Local Climate Adaptation Plan for Struisbaai small-scale fishing community

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Benguela CURRENT CONVENTION

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1. INTRODUCTION AND BACKGROUND

The Benguela Current Large Marine Ecosystem (BCLME) region is located on the south western coastline of Africa, adjacent to Angola, Namibia and South Africa. The Benguela system is particularly productive and is one of the most important fishing areas in the Southern African Development Community (SADC) region, providing food and livelihoods to thousands of coastal dwellers living in coastal communities along these shores. However, there is increasing evidence that this marine and coastal system is experiencing climate variability and change, alongside heavy fishing pressure and marine pollution. Marine fisheries are increasingly being exposed to changes in sea surface temperature, wind and currents, oxygen levels, increasing storm frequency, as well as changing rainfall, freshwater flow and run off patterns. These physical changes are affecting estuarine, coastal and offshore ecosystems and habitats, spatial distribution of certain species, and shifts in geographical ranges of certain species. These changes thus impact on the safety at sea, livelihoods, food security and economy of communities dependent on coastal and marine resources.

If global temperatures rise by 2°C by 2050 as expected, some of the anticipated consequences in the fisheries sector include falling productivity, species migration and localized extinctions, which could result in increased conflict over the use of scarce resources. Of course, these communities already face a number of ecological, social and economic pressures and risks and are amongst the most marginalized sectors in society. Climate change is thus an added stressor to their precarious life situation and initiatives to build resilience of small-scale fishers are recognized as urgent and necessary. Climate change mitigation and adaptation can reduce the potential impacts of climate change and the social and economic vulnerability of fishery dependent communities.

This project, entitled 'Enhancing Climate Change Resilience in the Benguela Current Fisheries System' supported by the Global Environment Facility (GEF), Benguela Current Commission (BCC) and Food and Agriculture Organization (FAO), aims to assess the vulnerability of fishing communities to climate change and work with them to develop community-based adaptation plans that are locally appropriate and implementable. Over the course of this project 15 vulnerability assessments have been undertaken and five adaptation plans have been prepared. Struisbaai, in the Western Cape province in South Africa and at the tip of the African continent, is one of the case studies where a community-based climate adaptation plan has been co-developed following a rapid vulnerability assessment.

2. CLIMATE CHANGE POLICY FRAMEWORK IN SOUTH AFRICA

In South Africa various government policies, strategies and plans have been developed in response to climate change. Under the National Climate Change Response Policy of 2011, provinces were tasked with assessing climate risks and impacts and developing provincial climate response strategies. Since 2011, a draft Climate Change Bill (2018) has been developed and published for comment. The Bill promotes a coordinated and integrated response to climate change and its impacts at all levels of governance. It aims to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, with a view of building overall social, economic, and environmental resilience. The National Climate Change Adaptation Strategy (NCCAS) (2019), approved in August 2020, represents South Africa's vision for climate change adaptation and climate resilience and outlines key action areas to achieve this vision. Both these policy documents require provinces and municipalities to map climate change risks and vulnerabilities, take account of climate change in planning and decision-making, and develop climate change response implementation plans to reduce vulnerability to risks associated with climate change.

The NCCAS identifies the coastal zone as one of the most vulnerable socio-ecological systems. There is a strong focus on building greater adaptive capacity to coastal risks, strengthening local institutions and promoting stronger coherence and co-ordination across different sectors, institutions and levels of government, as well as to integrate the national disaster risk management framework into climate change preparedness, response and recovery. The strategy also calls for the inclusion and strengthening of adaptive capacity and resilience to climate change into national, provincial and municipal disaster management plans. It seeks to identify individuals and communities at most risk from climate change within local municipalities and deliver context specific climate change vulnerability reduction programmes.

The Disaster Management Amendment Act (2015) specifically recognizes climate change as a hazard risk and requires national, provincial and local municipalities to prepare disaster risk management plans that include consideration of expected climate change impacts and risks. Climate change is thus being mainstreamed into various planning processes and response strategies. However, while all sectors are being tasked with developing action plans, adaptation plans and disaster risk management plans, the approach is typically driven by experts without thorough input and involvement from local communities who are often the ones experiencing the impacts of climate change on the ground. While the Department of Environment, Forestry and Fisheries (DEFF) has produced a draft Climate Change Adaptation and Mitigation Plan for the Agriculture, Forestry and Fisheries Sectors (CCAMP), this was initiated by scientists and there has been limited action thus far to socialize this with fisher communities as well as to implement some of the strategies identified.

This project is undertaking climate change risk assessments in small-scale fishing communities to determine their adaptive capacity, gain a better understanding of their vulnerability context to climate change, and develop locally appropriate adaptation strategies to address climate change and build resilience. These community-based adaptation plans are an attempt to identify strategies and actions that are seen by communities as priorities to address the impacts of climate change on local livelihoods and marine systems.

3. OVERVIEW OF STRUISBAAI CASE STUDY

Struisbaai is a well-known traditional fishing town located along the Cape south coast, at the southernmost tip of Africa (Figure 1). The town has also become a popular coastal holiday destination and retirement location aside from being a historical fishing community. Struisbaai forms part of the Cape Agulhas local municipality, and the Overberg district municipality within the Western Cape region. Struisbaai has a population of more than 6,000 people and 1,388 households. However, the Struisbaai small-scale fishers mainly reside in what is known as Struisbaai Noord. The population of Struisbaai Noord is slightly more than 1,100 people with approximately close to 400 households directly involved in fishing. Residents of Struisbaai Noord live in permanent housing structures and the area is serviced by adequate delivery of electricity and piped water supply.

