isolated and is accessible by two gravel roads that connect it to Riversdale (34,3km) and Stilbaai (43.1 km) which are the two closest towns. There is no bus service or public transport infrastructure servicing the community and only one member from the community on the “koppie” owns a vehicle. He provides a transport service to Riversdal at a set rate per person, but it is expensive, especially for people who are not earning a steady income. The need to travel to Riversdal is a practical one: there is only one “spaza” shop that is run by a local farmers’ wife, but prices charged for basic food items are exorbitant and one

cannot help feeling that the community's inability to travel to Riversdale on a regular basis is being exploited. The women in the community take responsibility for the procurement of basic foodstuffs and other goods needed for day-to-day living and there is a spirit of co-operation between them in an effort to surmount these practical challenges. This is evident in the way they "club" together to go to town in order to share the costs of the transport, take others' shopping lists with them, and generally help each other out where they can thus displaying a general spirit of "Ubuntu"[92]. This strategy of "Ubuntu" can be regarded as one of the most significant coping strategies currently displayed by this community (Ommer & team, 2007; Bennett et al., 2014b). While the infrastructure challenges described above do not relate directly to fisheries, it demonstrates how important infrastructure (or lack thereof) affects the development of not only a fishery (as with Mossel Bay and Stilbaai), but also the communities dependent on it.

Participant accounts of the recent history of Vermaaklikheid indicate that what were primarily productive farms have slowly evolved to an area filled with holiday houses and non-crop farms resulting in the systematic reduction of available employment opportunities in the area. As dependence on agricultural activities and associated employment opportunities steadily decreased, fisheries became an ever-increasing important livelihood strategy. Participants have also indicated that farmers previously allowed their employees their own small vegetable patch/garden on their land in an effort to improve overall food security. This is significant in the context of the community on the "koppie" – whilst they have government provided housing, gardening space is limited and they hold no communal land on which to implement a

[92] "Ubuntu" is an Nguni term that literally translated means "human kindness". In the South African culture, the meaning of the term takes on a more philosophical meaning where it speaks to the belief in a universal bond of sharing that connects humanity. This African philosophy is based on mutual support and sharing what you can to help others.

project such as a community garden. There is however one ex-fisher who has, with the assistance of DAFF and the Department of Trade and Industry (DTI), started a subsistence “chicken farm” as part of a programme where people are trained and given a “starter kit” of chicks to launch the project. This particular participant is able to engage in this activity, as he is fortunate to have a smallholding. Importantly, he did not leave the fishery by choice, but was forced to by problems experienced with regulation and eventually just gave up.

Along with the shift away from agriculture, access to the river has been removed by means of regulations that prohibit fishing in the river. Fences have also been erected to demarcate the farm boundaries resulting in the removal of walking access to the coast. Both these restrictions have an impact on the ability of this community to employ subsistence fishing as a coping strategy. There are thus limitations on both the formal and informal employment opportunities available and very little opportunity for both subsistence fishing and agricultural activities.

The three small-scale commercial fishers in the area provide the opportunity for employment as crew members, although this is not without its own constraints as fishers are forced to either launch boats in the river and exit through the dangerous river mouth or travel along the gravel road to Stilbaai to launch there. Both of these options are not ideal: travelling an excess of 80 km by road per day adds to inputs costs and the condition of the road poses safety risks associated to towing the boat by vehicle on a gravel road. The option to launch in the river is only viable in favourable weather conditions and “good” sea days seemed to be decreasing (see chapter 4). In addition to this, the high prevailing unemployment rate means that there is much more crew available than is required. Notably, not all crew members are traditional fishers,

but due to the absence of alternative employment opportunities crewing remains a viable and potentially, lucrative alternative livelihood activity.

Participants diversify outside fishery by engaging in informal economic activities such as alien vegetation clearing and providing garden services. The harvested wood is then sold to holidaymakers and other residents. In periods of high demand, such as the holiday season, selling wood can be a lucrative undertaking. This strategy is employed with a mixed amount of success – the owner does not necessarily invite the "woodcutters" onto the land and there have allegedly been complaints from farmers that the wood left behind poses a fire risk and that the responsibility of removing the leftover vegetation then reverts to the landowner. The woodcutters disagree with this sentiment and feel that they are doing the farmer a favour, as they would have to clear the alien vegetation from their land in any case. Gardening and caretaker opportunities are rare, as many houses are holiday houses and owners are reluctant to let strangers work on their property in their absence. As with any community, there are criminal elements that have in the past broken into houses and continue to do so. It is not clear how much of the crime experienced is borne out of desperation and if the crime is actually as bad as it is made out to be, but it clearly exists and stands in sharp contrast to the spirit of Ubuntu described above.

Conversations with the "coloured" community on the "koppie" reveal the significant amount of mistrust between the "white" and "coloured" members of the community. This is not unsurprising as the lingering legacy of South Africa's political past is more prominently felt and seen in rural areas, as opposed to more urban areas, an experience echoed by numerous communities across South Africa (Isaacs, 2006; Sowman, 2006). The distrust causes a failure to engage effectively in terms of, not

only conflict resolution but also coming to an agreement on community focused coping and adaptive strategies that may need to be implemented.

Low education levels have also been identified as an area of concern. Coupled with the remoteness of the town, continuing low levels of education must be seen as a major contributing factor to poverty, and more specifically, may limit community members in their available future livelihood choices (Isaacs, 2006). There is, however, a community member (and study participant) who has recognised this and is using her expertise to start an independent community school where every effort is made to provide the best possible education for the children of the community. The rationale employed by this participant is that the only way to break the endless cycle of poverty is to provide proper education to the children in the community. This venture receives no government support and is instead, funded by a Christian organisation from the United States of America. This brings home the fact that there is little to no support for the community from NGOs and apart from private citizens that contribute to funding through donations, the school, and by implication, the community doesn't seem to be on anyone's "radar". Notably this participant as well as the participant who runs the subsistence chicken farm are a couple that moved from Cape Town some years ago where he was a successful fisher and she was a lawyer. This is thus a case where expertise gained elsewhere, such as in the case of Witsands, is being employed to mediate the current situation in the community.

Challenges brought about by the inability to access capital has resulted in fishers in the community who would like to apply for rights, being unable to buy boats and equipment needed to comply with evaluation criteria used to allocate rights. This is in direct contrast to the Mossel Bay group where the access to capital has allowed

them to very successfully to diversify within the fishery. In the case of the Stilbaai group, an inability to access funds seems to limit the options that are exercised and in the case of this group, lack of funds restricts access to the fishery as a whole. This community will most likely benefit (along with Melkhoutfontein) from the implementation of the SSFP. Whilst there are limitations and concerns with the implementation of the policy (see chapter 3), the successful implementation and management of the community right should benefit both these towns in terms of, not only their food security, but also their overall resilience and ability to diversify in the future.

In the consideration of alternative future adaptation options, participants express an unwillingness to migrate, albeit temporarily or permanently. Participants regard Vermaaklikheid as their home and there is a connection to place that outweighs the livelihood struggles that they endure. Additionally, participants are quick to point out that migration to bigger urban areas does not guarantee employment, a sentiment echoed when one considers the national unemployment rate. Out-migration may furthermore may lead to the fracturing of communities, break networks, and transform relationships. Importantly the mood of the community is impacted when social relations within are changed (Ommer & team, 2007). Instead, communities and households should be encouraged to maintain diverse livelihood portfolios, including the development of subsistence activities (Ellis & Allison, 2004; Bennett et al., 2014b) – something that in light of prevailing social and economic conditions is not always possible or easily attainable, a fact that holds particularly true for the community of Vermaaklikheid. Social and economic conditions found in the community and resulting limited resources held by both individuals and the community on the “koppie” will limit, as in the case of the second Stilbaai subgroup described above, the ability to recognise

change and adapt to it. They are thus by implication very vulnerable to the effects of identified stressors but completely unable to effect the change needed to adapt, a fact that is explicitly acknowledged by community members.

5.4. Concluding remarks

This chapter serves to highlight strategies currently employed by fishers to ensure sustainable livelihoods and endeavours to provide a description of strategies that are implemented, provide insights into the decision-making process and possible implications for decision-making. This discussion is by no means complete, as a thorough evaluation that focusses on the reasoning used when making decisions will provide much more insight into the rationale employed. What is clear is that an overall trend discerned from the discussion is that both cognitive and reflexive decision-making processes are shaped by individuals and communities' experience of both their past and present environments. The fact that the practical implications of actions are not always the overriding concern in decision-making is highlighted and underscores the importance of culture and belief systems in decision-making. There is also recognition that the severity of the challenges experienced with policy and regulatory processes may be exacerbated by a strong resistance to change. Fishers are comfortable with navigating the status quo because it is "what they know" although tightening regulatory frameworks are forcing fishers to make decisions that they are not comfortable making, especially when considering implications of the implementation of the SSFP. It is also demonstrated that it is not impossible to function and operate within this new regulatory framework if sound business practices and informed decision-making are implemented.

Chapter 6 - Conclusion

The research presented in this thesis adds to the knowledge base through analyses of the stresses and perturbations that affect traditional commercial handline fishery of the southern Cape coastal region. The thesis also provides a preliminary analysis of adaptation strategies currently employed by fishers in this sector. In addition to this, a synopsis of the opinions and perceptions held by fishers (presented in Chapter 3) provides a "snapshot" of the fishery in this area that not only gives valuable insight into the day-to-day experiences of the fishers but also places the national and global into an appropriate context, thereby highlighting the relative importance of these two scales.

