

Report of the

**FAO/BCC REGIONAL WORKSHOP ON ASSESSING CLIMATE
CHANGE VULNERABILITY IN BENGUELA FISHERIES AND
AQUACULTURE**

Windhoek, Namibia, 11–13 April 2013



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PREPARATION OF THIS DOCUMENT

This is the report of the Benguela Current Large Marine Ecosystem Regional Workshop on Assessing Climate Change Vulnerability in Fisheries and Aquaculture, which was convened by the Benguela Current Commission and the FAO Fisheries and Aquaculture Department in Windhoek, Namibia, from 11 to 13 April 2013 in support of the project development phase for the project “Enhancing Climate Change Resilience in the Benguela Current Fisheries System” under the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) administered by the Global Environment Facility (GEF).

The report was prepared by Cassandra De Young, Fisheries Planning Analyst, Policy and Economics Division, FAO Fisheries and Aquaculture Department, Rome, Italy, and Cécile Brugère, Consultant, FAO Fisheries and Aquaculture Department. Support for this workshop was provided by the Government of Japan under the project “Fisheries management and marine conservation within a changing ecosystem context (GCP/INT/253/JPN)” and by the Government of Norway under the project “Climate change, fisheries and aquaculture: testing a suite of methods for understanding vulnerability, improving adaptability and enabling mitigation (GCP/GLO/322/NOR)”.

FAO. 2013.

FAO/BCC Regional Workshop on Assessing Climate Change Vulnerability in Benguela Fisheries and Aquaculture, Windhoek, Namibia, 11–13 April 2013. FAO Fisheries and Aquaculture Report No. 1051. Rome. 66 pp.

ABSTRACT

The purpose of the Benguela Current Large Marine Ecosystem Regional Workshop on Assessing Climate Change Vulnerability in Fisheries and Aquaculture was to present an initial review of the bio-physical and biological implications of climate variability and change on the region’s fisheries; review the latest stages in research on and application of climate variability and change vulnerability methodologies and discuss their appropriateness to the region's adaptation planning needs; identify key elements of vulnerability for the region, including climate-related drivers of change and adaptive capacities along the entire fisheries and aquaculture value chains. Making the link between expert advice and practical use of vulnerability methodologies from around the globe with fisheries representatives from the region set the scene for fruitful discussions on how to develop vulnerability frameworks appropriate to the region, making the best use of existing information and evaluating means to collect needed information, particularly concerning social and economic vulnerability of the region’s fisheries and aquaculture.

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ABBREVIATIONS AND ACRONYMS

BCC	Benguela Current Commission
BCLME	Benguela Current Large Marine Ecosystem
CDCF	Centre for Development Co-operation in Fisheries (Norway)
CRiSTAL	Community-based Risk Screening Tool – Adaptation and Livelihoods
DEA	Department of Environmental Affairs (South Africa)
DRM	disaster risk management
EAF	ecosystem approach to fisheries
EAA	ecosystem approach to aquaculture
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
IMR	Institute for Marine Research (Norway)
INIP	National Institute of Fisheries Research (Angola)
IPCC	Intergovernmental Panel on Climate Change
LDCF	Least Developed Countries Fund
NAPA	National Adaptation Programme of Action
NatMIRC	National Marine Information and Research Centre (Namibia)
NGO	non-governmental Organization
PIF	Project Identification Form
SAP	Strategic Action Programme
SCCF	Special Climate Change Fund
SLA	sustainable livelihoods approach
SSF	small-scale fisheries
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. OPENING OF THE WORKSHOP

Mr Hashali Hamukuaya, Executive Secretary of Benguela Current Commission (BCC) welcomed the participants and opened the regional workshop. He set the scene by providing an overview of the BCC, highlighting that the Convention between Angola, Namibia and South Africa had been formally signed on 18 March 2013 with the objective of promoting a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the Benguela Current Large Marine Ecosystem (BCLME), in order to provide economic, environmental and social benefits in its coastal countries. Mr Hamukuaya stressed the high productivity and variability of the BCLME, and trends associated with climate variability change, such as significant sea surface temperature warming, sea level rise, increases in algal blooms and occurrences of severe low oxygen events in the northern Benguela. Such changes are presumed to be linked to shifts of pelagic fish species out of traditional fishing grounds and increased jellyfish populations. Mr Hamukuaya thanked the Government of Norway for its support to this workshop and noted that a number of relevant projects funded by Norway are being implemented in the region.