The Struisbaai harbour (see photo above) is the launching and landing site for the local small-scale fishers, for commercial line-fishers coming mainly from outside the area, as well as for recreational boat-based fishers. Shore-based recreational fishing also takes place along the Agulhas coast, and several large-scale commercial activities occur offshore (squid and pelagic).

Local small-scale fishing is largely boat-based line fishing and the fishers operate using about 13 fishing boats that they launch from Struisbaai harbour. Approximately 12 boats are "chukkies", the traditional fishing boats with inboard diesel engines, used for generations by the line-fishers of the region. Chukkies are highly restricted in terms of how far they can travel out to sea, so fishers using them are geographically bound. Other boats used are the more modern ski-boats with outboard engines, which can also be towed behind a car from one fishing area to another. These ski-boats are similar to the ones used by the commercial fishers from outside the area and are able to carry powerful engines that allow them to travel long distances at high speed. However less than five fishers from Struisbaai Noord own a ski boat, which they obtained with government support. Most fishers work as crew given the limited number of locally owned boats. Main species caught are local temperate reef species including steenbras, stumpnose, red roman and silvers, and migratory species such as Cape salmon and yellowtail. Fishers also engage in shore angling for various inshore species as well as beach seine fishing for mullet.

There are few alternative income-generating opportunities besides fishing. Some community members have temporary or permanent jobs in the local grocery stores, hardware stores, petrol stations, building sector, tourism infrastructure such as restaurants and accommodation, in the recreational fishing charter businesses, and on the adjacent farms. The community is challenged by the remoteness of the town which limits the availability of jobs, especially outside the fishing season, and the lack of infrastructure such as schools and hospitals.

4. APPROACH TO DEVELOPING THE ADAPTATION PLAN

A participatory rapid vulnerability assessment (RVA) method was developed in a previous project titled, 'Climate Change, Fisheries and Aquaculture: testing a suite of methods for understanding vulnerability, improving adaptability and enabling mitigation (GCP/GLO/322/NOR)' commissioned by the FAO. This participatory assessment method was used to assess the stressors facing small-scale fishers from Struisbaai in relation to changing environmental conditions. The two-day RVA workshop aimed to assist fishers to identify the socio-economic, governance and environmental stressors that impact their livelihoods, with a focus on

environmental and climate-related stressors and changes. Also to identify the impacts associated with these environmental and climate-related stressors and changes on their livelihoods, the strategies they use to cope with and adapt to change and difficulties, and what support they require to better cope with and adapt to these changes and stressors. Outcomes from the RVA conducted in Struisbaai in 2016, and verified and updated in 2017, are presented below.

4.1 Outcomes of the Rapid Vulnerability Assessment

There were 21 participants at the first RVA workshop in 2016, all small-scale fishers, and all men. Women have played an important role in the Struisbaai small-scale fishery system. However, they were not forthcoming in wanting to attend the first workshop as none were working on the fishing boats and they were under the impression that the workshop would focus on fishing practices and observations out at sea. The average age of the participants was 48 years, range from 21 to 72. All participants attended consecutive days of the workshop.

In 2017, a follow-up RVA workshop was held by a team of researchers from the University of Cape Town (UCT) to understand the impact of climate change on the livelihoods of fisher communities and how they've managed to cope (or not) with these changes. Twenty-nine fishers (21 men and 8 women) from Struisbaai attended the workshop. The RVA identified the stressors that were considered highly significant by the community and included socio-economic, governance and environmental threats to their everyday lives and their fishing activity (see Table 1).

Struisbaai fishers identified several challenges in their socio-economic circumstances. The primary vulnerabilities that emerged from this exercise were the lack of access to finance to purchase better boats or engines, alcohol abuse, poor health and limited health infrastructure, lack of schooling and limited opportunities for the youth, overall lack of job opportunities, and most importantly the lack of alternative and/or profitable markets for their catch.

The current poor market was identified as one of several management/governance stressors for Struisbaai fishers. Fishers remain price takers and local prices have not increased despite the increased cost of fishing. The market also gets flooded often resulting in extremely low prices. The buyers control who gets the limited supply of ice and there is no real incentive to take ice on board vessels as landing site prices for fish are so low in any case.

Fishers did not agree with regulations about fish and bait species, fish sizes, and permits arguing that chukkies were only able to catch smaller fish on inshore reefs, compared to ski-boats that travel further to sea. Over time, women had also lost access to the traditional fish traps, and the area for beach seining had been severely restricted since the beach driving ban and protection of the estuary. Although women were absent from the first workshop, participants highlighted that they were a particularly vulnerable group, as they had even fewer livelihood opportunities than men, and their involvement in the fishing sector had been severely curtailed by the loss of access to shore-based intertidal harvesting, fish traps and fish processing.

Furthermore, local fishers resented the lack of regulation to prevent outside fishers from coming into their waters. With regards to large-scale commercial fisheries, fishers believed that the squid jigging at night was disrupting fishing patterns, which in turn affected their fish catches. Overall, fishers complained about the top-down management approach adopted by the fisheries authority and the lack of consultation and transparency with regards to regulations.

With regards to environmental stressors and impacts (see Table 2) fishers identified climatic changes, especially changes in wind direction during summer, the main fishing season as a significant challenge to their fishing activity. Climate change and variability was perceived to be causing unpredictable weather, a shorter fishing season, changing migration patterns of key species and less sea days. Also, fishers were increasingly concerned about their safety at sea.