The small-scale commercial handline fishery of the southern Cape, as is the case of most fisheries worldwide, is subjected to a range of environmental, climatic, and economic change, which requires ongoing responses in the form of reacting, coping, or adaptation. The data obtained from the participants, depicted in Chapter 3, paint a picture of a system that is subjected to ongoing change resulting from multiple stressors and their interactions. Not only are fishers required to cope with, and adapt to variability in the biophysical system, but they are also subjected to important social and economic pressures as well as those created by policy and management decisions. Examples of such pressures highlighted in chapters 3 and 4 include variability found in the natural environment with specific reference to weather fluctuations and the scarcity of the primary target species, pressures created by a perceived inadequacy of regulatory oversight and the administration of rights as well as pressures created by increased input costs and the general cost of living. Notably, these fishers have very little to no control over most of these stressors, as many of

these changes are the result of larger, macro scale events and developments, from which they are disconnected. An example of this is the constant fluctuation of the petrol price, which has a direct impact on the input costs. Fuel prices are adjusted and fixed nationally and are driven by changes in the international crude oil price. While it is straightforward to predict the impact of certain macro scales stressors on micro scales, such as the impact of a petrol price increase on consumers, this does not hold true for all stressors, mainly because the interaction across scales, including feedback loops, will cause a difference in how the impacts are felt. This is in part, demonstrated by the variation in responses to the same stressor amongst individuals and communities described in Chapter 5. That said, there are stressors that occur due to a failure to react appropriately to an initial stressor (see Chapter 4) and although the reasons for this failure may be wide and varied, it may be argued that some of the resulting stressors may well have been either dampened by an appropriate reaction or altogether avoidable. My research has highlighted some pertinent factors that need consideration, further research, and/or intervention in this regard.

Knowledge gaps that exist in terms of understanding variability and change within the marine environment as discussed in Chapter 4 hampers our ability to develop a comprehensive understanding of micro-scale interactions that influence the fishery system in the southern Cape. This knowledge gap has a real and distinct impact on the overall resilience of the human social component of the system, because it ultimately affects long- and short-term decision-making. Currently, fishers use only their experience and the past to inform decision-making processes when trying respond to change. As elaborated in Jarre et al. (2013) in the context of the pelagic fishery system on the west coast, this will not be sufficient in future, as climate change will affect the biophysical environment outside the range of our experience. These

changes need to be forecasted and communicated in order to allow for informed decision-making locally, as a basis for sustainable, long-term adaptation strategies. In the absence of reliable long-term projections, carefully designed scenario analyses would help fishers to make long-term choices. Drastic changes made by fishers are likely required, as well as some intervention and support from government and NGOs to facilitate that change.

The examination of multiple stressors provides valuable insight into the fishery system. Whilst it is possible to highlight some of the more obvious interactions and interrelationships between these stressors (Chapter 4) it is also apparent that, in order to fully understand the fishery system, these interactions and interrelationships as well as possible amplifying and dampening effects need to be the focus of further research. Whilst the research has also shown that adaptive strategies and the choice whether to adapt or cope, seems to be largely dependent on place, the reasoning employed in decision-making is not immediately clear. It does remain important to recognise the influence of place-specific context in decision-making processes which has bearing on decisions made when choosing how to respond to change as highlighted in the discussion provided in Chapter 5. There are however, exceptions to the rule where individuals employ strategies that are contrary to the general trend observed within the community. The individuals employing these strategies seem to be more successful and whilst possible decision-making rational has been discussed in Chapter 5, it is important that the exact drivers of their decision making process becomes the subject of further research in the consideration of possible future strategies.

Pressures associated with policy and regulatory frameworks place additional strain on fishers who are already struggling to cope with and adapt to variability and

changes in the biophysical system. The recently promulgated SSFP seeks to address shortcomings in the current management approaches to small-scale fisheries, but as timelines for implementation are unclear, it becomes impossible to evaluate whether this policy will address the policy and regulatory concerns highlighted by study participants. My research highlights the closing "grey zone" between the objectives of poverty alleviation, notably for historically disadvantaged communities, and maximisation of economic gain through efficient commercial enterprises in the handline fishery. It this political space of the "grey zone" that has allowed some commercial fishers to continue "business as usual", with an implicit compromise between a viable lifestyle and commercial efficiency. That said, it remains important to recognise that the failure to plan may also be linked to the social and cultural identity held by fishers, which is indicative of an unwillingness to give up this part of their identity.

Either way, improvement of communication and a more "hands-on" approach by DAFF appears to be crucial. Whilst such improvement will not address regulatory shortcomings emanating from policy and its administration, it will serve to alleviate a lot of frustration and promote building of trust in order to facilitate a more open dialogue, which in turn, and in the long-term, will benefit future policies. It also continues to be problematic that fishery managers are not adequately trained to deal with the increased demands required to implement an effective EAF, and there is thus the continued requirement to build more capacity (see Cochrane et al., 2009) in order to ensure that due consideration is given to all components of the social-ecological system during policy formulation and implementation.

The variation displayed between the six communities in terms of their day-to-day experiences and challenges serves to underline the supposition that the macro-level approach to management currently employed will never be “best fit” for the different small-scale fishing communities across South Africa. The MLRA already makes provisions for the Minister of DAFF to delegate management powers to provincial structures and the enactment of this provision may be the key for South Africa to develop “best-fit” strategies that are scaled to a regional context. The SSFP established a management framework where the needs of the community are considered through the establishment of community co-operatives and thus a certain amount of downscaling of regulation will be applied to the small-scale fishing sector whilst ensuring compliance to the MLRA. The small-scale commercial fishers will however not be able to partake in the community right and co-operative that will be established through the implementation of the SSFP unless they choose to relinquish their current commercial rights. Importantly, many fishers would rather choose to maintain the current status quo in terms of regulation of policy, as they know how to operate within the current contextual framework (as discussed in Chapter 5). It must also be borne in mind that current levels of mistrust pose severe challenges to the implementation of policy in general.

The prevailing, difficult economic climate, both on global and national levels, has an impact on small businesses and consumers worldwide, aggravated by developmental challenges faced by developing countries, such as South Africa. Regionally, and particularly in a largely rural area like the Southern Cape, this results in a particularly challenging social and economic environment. Fishers, who do not have access to large amounts of capital, do not have other skills and those who lack formal education are particularly at risk as these shortcomings hinder their ability to

secure alternative sustainable livelihood opportunities. It is here that more inter-departmental collaboration and concrete projects are required in order to address some of the socio-economic shortcomings that have been discussed in Chapters 4 and 5. The Department of Trade and Industry may have a particularly important role to play in lending support in terms of skills development, in specific relation to small business skill development, and general financial skill training. Such initiatives would have to be conceived and implemented in collaboration with DAFF, and very importantly, with the stakeholders at the community level. Should the community based right system as proposed by the SSFP be implemented, communities will specifically require such assistance and training to allow them to manage the business aspects attached to the right. The SSFP explicitly recognises the need for collaboration between departments, but the extent to which support will be lent as well as the capacity available to do so is unclear. What is pertinent is that the success of the SSFP (in terms of the benefit to the community at large) hinges on the effective management of the fishery by the community. If collaboration between government departments continues to fail, there may be an increased need for the presence of NGOs to facilitate change, but also such initiatives need co-ordination, based on an improved understanding of local contexts and interrelationships on the regional scale. The insights gained from this research have resulted in a comprehensive, qualitative dataset that serves to provide insight into the daily lives of this group of fishers, anchored in their own perspective. However, there is a lack of appropriately scaled quantitative data needed to provide insights into, amongst others things, household income, supply chains, and networks, education levels, employment status, all of which are crucial in developing an understanding of economic forces that gives rise to environmental degradation whilst undermining sustainability (see Sowman et al.,

2013). The collection of the data and subsequent analyses for this research area is already underway.

The varying levels of resilience displayed by the different communities as described in Chapter 5 may be viewed in both a positive and negative light. Folke (2006) argues that too much resilience may have negative consequences for communities as systems continually return to the original state once the stressor abates. This rings very true for the research area at large, but in particular for the fishers of Stilbaai. The wide array of strategies displayed by the group allows them to make it through the hard times whilst always reverting to fishing whilst largely employing the same strategy. Coupled to this is an unwillingness to recognise that the biophysical system may not always return to, or be able to return to, its former state. As discussed in Chapter 4, climate predictions do not currently provide much insight into expected local level variations and shifts, larger scale modules, such as Global Circulation models, predict that climate change is inevitable and will affect the natural environment and its components in some way at various scales. Plans made by many individuals hinge on the supposition that they will, in the long term, always be able to eke out a livelihood by fishing. This is echoed in statements like 'the fish will come back' or "God will bring the fish back'" or 'the weather will turn"'. The failure to recognise and plan for long-term, large-scale change is exposing the fishery and its fishers to great risk and as discussed in Chapter 5, poses a very real threat in terms of their long-term sustainability as fishers.