1.1 Update on the history and status of the regional climate change project development

Mr Hamukuaya provided a brief history of the proposed Global Environment Facility (GEF) Least Developed Countries Fund (LDCF) and Special Climate Change Fund (SCCF) regional project “Enhancing Climate Change Resilience in the Benguela Current Fisheries System”, to be executed by the BCC, supported by the FAO and in collaboration with national and global partners. The initial request for the BCC to develop a regional project stemmed from the recommendations of a November, 2011 regional workshop, “Climate change implications for fisheries of the Benguela Current region: making the best of change”¹, which had as objectives to bring fisheries and climate change partners together to share and plan; to identify drivers and impacts of change, their effects on fisheries and the communities that depend on these resources; to identify short- to mid-term actions to improve the resilience of the marine system and the adaptive capacity of the fishing communities; and to agree on potential scope for a follow-up funding proposal. The participants of the 2011 workshop recommended to the BCC, national governments and relevant partners to:

- support actions toward better understanding of the vulnerability of the BCLME human and marine systems to climate change and variability – of different systems, at different scales, comprehensive (e.g. throughout the value chain, through to communities and nations);
- identify and support actions to decrease the vulnerability of the BCLME human and marine systems and support broader moves toward sustainable development;
- organize national and regional processes (e.g. workshops, pilot and case studies) to support the fisheries and aquaculture sector in reaching consensus on vulnerabilities and appropriate adaptation actions within national and regional climate change and development priorities and strategies;
- identify and implement pilot projects to explore options and demonstrations for best practice and tools that can be used for implementing practical actions for adaptation to climate-induced change;
- pull together broad stakeholders from climate change, fisheries, land and aquatic resources management, water, agriculture, development to ensure participatory and integrated approaches are supported;

¹ *Climate change implications for fisheries of the Benguela Current region: making the best of change. FAO/Benguela Current Commission Workshop, 1–3 November 2011, Windhoek, Namibia. FAO Fisheries and Aquaculture Proceedings. No. 27, Rome, FAO, 2012. Available at www.fao.org/docrep/017/i3053e/i3053e.pdf*

- identify means of supporting and funding the implementation of recommended actions at all levels (e.g. industry, fisher, community, non-governmental organization, government, intergovernmental organization/civil society organization);
- support the participation of the BCLME fisheries and aquaculture sectors within national, regional and global climate change discussions and actions (e.g. presenting issues specific to fisheries and aquaculture, understanding trade-offs and synergies of adaptation and mitigation actions within other sectors);
- utilize and build on the existing political commitment and integrated institutional arrangements of the BCC to facilitate and coordinate a regional programme on climate change adaptation in the BCLME region; and
- for the BCC to coordinate follow-up actions with FAO, the United Nations Development Programme (UNDP) and other relevant actors.

Based on these recommendations, the Angolan National Adaptation Program of Action (NAPA),² the Angola, Namibian and South African United Nations Framework Convention on Climate Change (UNFCCC) National Communications, national fisheries strategies and with the approval of the national GEF focal points, the BCC and FAO submitted a regional project concept note to the GEF for funding under the LDCF and SCCF in the fall of 2012. This was approved and the approved five-year project concept note is available in Annex 1. It proposes the following objectives and project components:

Title: Enhancing climate change resilience in the Benguela Current fisheries system

Objective:

To build resilience and reduce vulnerability of the Benguela Current marine fisheries systems to climate change through strengthened adaptive capacity and implementation of participatory and integrated adaptive strategies in order to ensure food and livelihood security.