The most important challenge however was the perceived high fishing effort by outside fishers. These include commercial line-fishers and recreational fishers who travel to Struisbaai during the holiday season and whenever migratory species pass through the area. All outside fishers have access to ski-boats, placing them at a competitive advantage to local chukkie fishers. Ski-boats can access the fishing grounds faster than chukkies and occupy the best fishing spots. As mentioned above, availability of local vessels is limited and very few fishers from Struisbaai can obtain crew jobs on the outside vessels. Meanwhile, local ski-boat owners struggle to afford fuel for trips, as their market return is marginal. Conflict has arisen within the community, as a few local small-scale fishers who do not have access to boats migrate to the west coast for work. They are perceived to be supporting ski-boat owners who fish in Struisbaai when conditions are good. With limited alternative livelihood options outside of fisheries, fishers proposed multiple ways in which they might maximize the income generation potential of their fishing activities and gain access to larger markets.

4.2 Developing the Adaptation Plan

The workshop in Struisbaai provided an opportunity for the fishers to analyze the causes of perceived environmental changes and the factors that make them exposed to greater risks. The participants identified the power relations between the small-scale fishers and the marketers as one of the main issues that make them very vulnerable. In addition, they cited the failure of government to implement the principle of preferential access for small-scale fishers to their traditional waters and resources as another factor that increases their vulnerability.

The process of developing the adaptation plan in Struisbaai consisted of three phases, 1) revisiting the adaptation strategies identified in the RVA conducted the previous year and agreeing on a final list of strategies, 2) holding a community adaptation planning workshop to flesh out the various strategies, and 3) working with the newly formed Struisbaai Fisher Association in the implementation of the ABALOBI programme which begun during 2016, in between the first RVA and the follow-up validations. Engaging with the ABALOBI programme helped the fishers, in a learning by doing approach, to fine-tune adaptation strategies, prioritize them within a community development approach, and implement priority action steps.

The development of the proposed activities into actionable plans was captured in the Adaptation Plan Development Matrix and required multiple engagements to drive strategies into the implementation phase. Struisbaai fishers have taken steps to progress their proposed adaptation actions with the support of local government and partner organizations who remained active within the community.

Under the current BCC-GEF-FAO project, the first specific engagement on detailing this progress and further developing the adaptation plan occurred in February 2019. Additional engagements to drive all these strategies into the implementation phase are required, but some have made significant progress, especially those linked to the ABALOBI programme, currently implemented in Struisbaai. The process to reach implementation for select adaptation activities are detailed in Table 3.

Table 1: Environmental, socio-economic and governance stressors

Environmental	Socio-economic	Governance/Management
• Overfishing and competition with mobile fishing fleet (commercial and recreational) • Changing weather (winds, sea state, sea temperature and currents)	• Drug and alcohol abuse • Fishers don't have market access or market power • Lack of schooling opportunities • Poor infrastructure at the harbour • Health issues and limited access to health services • Social ills • Lack of employment, especially for youth • Limited or no access to financial services and business development programmes • Cost of fish is increasing • Limited cold-chain facilities	• Fishing regulations (size limits, closed seasons and areas) don't work for the small-scale fishers and don't seem to make sense in their opinion • Loss of access to grounds for traditional fish traps • No clear permit for proper shore-based or boat-based bait collection • Lack of co-management with the authorities • No access to the river for fishing • Corruption and politics impede change and development • Unclear and changing rights allocation to small-scale fishers

Table 2: Environmental stressors and changes, impacts and causes

Key Changes	Impacts	Cause
Overfishing and competition with mobile fishing fleet (commercial and recreational)	• Less fish to catch • Disruption of fishing grounds • Issues at the harbour in terms of parking and launching space • Reduced catches for some species over the years • Fishers have to travel further to access productive fishing grounds	• Mobile fleet has large fishing area they can fish in, heavy pressure on stocks and popular recreational fishery
Changing weather (winds, sea state, sea temperature and currents)	• Unpredictable weather • Shorter fishing season, also starting later • Changing currents and water temperatures despite perceived good fishing conditions • Changing migration patterns of key species • Safety at sea concerns • Less sea days, chukkies cannot go out while powerful ski-boats can, less income	• Climate change and variability

Table 4: Adaptation Plan

	Proposed Adaptation Actions	I	M	L	Describe Activity	Are there short/ long-term risks?	Institutional Partners (Local & National)	Regional and Intnl partners
Institutional Adaptation	• Increased collective action • Professionalization	X			Formalize a fisher association to stimulate collective entrepreneurship and collaboration, with for example, rules on crew moving between local boats and migratory fisher groups.	Conflict and lack of interest in working as a group	• ABALOBI • Department of Small Business Development	• BCC • Smartfish • FAO
	• Less competition with outside commercial and recreational fishers • Less overfishing • Better monitoring of catches at the landing site	X			Implement the small-scale fisheries policy with preferential access to local small-scale fishers, including the chukkie fishers who possess line-fish rights. Enforce better monitoring of catches at landing sites; put together data showcasing impact of outside fishers and low return to the economy; also lobby De Nel testing area for better explanation of experiments and impact mitigation.	No policy support	• DEFF	• ABALOBI • Exactearth • AU
Livelihood Options	• Improved governance • Compliance		X		Better understand the current regulations by inviting DEFF scientists and also showing their own ABALOBI data as well as local knowledge regarding the recovery of some species.	Fishers and scientists keep disagreeing	• ABALOBI • BCC • WWF • DEFF	
	• Safety at sea	X			Use platforms and apps such as Windfinder and work with scientists to understand why the weather is more unpredictable; lobby for an upgrade towards ski-boats but within controlled fishing effort and viable engine capacity.	Inaccurate predictions via mobile apps and models	• SAMSA • ABALOBI • CSIR	• CSIR • Windfinder • OCIMS
Reducing/Managing CC Risk	• Improved income • Improved financial management • Socio-economic development • Less 'chasing for fish'	X			Maximize on market opportunities and find markets that are interested in diversified catches and so-called undervalued species.	Lack of market appetite for diverse species and season	• ABALOBI	• Ocean outcomes
	• Improved quality • Better prices • Market access • Recognition of women's work	X			Get training on quality control and lobby for access to cold-chain infrastructure	Economics of model may not be viable	• ABALOBI NPO	• Smartfish • Ocean outcomes
	• Diversified livelihoods • Awareness of local culture		X		With the on-going influx of high-powered boats as well as the expenses associated with chukkies it may be appealing to tourists to go on tours in safe waters and learn about traditional fishing practices and culture.	Lack of clients	• Local and district municipalities	• Wesgro
	• Safer launch • Decreased conflict		X		Dredge the harbour, drop new moorings and relook at the harbour wall setup. There is also a need to look at access control to the harbour, perhaps with a security gate and controller. Fishers also need access to water and electricity at the harbour.	Badly managed operation	• DEFF • Local and district municipalities	• AU • NPA
	• Financial stability • Increased collective action • Improved financial management		X		Map collective expenses and look at bulk buying of bait and possibly fuel.	Access to quality bait	• Department of Small Business Development	