Fisheries are complex social-ecological systems that exist in dynamic environments and significant advances in research are required for fisheries to be managed effectively (Ommer and Team, 2007; Dörner et al., 2014). In contrast to

previous management approaches, an EAF sets broader knowledge requirements that calls for an increase in understanding of many areas that range from the “impact of fisheries on resources and ecosystems, to social, economic, and governance of the fishery system’” (Dörner et al., 2014:2). In addition to this, the information needed for the effective management of small-scale fisheries may be even more complex as these fisheries serve to secure livelihoods and food security. Difficulties with policy implementation coupled with poor data availability have made it difficult to achieve sustainability in this sector (FAO, 2012).

This thesis has contributed to our understanding of current reacting, coping and adaptive strategies, and has discussed important drivers behind the decisions made. The interactions of these drivers and interrelationships between the various strategies still need to be better understood. Whilst the understanding gained provides invaluable insights into a fishery system that has not been well described, it furthermore serves to highlight the many knowledge gaps that need to be addressed by conducting further context-specific research at smaller scales. We will then be in a better position to explore viable strategies for the future through action research, as a basis for regionally appropriate management recommendations.

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Appendix

Mossel Bay

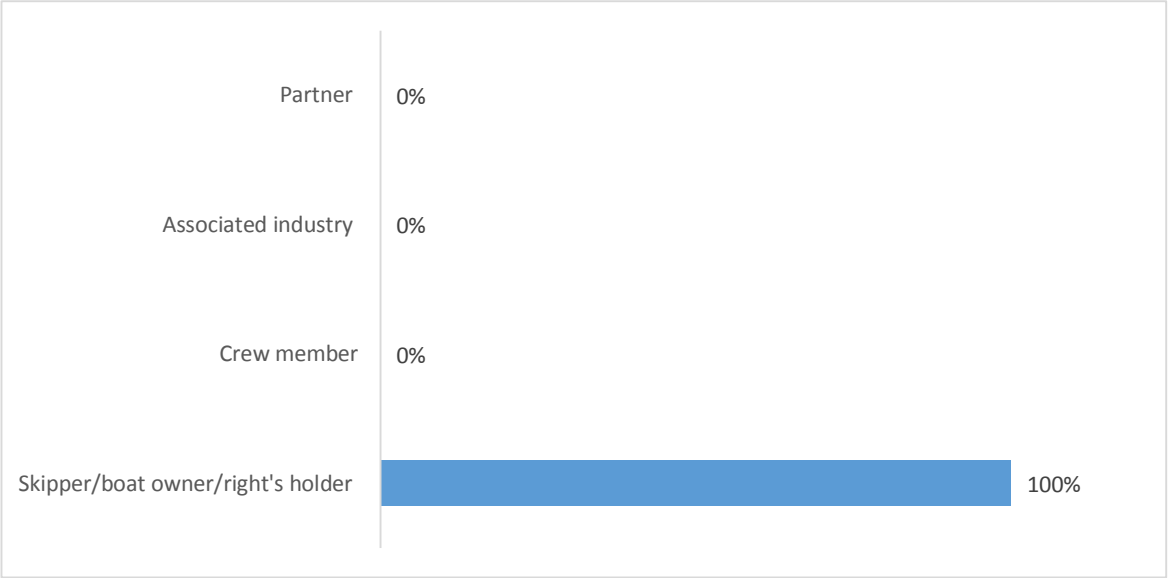

Figure A1 – Group composition: Mossel Bay

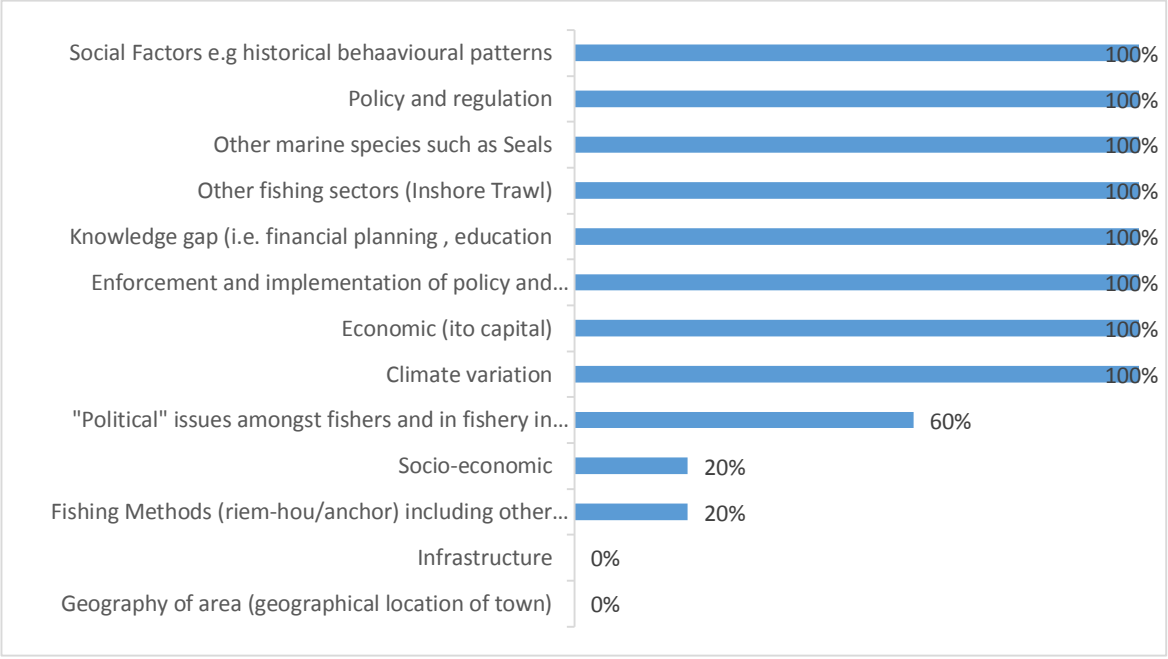

Figure A2– Stressors identified by participants from Mossel Bay

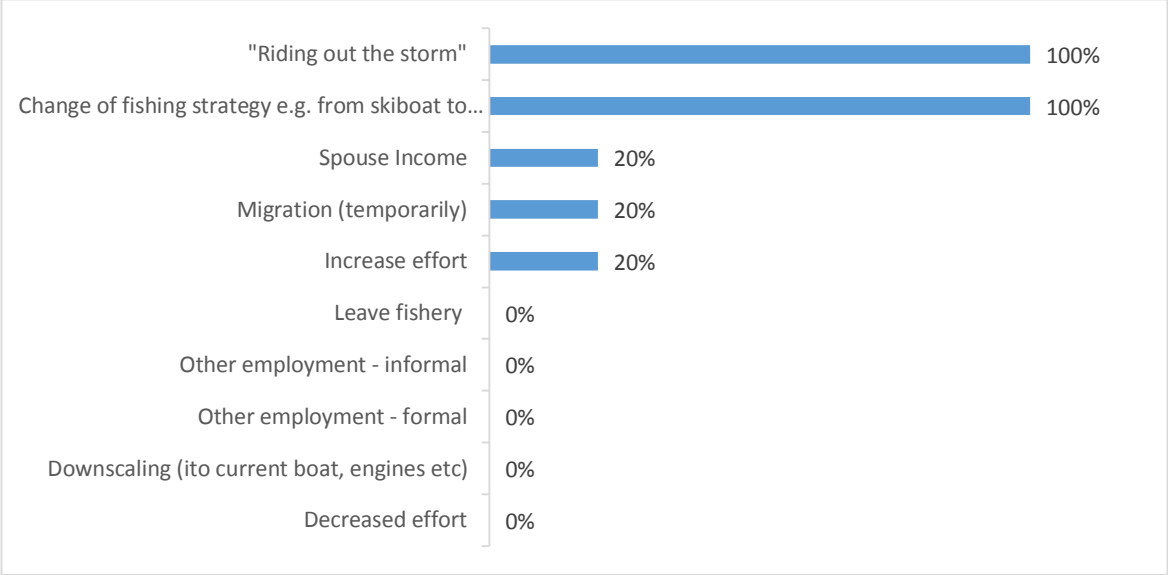

Figure A3 – Current adaptive strategies employed by fishers in Mossel Bay

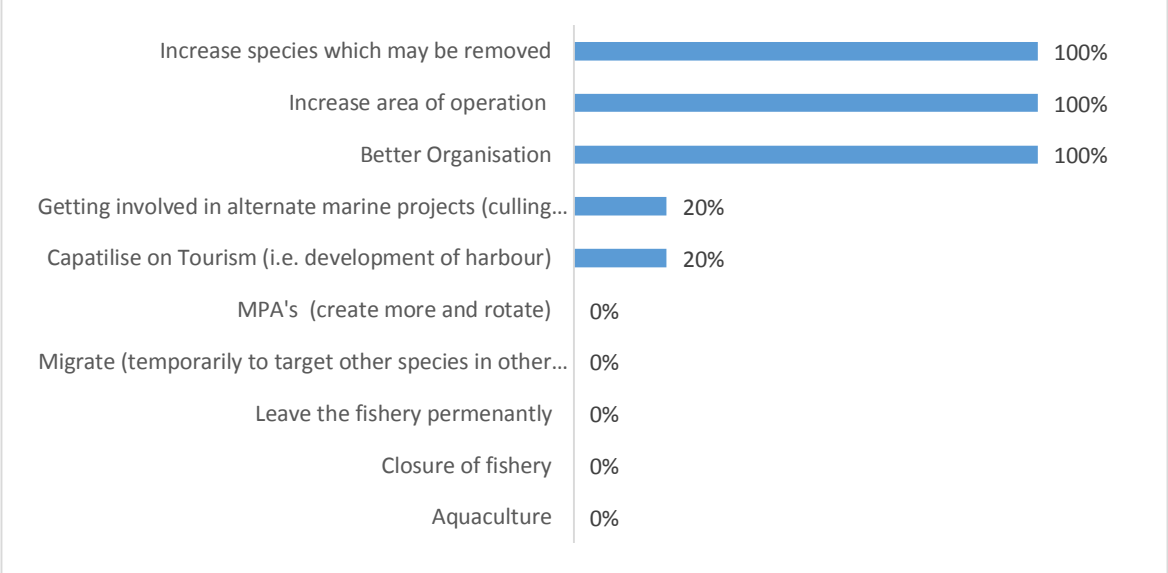

Figure A4 – Possible future adaptive strategies identified by participants from Mossel Bay