Project components:

1. Integrating fisheries climate change considerations into fisheries policies and planning and into broader inter-sectoral policies and programmes.
2. Piloting of improved climate-resilient fisheries practices.
3. Capacity building and promotion of improved climate-resilient fisheries practices
4. Monitoring and evaluation

The proposed road map for development of the project document is presented in Annex 2. This workshop was intended to support the development of vulnerability assessment methodologies for fisheries socio-ecological systems and the collection and analysis of baseline information for the project components and will build on work done in relation to the BCC Strategic Action Programme (SAP) Action Area 1, with regard to assessments and surveys of stocks and ecosystems, but also with regard to socio-economic analyses within the framework of improving sustainable ecosystem use/management as well as fisheries assessments and management at the country level.

The project preparation phase will include multi-stakeholder consultations, including regional inception, national stakeholder and regional validation workshops. It is proposed that a scoping study of relevant stakeholders at the community, fisheries, national and regional levels will be undertaken to ensure involvement of key stakeholders in the project design process and clear definition of their role and responsibilities in the project and to identify related activities and development partners. This phase will also 1) establish vulnerability assessment frameworks appropriate for the Benguela Current fisheries social-ecological systems; 2) undertake policy and institutional analyses with the aim of integrating fisheries climate change considerations into fisheries policies, planning and programmes; and 3) identify existing best adaptation practices for the fisheries socio-ecological systems of the

² See http://unfccc.int/national_reports/napa/items/2719.php

Benguela current region. During this phase, project execution options and agreement on the most efficient and cost-effective arrangement as well as the definition and specific roles and responsibilities of project partners will be discussed and determined.

This workshop on assessing climate change vulnerabilities in fisheries and aquaculture in the Benguela system was the first of the project development activities.

1.2 Introduction of participants

The participants introduced themselves (see Annex 3). Mr Kevern Cochrane, Rhodes University, was appointed Chair of the workshop, and Ms Cassandra De Young and Ms Cecile Brugère, FAO, as Rapporteurs.

1.3 Overview of workshop objectives and expected outputs

Ms Cassandra De Young noted that the fisheries and aquaculture sector is a late-comer to the formal discussions on climate change vulnerability when compared to other sectors, such as agriculture and health. Vulnerability is a complex issue and its assessment in the context of fisheries and aquaculture has linkages with existing approaches such as sustainable livelihoods approaches (SLA), the ecosystem approach to fisheries and aquaculture (EAF/EAA), disaster risk management and many others. Issues of scale, uncertainty in determining causal relationships among climate and other drivers as well as in future projections of change and assessment methodologies render our understanding of the issues underlying vulnerability more difficult and do not always lead to appropriate adaptation.

In this context, the objective of the workshop was to introduce the latest thinking in climate variability and change vulnerability methodologies and to begin a reflection on what vulnerability assessment frameworks and methodologies would be appropriate for the Benguela region to set the stage for in-depth assessments during the project implementation phase.

The agenda was reviewed and agreed upon (Annex 4).

2. OVERVIEW OF VULNERABILITY ASSESSMENT METHODOLOGIES AND VULNERABILITY ASSESSMENT CASE STUDY PRESENTATIONS

2.1 Assessing vulnerability to climate change at multiple scales: to what purpose and how?

Mr Eddie Allison, of the WorldFish Center,³ Malaysia and the University of East Anglia,⁴ the United Kingdom of Great Britain and Northern Ireland, provided an overview of the vulnerability analysis concept and its purpose and examined some of the attempts to use the Intergovernmental Panel on Climate Change (IPCC) exposure-sensitivity-adaptive capacity framework to assess the relative vulnerability of different people, places, economies and production systems to various facets of climate change in the fisheries sector (full presentation in Annex 5).