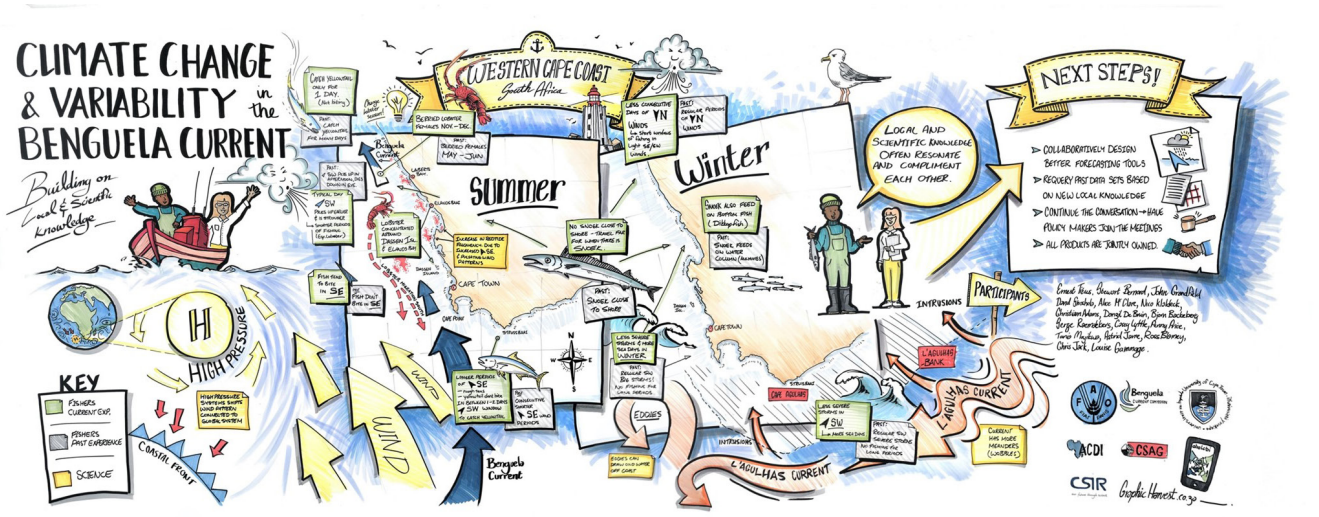
Resources required (Funding, skills, from whom)	Roles & responsibilities of participants (community)	Roles & responsibilities of external partners (Gov, NGOs, Researchers etc.)	Timeframe (Development & Implementation)	Budget	Chellenges	Next Steps
• Training • Meetings	• Get together and draft a Constitution • Attend association meetings	• Assist with organizational development	6 months	R50 000	Resolve power dynamics, skippers and crew	Mentor the organization through business and organizational development
• Political support • Meetings	• Log their catch on ABALOBI Fisher and give feedback at data meetings • Engage with DEFF regarding community fishery (using ABALOBI data)	• Implement small-scale fisheries policy • Explore the TURF model • Charge a levy fee to recreational fishers • Implement a harbour monitoring system	1 year	R500 000	Commitment from DEFF to implement and sustain programme	Implement small-scale fisheries policy and look at spatial data
• Meetings • Joint research project	• Attend meetings with DEFF and scientists and participate	• Share knowledge • Participatory research projects	3 months	R80 000	Sufficient time is needed for deeper engagement and collaboration	Host regular fisher scientist workshops
• Training • Mobile phones and data	• Use the apps to manage risk when going to sea	• Share data model predictions	3 months	R10 000	Resolution of predictions vs local observations	Collaborate with CSIR on improved oceanic predictions and ground-truthing
• Meetings	• Participate in the ABALOBI Marketplace programme • Catch a diversity of fish linked to permit	• Capacity building • ABALOBI Marketplace curation	6 months	R550 000	Appetite for unusual species on market, capacity for filleting and packing	Diversify market channels (restaurants, public, retail, export)
• Cooler boxes • General QC materials (temp probe etc.) • Ice machine • Small space for QC work • Training	• Work as a team • Remunerate women's work • Buy ice for at sea and during quality control process	• Provide learning by doing infrastructure	3 months	R1 200 000	Support for ward and municipality	Upgrade to cold-chain container setup
• Political support • Training • Meetings	• Maintain boats	• Explore and draft financial models and marketing strategies	6 months	R50 000	Safety and insurance	Explore tourism potential
• Political support	• Raise concerns	• Dredge harbour • Upgrade facilities	6 months	R6 000 000	Government priority and budget allocation	Assess recent harbour works and map out next steps
• Meetings	• Look at collective accounts and engage suppliers	• Engage bait suppliers	3 months	R350 000	Local storage in blast freezers	Assess bait needs and logistics model