Gouritsmond

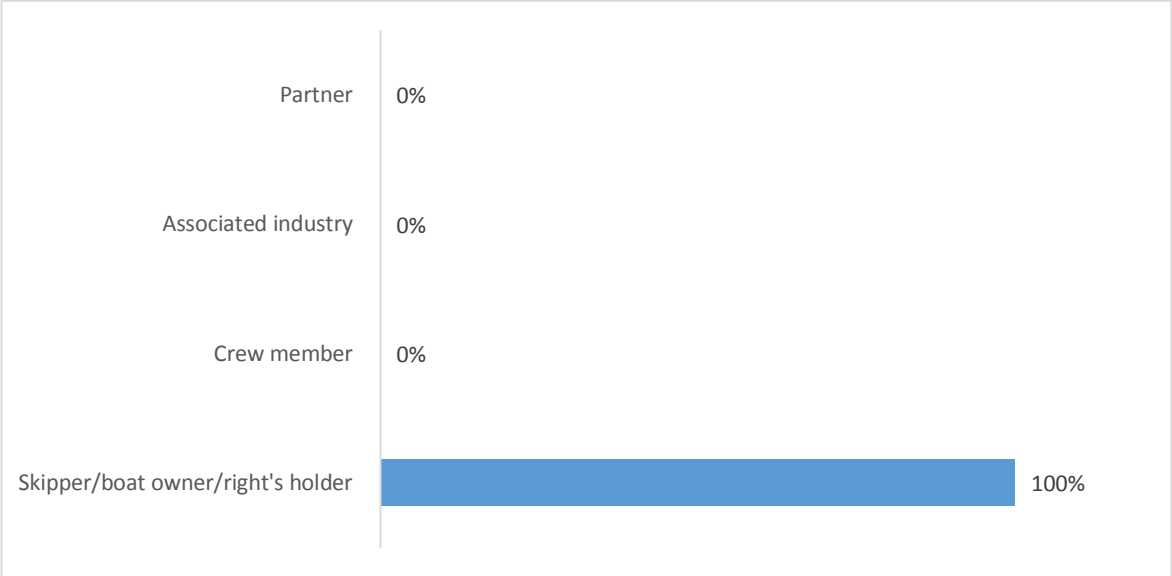

Figure A5: Group composition: Gouritsmond

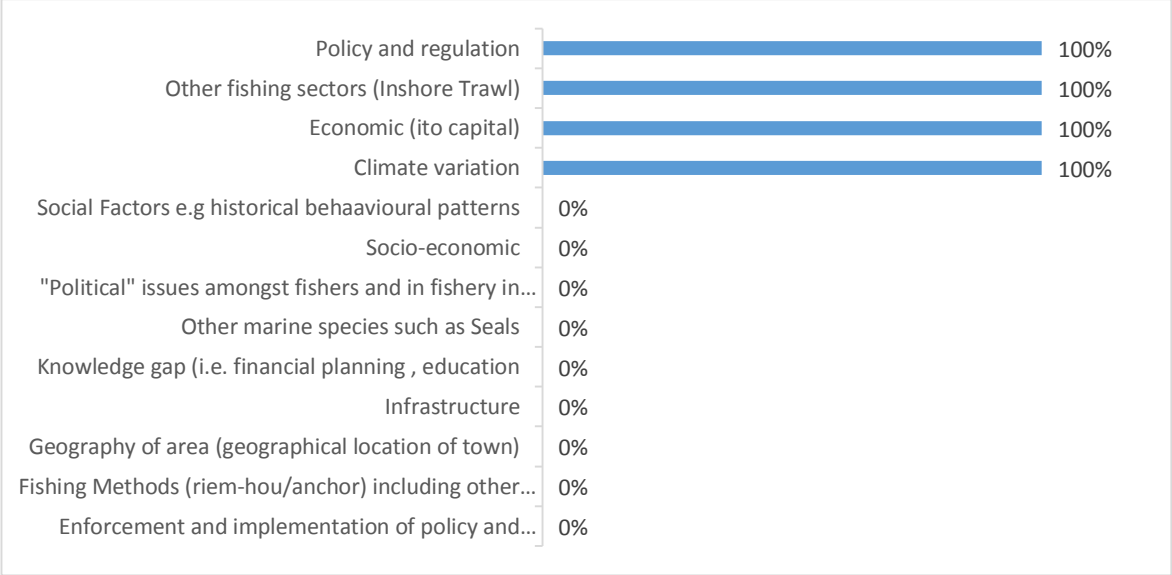

Figure A6: Stressors identified by participants from Gouritsmond

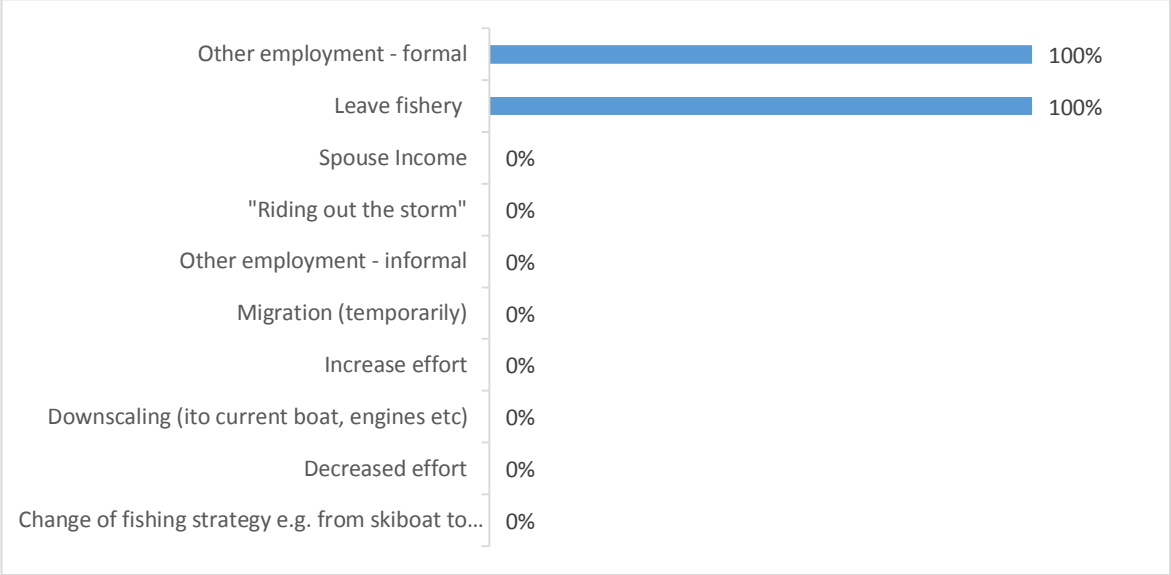

Figure A7: Current adaptive strategies employed by fishers in Gouritsmond

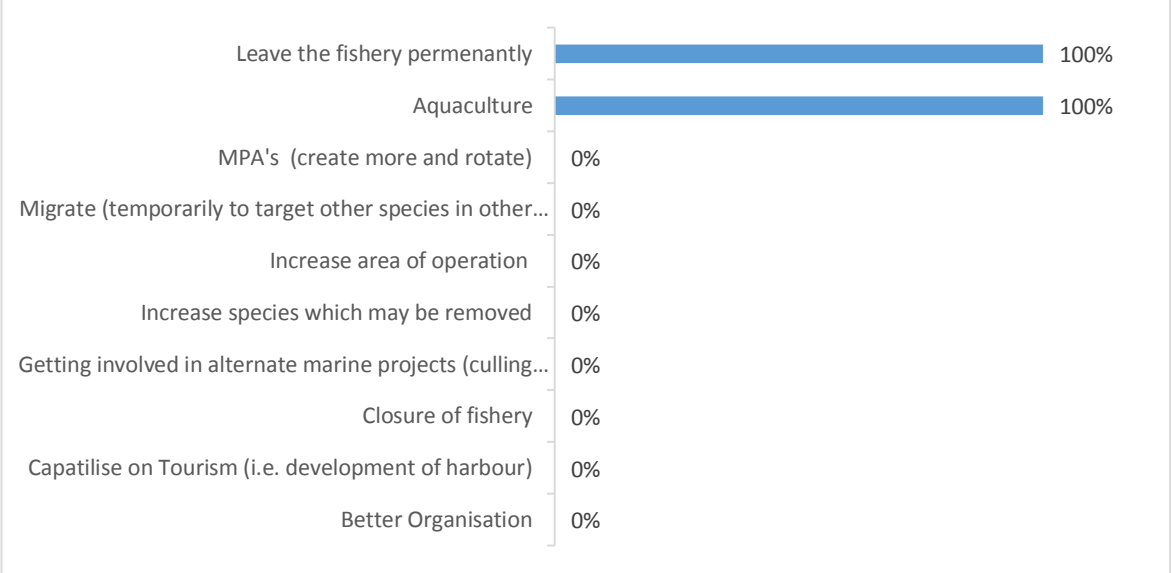

Figure A8: Possible future adaptive strategies identified by participants from Gouritsmond