Mr Allison explained that the main purpose of vulnerability analysis is to improve targeting and effectiveness of adaptation actions and should answer the following questions:

Who are the vulnerable people and how can their vulnerability be reduced? (e.g. by reducing exposure and sensitivity or increasing adaptive capacity)

Where are the vulnerable ecosystems? Can their capacity to adapt be supported by resource management?

Where will the economic consequences of vulnerability of fishery systems be felt most? How can we plan to minimize those consequences?

Where will climate change create new opportunities and bring benefits? Whom for?

He noted that a vulnerability analysis can be quantitative, qualitative, relative and absolute, global, local, expert-driven or stakeholder-driven, or a combination of these. Importantly, the scale, approach and method of vulnerability analysis used should be determined by its purpose and the approach taken be determined by resources, time, expertise and availability of data. A note of caution was made, in that the interpretation of vulnerability analysis requires careful attention to the assumptions and choices of indicators and models used, particularly where multiple indicators of each component are used. The presentation concluded with recommendations to consider combining top-down and bottom-up assessments, keep such assessments simple, and avoid undue preoccupation with refining the vulnerability analysis. Since the development by the IPCC in 2001 of an approach to assess relative climate change vulnerability, there have been numerous attempts to use its exposure-sensitivity-adaptive capacity framework to assess the relative vulnerability of different people, places, economies and production systems to various facets of climate change. These experiences may prove useful in the definition of vulnerability frameworks for the Benguela region.

Four additional case study presentations were made and discussed during the course of the first day of the workshop in order to illustrate the range of vulnerability assessment experiences as well as the processes undertaken in the implementation of the assessment (e.g. which methods were chosen and why, how were approaches integrated, how were issues of scales dealt with). Presentations are summarized below and presentation slides are available in Annex 5 for further information.

1. Qualitative vulnerability assessment: Case of coastal fishing households, United Republic of Tanzania

Mr Robert Katikiro, from the Leibniz Center for Tropical Marine Ecology in Bremen, Germany,⁵ reported on the use of qualitative methods to assess vulnerability of fishing households to climate change impacts, with a particular focus on vulnerability in relation to locally perceived short-term seasonal risks. The vulnerability assessment undertaken was a part of a project 'Linking reef fisheries and livelihoods of coastal households in Mtwara district, southern Tanzania' and this presentation

³ www.worldfishcenter.org

⁴ www.uea.ac.uk/international-development

⁵ www.zmt-bremen.de/en/

outlined the vulnerability assessment for Msimbati village in the Mtwara district. Vulnerability was considered not only by meteorological hazards, but also by a series of dynamical processes involving socio-cultural, economic and political processes. Therefore, this project adopted vulnerability as a concept with many perspectives on what it represents. Various methods were employed to assess the vulnerability and existing adaptive capacity to climate change impacts including the Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL)⁶ decision support tool, interviews with appropriate participatory rural appraisal exercises and local knowledge, and transect walks. This approach allowed validation of the results through data triangulation. The vulnerability assessment took the form of narrative based procedures especially in focus group discussions, which aimed at arguing on what and how participants perceived as hazards to their livelihoods. The assessment procedures conducted focused on describing the different interpretations of the vulnerability phenomena, identifying key multipliers and providing platforms for exchange and communication between interest groups, thereby empowering them. The use of CRiSTAL identified strong winds, floods, drought and sea-level rise as the major hazards. The likely impacts of these hazards on livelihoods of fishing households included decline in fish catch, destruction of houses and property, loss of income, rise in crime events, shoreline erosion, and saline intrusion in traditionally used freshwater wells. Existing coping strategies were identified, including modifying fishing gear and vessels to manoeuvre with climate variability, opting non-fishing activities, doing nothing, and changing fishing hour patterns. Alternate coping strategies were also explored based on the influence of hazards on fisheries stocks/resources and on opportunities and challenges that were explored during the workshop. With fishing households, a qualitative assessment approach offered more context-based answers to ‘who and what is vulnerable?’ The methodological challenges of qualitative assessment were evidenced by this study, thus, qualitative approach was not enough to answer accurately the multidimensional aspects of vulnerability in fishing households.