5. CLIMATE ADAPTATION STRATEGIES/ACTIONS

5.1 STRATEGY 1: Make use of technology to manage fishing activity with unpredictable weather

The fishers of Struisbaai have been a part of the ABALOBI programme since its inception in 2015 and have been instrumental in the design of the applications that form part of the programme's offerings. One such application is ABALOBI Fisher, the foundational app of the ABALOBI suite. In the first version of ABALOBI Fisher, weather data was entered as part of the catch record only and not necessarily used to plan fishing activity. As some of the fishers became more comfortable with using the ABALOBI Fisher app, the introduction of weather apps to review weather forecast data and use this information to manage/plan their fishing activity became a focus in developing fisher engagement with information and communication technology. However, unlike the Fisher app which they co-designed, the phone-based weather app represented a significant and different challenge for the fishers who generally have low-levels of education and lack confidence in their ability to use mobile technology. Supporting the fishers with using the preferred weather app, Windfinder™, required several training sessions before fishers felt comfortable with the technology and this training is continuous as the app upgrades and/or as better/more accurate applications are introduced.

The training needed to keep fishers engaged with this technology is fully funded by ABALOBI. Yet, it should be noted several fishers still prefer to assess the weather using traditional methods as opposed to the Windfinder™ when assessing on the potential for fishing activity on the day. While fishers have become more active with using the technology in managing their fishing activity, the opportunities to engage with atmospheric/climate scientists has been limited and this component of the adaptation action has, consequently, had limited progress, with the exception of a workshop held in 2018 in partnership with UCT, whereby scientists and fishers shared knowledge which was captured in a graphic harvest below. One of the major next steps for the Struisbaai community is to prioritize the engagement with scientists, primarily around how to interpret/link weather data in the long term to assess trends when planning for the fishing season.



5.2 STRATEGY 2: Implement a cold-chain and quality control system and maximize on market opportunities and undervalued species

These two adaptation actions are closely tied to one another as their development and implementation happened in parallel. These actions were supported by ABALOBI as they began the process of building a restaurant supported fishery ultimately facilitating access to better markets for small-scale fishers in South Africa. The digital platform for this restaurant supported fishery is called ABALOBI Marketplace.

The ability of the small-scale fishers to upgrade their value chains is strongly influenced by the structure of these chains and associated relations between fishers and (potential) buyers. Being located far from urban centres and the markets where demand for fresh seafood is highest, small-scale fishers have few options to transport or market their catch. Consequently, they are forced to rely on marketers, with the marketers holding the power to set prices and the fishers acting as price takers, with few opportunities to break through this dependency and marginalization. In addition, very few small-scale fishing communities and groups have access to credit schemes or micro-finance. In many parts of the world, small-scale fishers suffer from considerable loss of income due to inefficient harvesting processes, poor handling, preservation and processing practices. Improvement of these aspects can be an important factor in the development of small-scale fishers' livelihoods through value chains. The ABALOBI Marketplace programme connects fishers directly to markets, via an electronic platform.

In April 2018 the first fish from Struisbaai was supplied on the ABALOBI Marketplace, with fishers earning almost four times as much per kilogram for locally caught, 'undervalued' species. The fishers were able to achieve this price largely because of the value added to the product through the post-harvest quality control and having a basic, yet effective cold-chain protocol and system in place. The community-based quality control and cold-chain system developed together with fishers initially consisted of a set of cooler boxes and flaked ice brought in from Cape Town with hands-on post-harvest quality control checks by ABALOBI staff. The introduction of this system was a steep learning curve for the fishers and fishworkers who would later join the system and required 6-12 months of refinement and support from ABALOBI before handing over the bulk of the operations to the community.

In the last year and a half, the ABALOBI Marketplace has grown to service over 190 restaurants with locally caught, diverse fish species and nearly 60% of this demand is met by fishers from Struisbaai. However, maximizing on this market opportunity has also required substantial increase in the quality control personnel and highlighted the need to expand the cold-chain facilities beyond the current, home-based operations. Training, and giving fair remuneration, for additional quality control officers to meet marketplace demands is one of two vital next steps for Struisbaai fishers. With support from ABALOBI quality control training has been secured for at least three additional quality control officers, but there has been some resistance within the Struisbaai fishers' group regarding remuneration for the quality control officers. The challenge of changing mindsets around role diversification and fair remuneration within Struisbaai has been a significant challenge for the Struisbaai Fishers Association. The fishers have had extensive, internal engagement around the role of the quality control officers and their importance in the ABALOBI Marketplace value chain. One consequence is that mid-2019 the nascent fisher association started to remunerate the quality control team for a fair return that had been mutually agreed.