Stilbaai

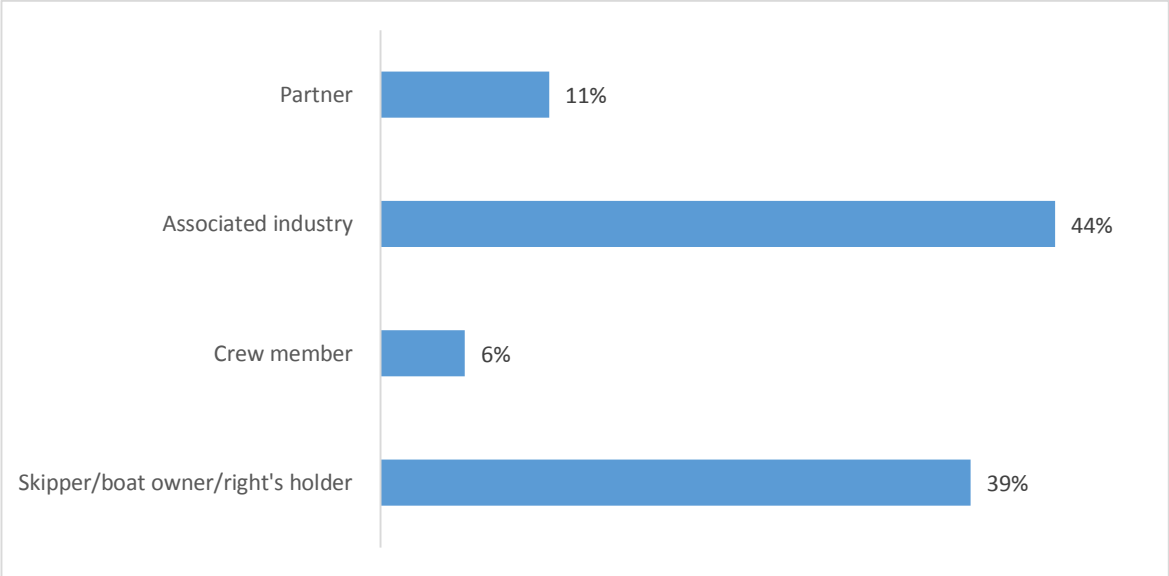

Figure A9: Group composition: Stilbaai

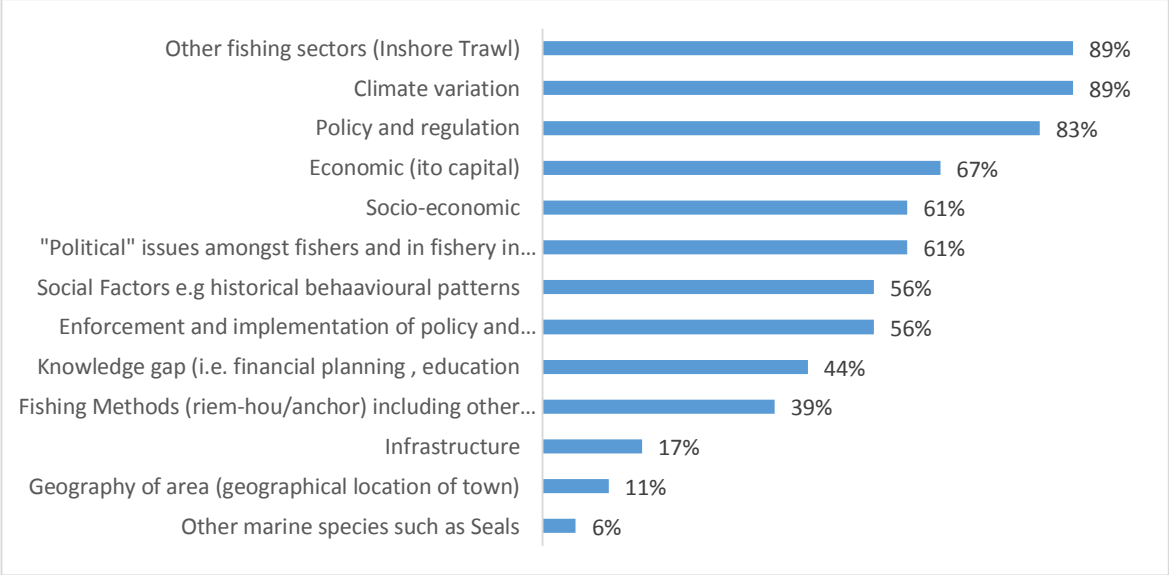

Figure A10: Stressors identified by participants from Stilbaai

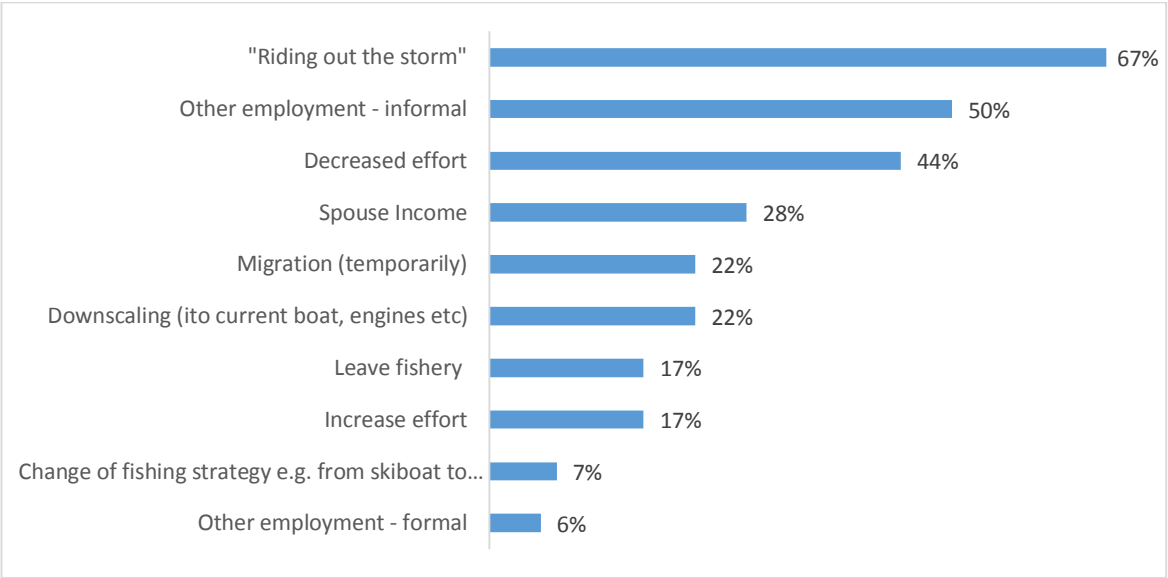

Figure A11: Current adaptive strategies employed by fishers in Stilbaai

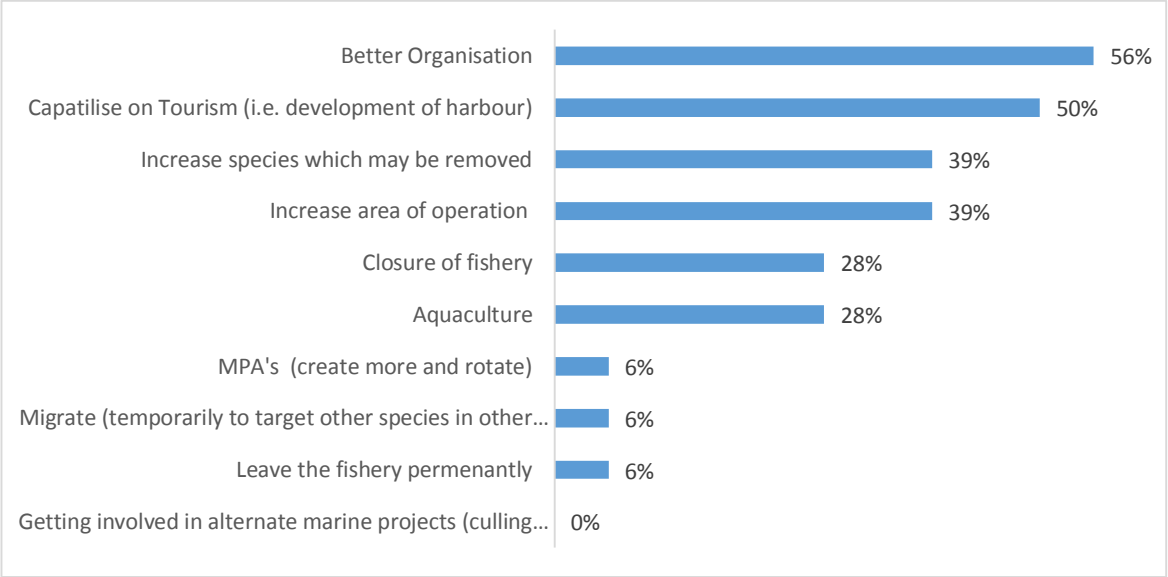

Figure A12: Possible future adaptive strategies identified by participants from Stilbaai