As mentioned above, Struisbaai started their cold-chain management system with a few cooler boxes and ice brought in from Cape Town. Operations in Struisbaai scaled up significantly in the last year (2018/2019) with the purchase of an ice machine, temperature probes and multiple scales which are meticulously maintained by the quality control officers on site. Paired with the equipment is a cold-chain management checklist developed in consultation with fishers and the quality control officers and trialled over the last 12 months. This system functioned adequately in the previous yellowtail season (the major fishing season for this coast) with a small number of fishers engaged in the ABALOBI Marketplace, but only around 25% of their catch was funnelled through this system. The Struisbaai fishers engaged with ABALOBI Marketplace has increased significantly since the last season and the volume of fish expected to move through this system will likely exceed the capacity of the current cold-chain management system. In response to this potential challenge, and as an expansion of the adaptation action of implementing a cold-chain system, at the adaptation planning meeting in February 2019 the fishers proposed

the acquisition of a modular, community-based cold-chain facility i.e. a container-based fish processing facility similar to the unit designed and used by ABALOBI in their Cape Town-based operations. The container would also serve as a storage facility for the fishers and opens the door for fishers to meaningfully engage with larger retail markets who have shown interest in the remaining 70-75% of the yellowtail landed by the fishers not earmarked for the ABALOBI Marketplace. Funding for the fully equipped unit was subsequently secured through partner organizations and the unit was delivered to Struisbaai in February 2020 ushering the next phase of the Struisbaai fishers' cold-chain operations development.

5.3 STRATEGY 3: Developing a local fisher association

With new markets holding much of the fishers' focus in the two years since the RVA, the fishers relied heavily on ABALOBI, through their in-situ field officer, to manage the communication and organizational aspects of their fisher group. The need for a formalized structure, fully managed by the fishers, became more pressing as they engaged more with the market and as the accompanying quality control and cold-chain infrastructure needs increased.

In the first adaptation planning meeting the attendees raised the formation of an association as their primary agenda for the first six months of 2019. Fishers identified a need for training on collective governance and the different types of groups which a community might be interested in forming. The fishers engaged with ABALOBI to provide the organizational and governance training necessary and further proposed that skippers have a meeting to discuss their vision for this organization in Struisbaai before training commences. The first skippers meeting took place in mid-March 2019 and the decision to form the Struisbaai Fishers Association was agreed upon. Fishers held at least three additional internal meetings before approaching ABALOBI to provide organizational training at their earliest convenience. ABALOBI offered a one-day workshop in 'Collective governance: How organizations work' to the Struisbaai Fishers Association in mid-May 2019. This training was provided by ABALOBI in their efforts to support the growth of collective action amongst small-scale fishers. Following the training, the decision to register as a voluntary organization was taken, but the official registration has yet to be completed. The next step for the organization is to register their association before the end of 2020, although they have met regularly as an organization already, and to formalize their supplier agreements with ABALOBI and the other markets they have recently been exploring.

5.4 STRATEGY 4: Attending a learnership

In 2019, ABALOBI facilitated a five-day learnership with participants from Struisbaai. The intention of learnership is to enhance adaptation activities in small-scale fishing communities by equipping participants with skills in support of community-based operations and empowering them to engage meaningfully with ABALOBI's platforms.

It is essential for all fishers involved in ABALOBI Marketplace to be aware of the implications, both legal and ethical, of providing fish to a marketplace. Additionally, quality control workers already active in the communities contribute to the value chain that results in the higher price point fishers receive by being part of the ABALOBI programme. Raising this awareness is important not only to maintain a high standard of product, but also in achieving equity in remuneration for work provided, particularly as women mostly fulfil the role of quality control officers in communities and have previously not been adequately remunerated for their vital contribution.

Learnerships are run from ABALOBI's office and participants receive a focused combination of theoretical knowledge and practical skills from ABALOBI staff, outside experts and chefs. Each session within the modules is adapted by the facilitator(s) to match the audience needs and context wherever possible. Theory modules form the basis of the in-class learning and topics include: Overview of the App Suite; The Fishers' Journey and the Value Chain; Basics of Tech & Information and Communications Technology Systems; Basics of Health & Hygiene in a Fisheries Operation; Introduction to Co-management; Conflict Resolution; and Monitoring & Control Systems.

The practical training component is centered around ABALOBI's fish packing container. Here, learners receive instruction on implementing protocols related to operating the container, including receiving fish, to conducting quality inspections, batching restaurant orders, and implementing control systems. The health and hygiene theory learnt in class is reinforced through practice in the container, which emphasizes the importance of professionalism in the facility and the role that learners will take on in running quality control and operations once they returned to their communities. In turn, the skills learners receive increases their confidence to support activities in their communities.

An exciting interactive component of the learnership involves a session led by chefs to better understand product quality, and an experiential learning trip which includes a meal at an active ABALOBI Marketplace restaurant. Learners are introduced to chefs through this process and given practical demonstrations. These interactions are hugely important in forging personal links between fishers and chefs. The ability to observe and participate in key components of the ABALOBI value chain, not only improves participants' understanding, but they gain a sense of pride in the product they produce.

Through learner feedback and evaluation, training materials and methods for future ABALOBI training and scale up activities were refined. This constant refinement is key to tailoring training opportunities relevant to individuals and communities and drives real learning, skills transfer, and improvements in capacity. Moving forward, ABALOBI will look to conduct more learnerships utilizing the methods developed over the initial learnership series.

5.5 STRATEGY 5: Explore a preferential access area for local small-scale fishers

Given the fishers' concerns of the fishing effort on resources which impacts their livelihoods, the fishers would like the implementation of the small-scale fisheries policy that can give preferential access to local fishers, including the chukkie fishers who possess line-fish rights. In addition, for DEFF to enforce better monitoring of catches at landing sites to enable data to be collected on the larger impact of mobile and recreational fishers on resources. While this strategy requires political will, the next steps by the fishers are to collect catch data on the ABALOBI Fisher app for presentation to DEFF to lobby for preferential access, and to engage with DEFF on the use of the ABALOBI Monitor app for recording of landings by all sectors utilizing the Struisbaai harbour and coastline. Data collected in real-time could be used to adapt fishing permit conditions and stimulate local co-management of resources.