Melkhoutfontein

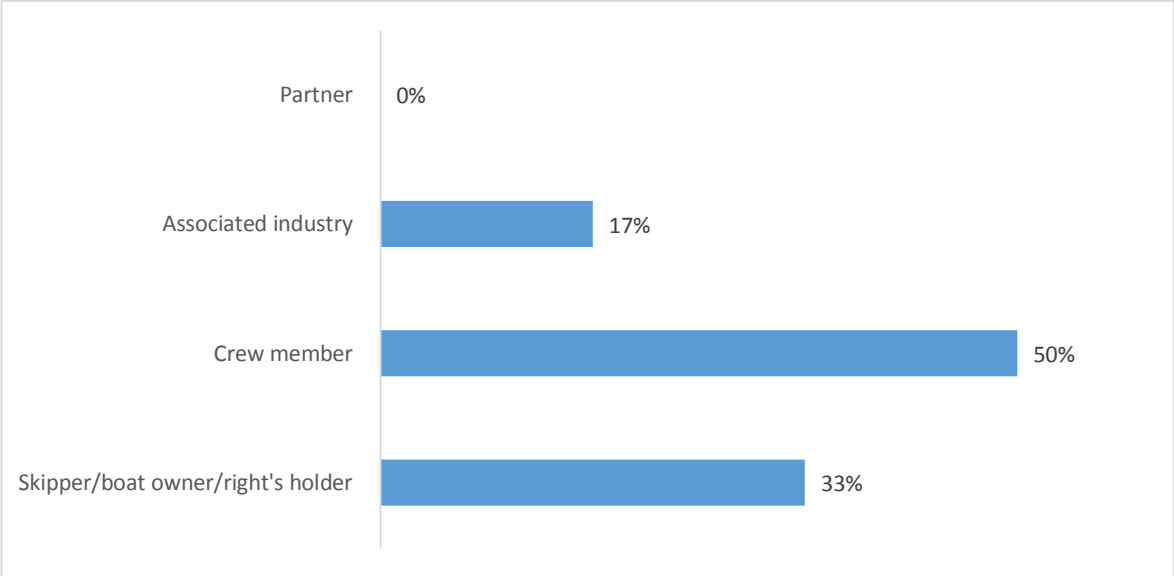

Figure A13: Group composition: Melkhoutfontein

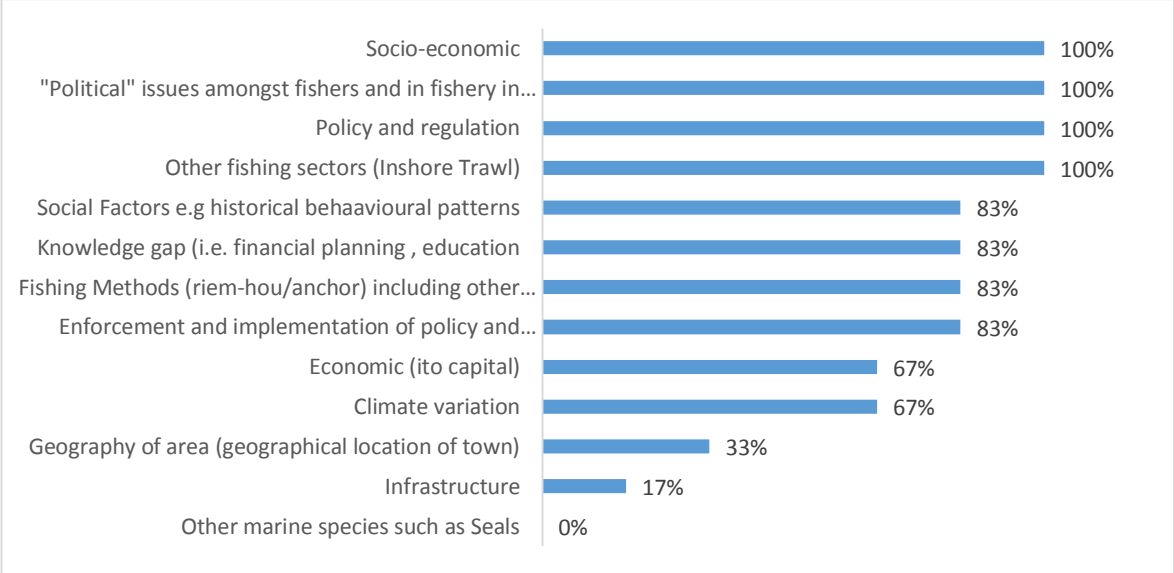

Figure A14: Stressors identified by participants from Melkhoutfontein

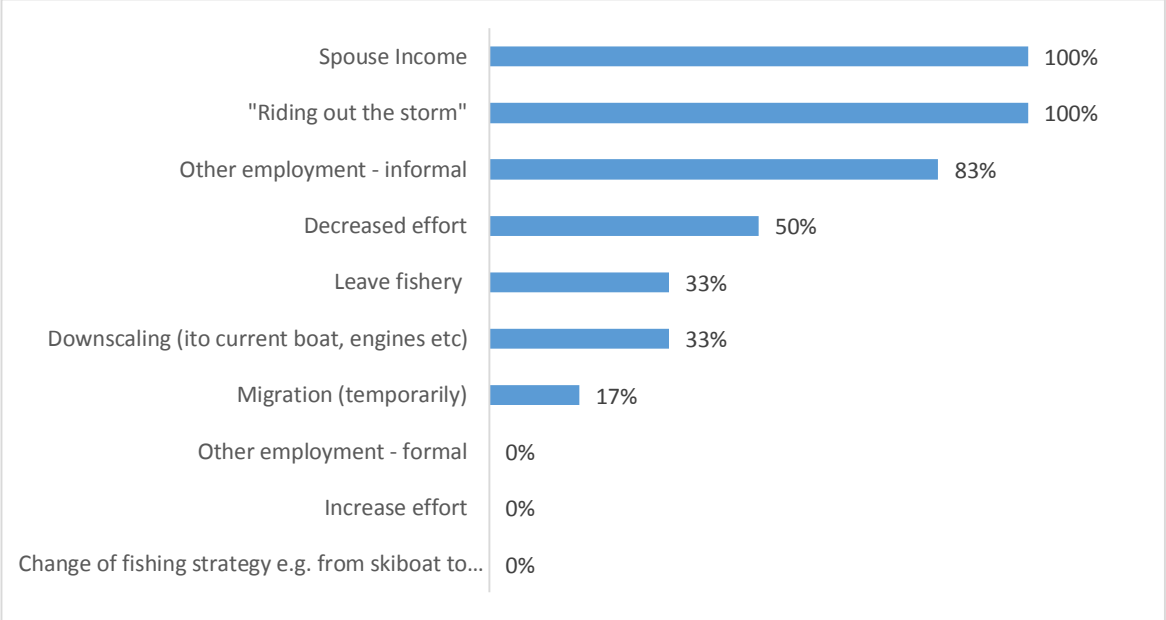

Figure A15: Current adaptive strategies employed by fishers in Melkhoutfontein

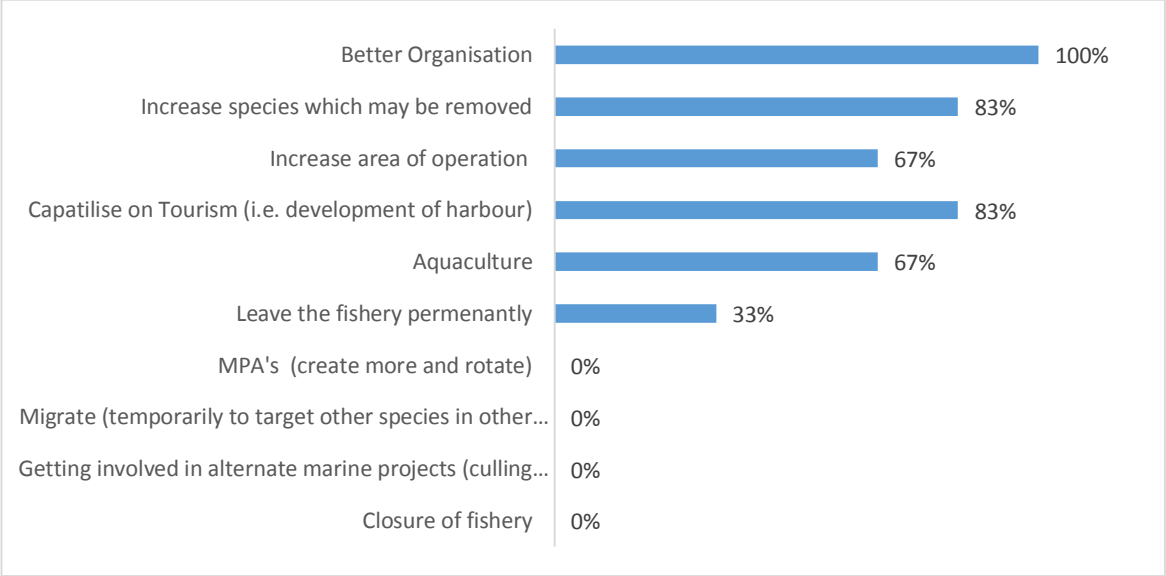

Figure A16: Possible future adaptive strategies identified by participants from Mossel Bay

Vermaaklikheid

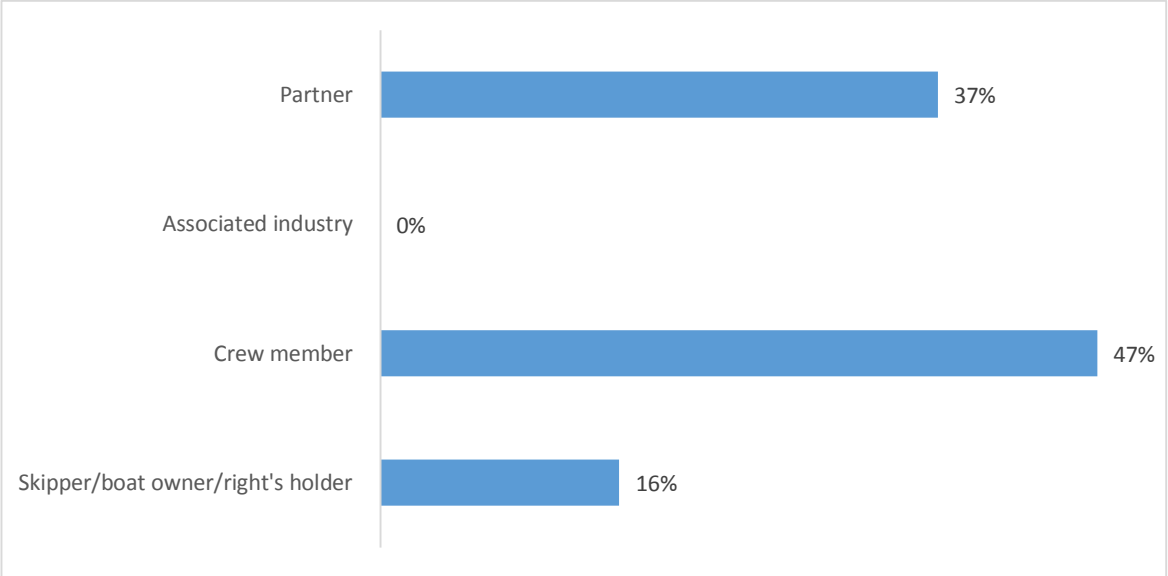

Figure A17: Group composition: Vermaaklikhied

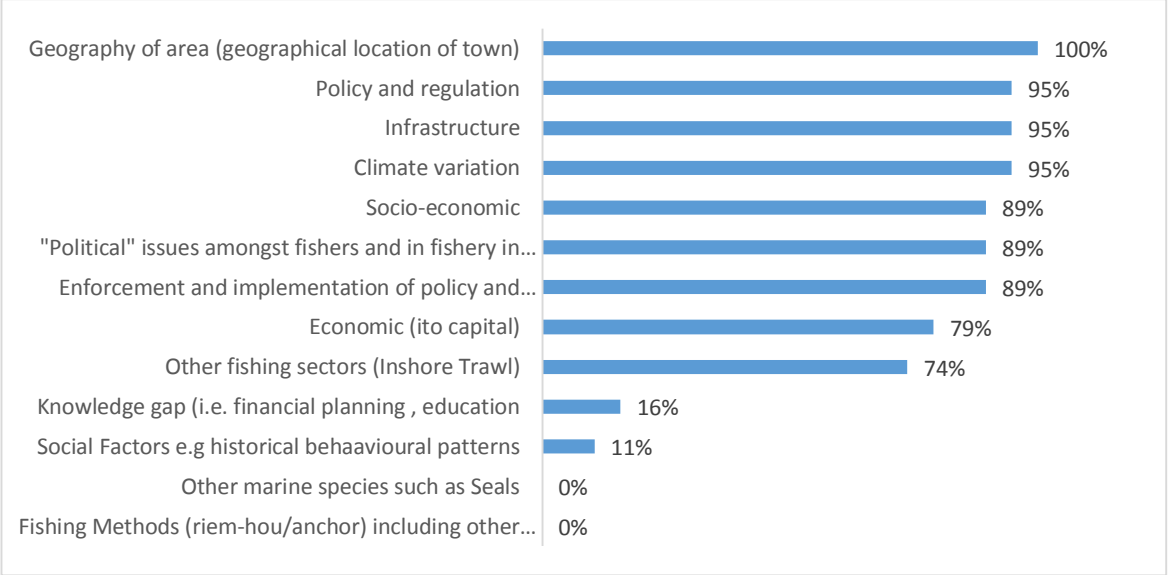

Figure A18: Stressors identified by participants from Vermaaklikheid

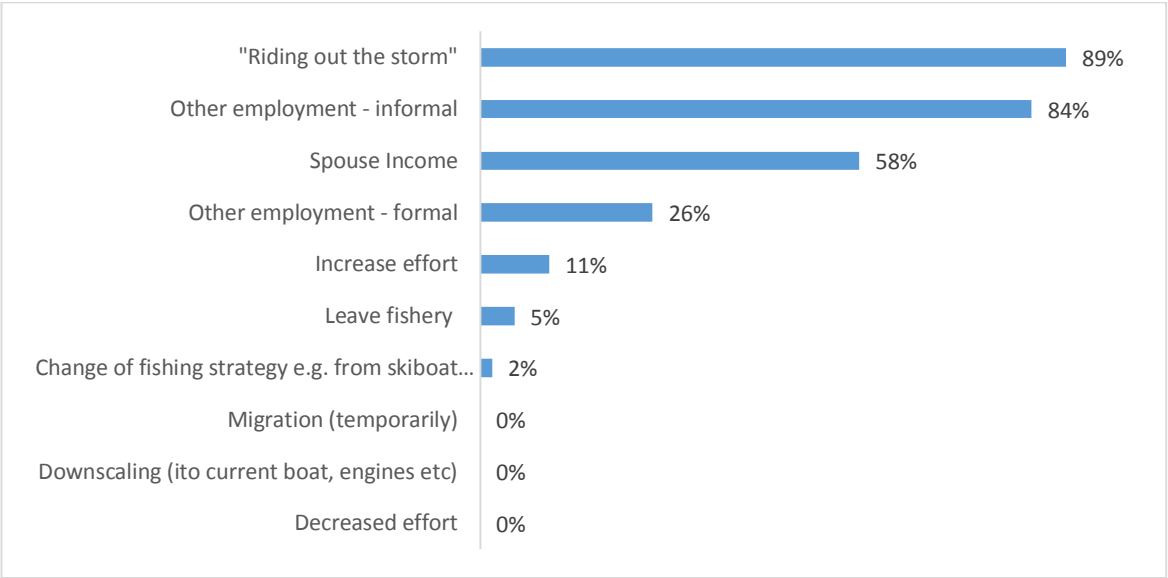

Figure A19: Current adaptive strategies employed by fishers in Vermaaklikheid

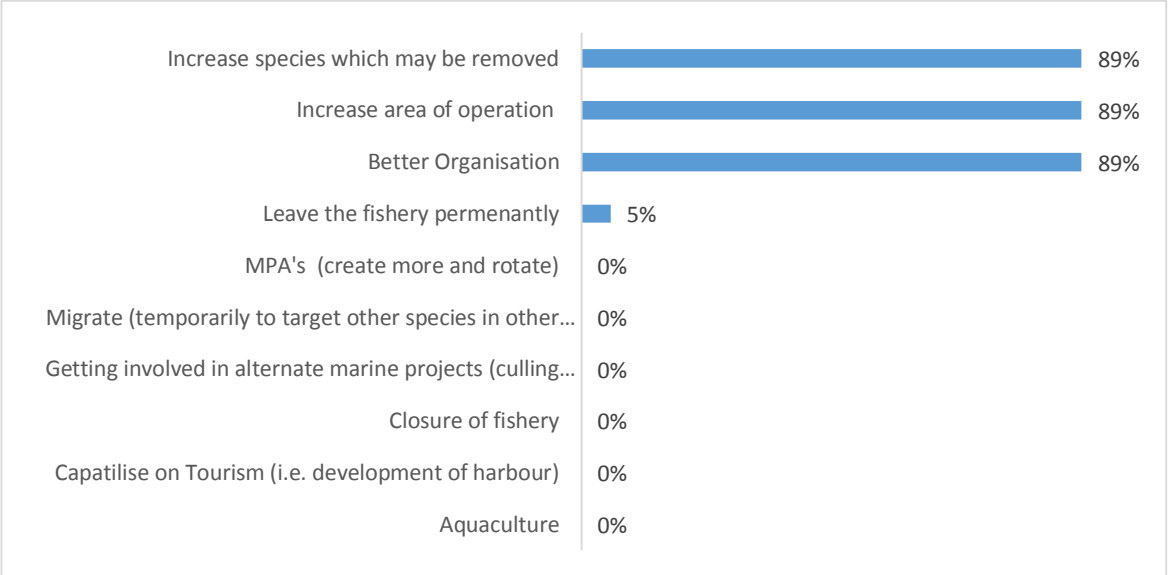

Figure A20: Possible future adaptive strategies identified by participants from Vermaaklikheid