5.6 STRATEGY 6: Enhance fisher knowledge and input in national fishing regulations through fisher-scientist exchanges

The current relationship between DEFF and local fishers is constrained by limited collaboration from government which has resulted in regulations misunderstood or being considered locally inappropriate by small-scale fishers. The fishers would like to address this issue by inviting DEFF scientists to an exchange to show their own ABALOBI data as well as share local knowledge regarding the recovery of some species and overexploitation of others. Improved relationships with DEFF could then lead the way to more collaborative policymaking and the revision of regulations. Next steps to action this strategy are for regular fisher-scientist-DEFF workshops

to be arranged and the initiation of participatory research projects. These could include the collection of relevant environmental data, joint research trips, and the deployment of tools such as Baited Remoted Underwater Video cameras. Local students could assist with processing of video material and species identification. It is evident that for many of the fishers' observations around possible environmental variability or change resonance exists with available scientifically available information. Further engagement and joint research can deepen much needed understanding of these changes and effects.

5.7 STRATEGY 7: Revisit the use of chukkies for tourism opportunities i.e. fishing day trips

To diversify livelihoods and promote the recognition of the cultural heritage of the fishers, it was suggested that the offering of boating/fishing tours in the area be included as a strategy. With the on-going influx of high-powered boats as well as the expenses associated with chukkies it may be appealing to tourists to go on tours in safe waters and learn about traditional fishing practices and culture, as well as the local environment. Fishers would like to engage with the local and district municipalities regarding tourism potential and explore and draft financial models and marketing strategies as next steps. Key considerations will be safety measures, liabilities and insurance, as well as training on guidelines when encountering marine mammals such as whales and humpback dolphins which regularly frequent the area.

5.8 STRATEGY 8: Upgrade and repair Struisbaai harbour to manage sand build-up and allow for easier launching of vessels

A well-designed and maintained harbour is needed for fishers to exercise their livelihood and maximize on opportunities to fish when weather conditions allow. Current constraints at the harbour include inundation with sand, issues with parking and access and limited facilities as well as regular maintenance and cleaning. Improvements that need to be undertaken include dredging the harbour, dropping new moorings and reassessing the harbour wall setup. There is also a need to look at access control to the harbour, with a security gate and controller. Fishers also need access to water and electricity at the harbour. The Arniston fishers spend several months a year in Struisbaai so arrangements need to be improved to better accommodate them. This strategy is dependent on DEFF and the local and district municipalities and requires substantial financial input, however the fishers' role is to communicate their concerns, assess the recent harbour works and map out next steps.

5.9 STRATEGY 9: Develop preferential procurement relationships and buy in bulk

Fishers are facing increased costs in buying fuel, bait and gear. To mitigate some of these costs and operate more efficiency the fishers seek to map collective expenses and look at bulk buying of bait and possibly fuel. This strategy is dependent on assessing collective needs and logistics and approaching potential suppliers. The Department of Small Business Development was identified to assist in this regard, as well as the local municipality and local businesses.

6. TRAINING PRIORITIES

Throughout the community engagements, several training needs were either identified by the facilitators or the participants from the fisher community and include the following priorities.

6.1. Training in organizational development and management

Fishers identified the need for organizational development including membership structures, governance and management processes. A one-day workshop on collective governance was given by ABALOBI but the association would like to expand their training to include basic financial literacy and advanced bookkeeping together with additional capacity building in governance. Of particular interest are co-management and community-based management.

6.2. Training in business management and marketing

Formation of the Struisbaai Fisher Association and developing a restaurant supported fishery are key aspects to the adaptation plan. For the fisher association to be successful in marketing themselves the fishers identified the need for training in marketing and storytelling, value adding and customer engagement. The association also requires training in administrative processes, financial management and business plan development together with more specialized training in fisheries operation and monitoring and control systems.

6.3. Training in cold chain and fish processing techniques

A key component of the ABALOBI Marketplace is the implementation of a simple and effective cold chain and improved fish processing. The first learnership held by ABALOBI was foundational and ABALOBI will look to conduct more learnerships utilizing the methods developed over the initial learnership series.

6.4. Training in data insights and data usage options

Data from the ABALOBI App together with local knowledge can be used by the fishers to engage with DEFF and contribute to collaborative decision making and adaptation of permit regulations. Additional training in how to use data to gain insights into fisheries management and effectively communicate those insights is required.

7. IMPLEMENTING THE ADAPTATION PLAN

7.1. Communication

To progress implementation of the Adaptation Plan, the contents of the plan should be communicated to all relevant partners and government departments listed (see Table 3) including the Department of Environment, Forestry and Fisheries, Department of Small Business Development, local and district municipalities and South African Maritime Safety Authority (SAMSA).

7.2. Partnerships and funding

For each adaptation action (see Table 3), funding needs to be sourced and the partners listed need to be approached to support the rollout of the strategy. The community working collaboratively with their partners to act upon the Adaptation Plan is key to maintaining momentum and interest amongst community members, and their partners. This will also require support and input from the government partners listed in terms of progressing actors identified, providing or assisting with sourcing funding for adaptation actions, and maintaining communication with the local fishing community. The relevant government partners also need to support integrating the particular strategy/action into their institutions processes and plans. Struisbaai currently benefits from support through the ABALOBI programme, however extra resources are needed to consolidate the association and suggested adaptation actions. Thus ongoing financial and technical support from BCC-GEF-FAO to move to implementation of the Adaptation Plan is required.

7.3. Integration

The adaptation actions listed need to be integrated into the various plans at all levels of government (e.g. Integrated Development Plans, Overberg District Municipality Climate Change Plan and sectoral Climate Change Adaptation and Mitigation Plans (CCAMP)). Therefore, identifying opportunities for inserting the adaptation strategies into local, sub-national and national plans and strategies is an important stage in transitioning from a community-based plan on paper to implementation. This includes integration into sector plans (e.g. fisheries management and development plans), national poverty alleviation strategies and socio-economic development plans at all levels of governance to ensure that the specific strategies

that build resilience in vulnerable communities are implemented. The National Climate Change Adaptation Strategy (NCCAS) states the need to facilitate mainstreaming of adaptation responses into sectoral planning and implementation. The CCAMP highlights small-scale fishers as the most vulnerable in the fisheries sector and points to improving governance and cooperation between communities and government, strengthening interaction and cooperation within the communities themselves, and enabling communities to assist in environmental monitoring and research with government and other institutions. The CCAMP refers to the Policy for Small-scale Fisheries as critical to these processes and an opportunity exists for Adaptation Plans to be used in implementation of the policy. In this way sectoral plans would align with the overarching approach to adaptation identified in the 2011 National Climate Change Response Policy (NCCRP) which focuses on the development of adaptation responses that are flexible to changing conditions and that take local context and local knowledge into account.

7.4. Training

The training priorities identified in Section 6 above need to be executed as soon as possible to build the skills required to implement the plan. Funding from the current BCC-GEF-FAO project has been identified as a possible source of funds that could be harnessed to execute these trainings during the coming year. Appropriate training providers need to be identified, briefed and appointed.

7.5. Feasibility and sustainability

The strength of community-based adaptation planning is that the strategies are identified by the community members themselves and therefore are aligned with local needs and values. While this does not guarantee the feasibility and/or sustainability of the strategies, it stimulates interest and ownership of the adaptation plan by community members as a critical first step. Together with training and a collaborative effort by all stakeholders identified, feasibility of the plan will be greatly enhanced. The vertical and horizontal integration of the adaptation plan into government plans will also enable more sustainable support as adaptation planning processes become mainstreamed.

For each of the strategies, the fishers determined a timeframe for development and implementation, resources required and an estimated budget. Importantly, resources required were matched with potential/existing partners and the roles and responsibilities of both community members and external partners identified (see Table 3). Thus, realistic expectations and funding objectives are in place and implementation can be phased according to feasibility. While some strategies are more easily achieved e.g. implementing a cold-chain and quality control system, it may be that certain strategies are not feasible e.g. upgrades to the harbour and where this is the case, the need for further investigation was highlighted as a next step.

7.6. Risks and challenges

For each of the adaptation strategies, risks to successful implementation were identified by the fishers. The identified risks included those relating to poor management, conflict, lack of support and unviability due to market conditions. The range of adaptation strategies in the plan seeks to spread any risk and allows for a diversified approach to adaptation that draws on the existing strengths of the fishers and allows scope for new opportunities.

It is expected the fishers will experience challenges in the implementation of the adaptation plan including difficultly in organizing community members, access to funding and resources, and limited capacity to engage with government. The need for partnerships, funding, integration and training addressed above will serve to mitigate these challenges and support the community in the successful implementation of their plan. Challenges and lessons learned also contribute to the iterative development of adaptation plans.

8. RECOMMENDATIONS

- Prioritize engagement between fisheries authorities, scientists and small-scale fishers for joint monitoring, research and co-management of marine resources and collaborative policymaking including the negotiation of preferential access for small-scale fishers and adaptation of permit conditions.
- Provide ongoing training and mentorship to the Struisbaai fisher community on collective governance, fisheries operation, information and technology systems, and monitoring and control systems to further develop their access to the marketplace and preferential procurement relationships.
- Explore potential for fisher-operated tourism in Struisbaai together with local and district municipalities and draft financial models and potential marketing strategies.
- Engage with government on the integration of community-based adaptation plans and associated strategies into government plans at all levels to access further funding and support for implementation and foster cooperation between communities and government.
- Iterative review of the community-based adaptation plan with the Struisbaai fisher community to assess changing vulnerabilities and strategies.

9. CONCLUSION

The adaptation plan development process in Struisbaai has made significant progress in many of the key climate change adaptation areas earmarked in the literature. Compared to other coastal communities Struisbaai fishers have, to some extent, been able to implement several strategies in a short space of time, largely thanks to the continuous engagement with their partner organizations. The iterative approach to developing the Adaptation Plan for this community allowed the changing circumstances of the community and the reprioritization of their adaptation needs to be incorporated into the plan in a collaborative, supportive manner. This approach supported the uptake of this plan across the sectors of society which can make the best of use of it.

Implementation and strategy development can be a side-by-side process as the steps to achieving the proposed adaptations to climate change often occur at different time scales and are subject to external forces as exemplified by the delays with the implementation of the small-scale fisheries policy by government which is understood to adversely affects fishers' ability to co-manage the fishing resource they depend on. The role of partner organizations in supporting coastal communities in their adaptation strategies is vitally important, particularly in the initial stages, where communities may lack the means of access to government or stakeholders who can assist them with their adaptation actions. As communities become more capacitated through engagements with their partner organizations their resilience and capacity for lateral movement in their adaptation processes also develops supporting their ownership of the adaptation plans they proposed.

The Struisbaai fisher community is well positioned for climate change resilience if secure rights and preferential access are supported by capacity building for organizational as well as small business development. Joint research and data collection for co-management with the fisheries authority can lead to fisheries rebuilding and sustainable utilization. This plan needs to be socialized with key stakeholders in order to gather momentum and activate implementation.

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