Witsand

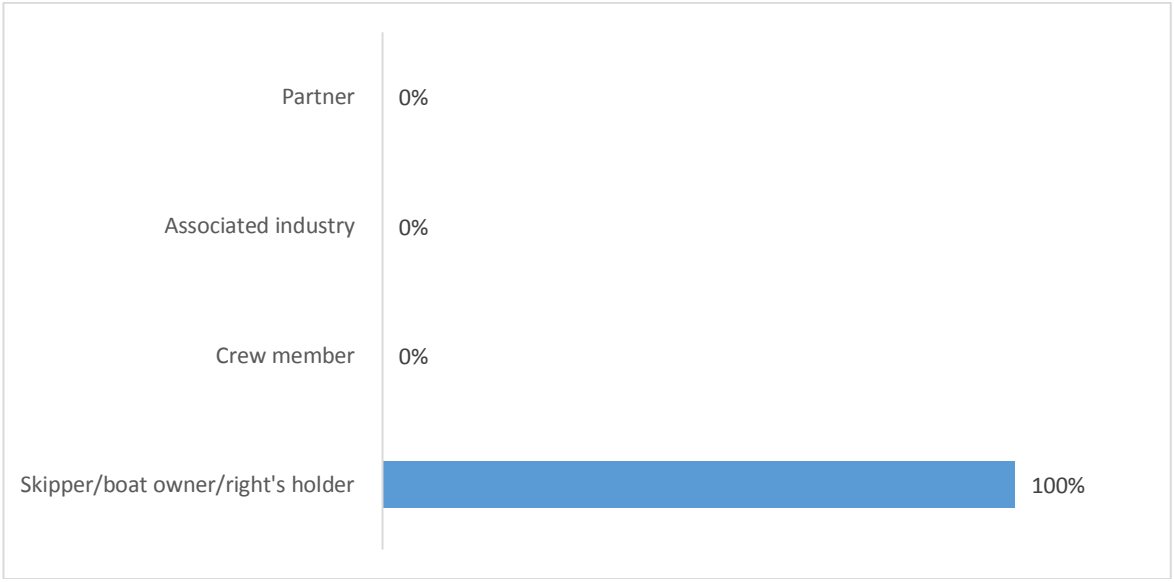

Figure A21: Group composition: Witsand

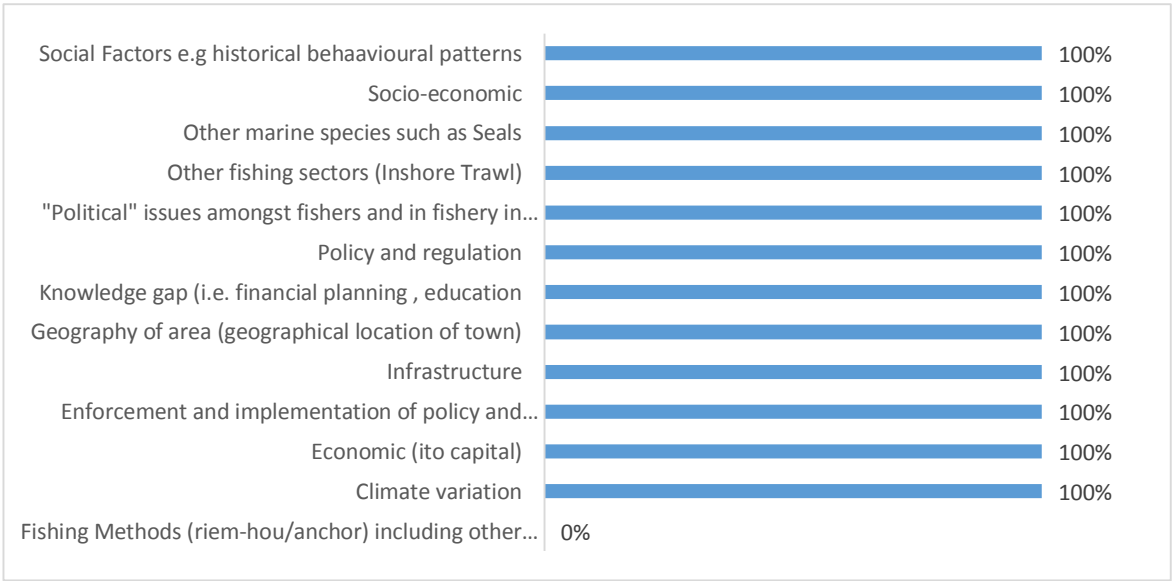

Figure A22: Stressors identified by participants from Witsand.

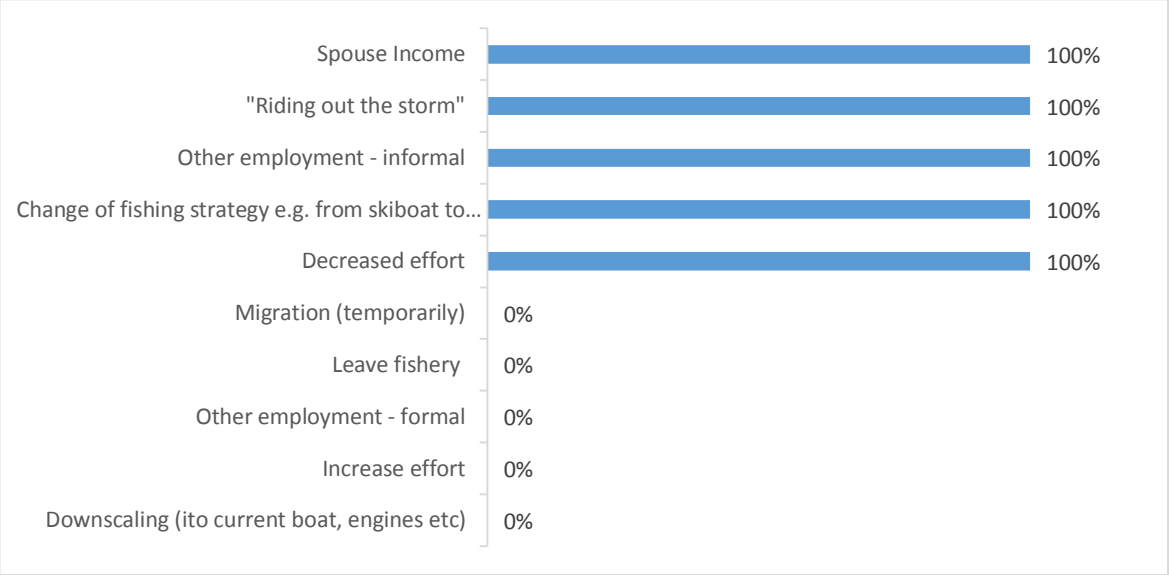

Figure A23: Current adaptive strategies employed by fishers in Witsand.

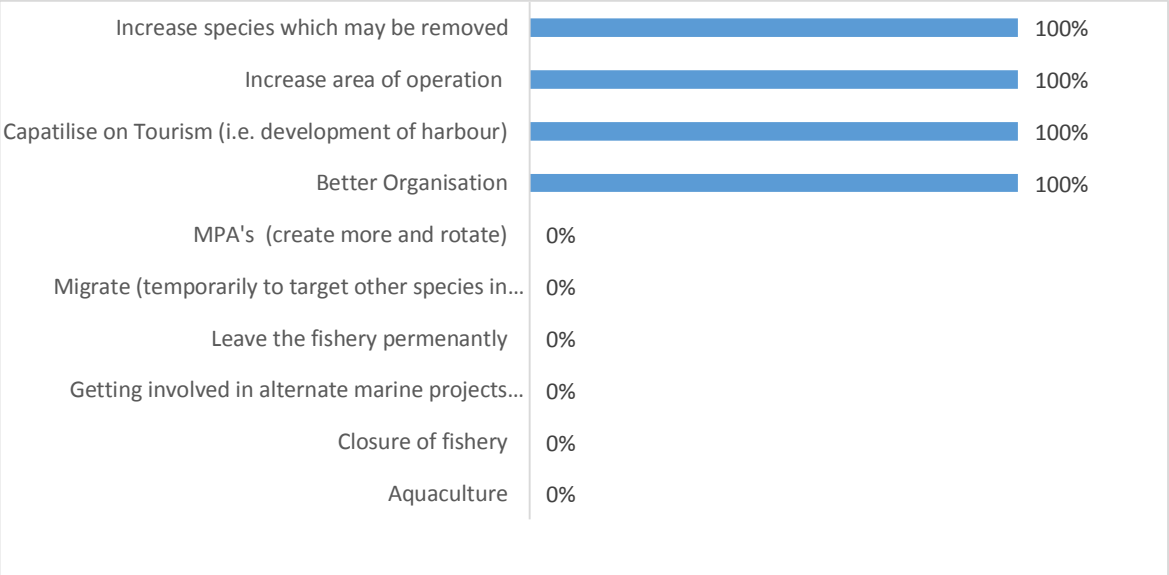

Figure A24: Possible future adaptive strategies identified by participants from Witsand.