2. Fisherfolk perspectives of vulnerability: Climate and policy intertwine in small-scale fisheries in Southern Brazil

Mr Denis Hellebrandt (University of East Anglia, the United Kingdom of Great Britain and Northern Ireland⁷) and Patrizia Abdallah (Universidade Federal do Rio Grande, Brazil⁸) presented evidence of how the vulnerability of fisherfolk is affected by the combined impact of climate variability and fisheries policy. The argument is framed by a critical perspective on the relationship between fisheries and poverty, and links to literature which emphasizes how policies that minimize fishers’ exposure and susceptibility to shocks may be more relevant than initiatives seeking to maximize wealth generation in SSF. This study was carried out in the Patos Lagoon estuary in southern Brazil. Fisheries governance in the area is based on co-management, which has set regulations controlling season closure, gear type and minimum fish and shellfish size. Both quantitative and qualitative methods, including surveys, participant observation and in-depth interviews were used. Three categories of inter-related hazards emerged from the analysis: (i) overcapacity was associated with incentives from credit supporting new entrants and increased use of bottom trawling; (ii) climate variability was related to coupled rainfall and wind patterns, with direct effect on target abundance and range – its high impact was explained by non-compliance to regulations, a result of the mismatch between rigid formal rules and fishing strategies adapted to uncertain climatic and ecological conditions; and (iii) pressure on estuarine stocks was linked to the virtually absent control over the excessive fishing capacity of the industrial coastal fleet. These patterns were independently confirmed by the different methods applied. These findings resonate with other studies that stress how vulnerability is determined by the compounded effect of ecosystem and policy processes.

⁶ See www.iisd.org/cristaltool/

⁷ www.uea.ac.uk/international-development

⁸ www.ufrgs.br/english/

3. Vulnerability to climate change in Chilean aquaculture and fisheries: results and findings.

Mr Exequiel González Poblete, from the School of Marine Sciences at the Pontificia Universidad Católica de Valparaíso, Chile⁹, in collaboration with Mr Ricardo Norambuena and Ms Carolina Alarcón from the Universidad de Concepción in Chile, presented three studies that have been used by the Chilean Undersecretariat for Fisheries and Aquaculture (USFA) to determine fisheries and aquaculture vulnerability to climate change and promote the nation's adaptive capacity to climate change impacts.

The first study¹⁰, on the vulnerability of Chilean capture fisheries, used the IPCC's exposure, sensitivity and adaptive capacity components of vulnerability. It identified a number of physical and anthropogenic stressors to estimate the exposure of the Humboldt Current System, and deducted the level of sensitivity of the Chilean fisheries under analysis based on the known and predicted future status of the fishery. The determination of the adaptive capacity of the Chilean fisheries sector relied on the analysis of the 1997–2002 crisis experienced by the Chilean Jack Mackerel fisheries. The authors concluded that there was a relevant adaptive capacity to changes in biomass levels in the pelagic central-south fishery of Chile and that the adaptive capacity to climate change was directly related to fisheries sustainable management efforts.

The second study¹¹ estimated the vulnerability of Chilean aquaculture, considering it both as the whole sector and subdivided it into four main aquaculture types (salmon, seaweed [*Gracilaria*], Chilean blue mussel and northern scallops). Vulnerability analyses used two of the IPCC emission scenarios. The study identified environmental stressors to determine the level of exposure and economic indicators as proxies for sensitivity. Determination of the adaptive capacity of the country was based on national information regarding the relative importance of the Chilean economy in the international arena (gross domestic product – GDP), life expectancy, educational attainment and governance. Although results suggested that the Chilean economy and country had a low level of vulnerability to climate change through the potential effects of climate change on its aquaculture activity, they did not allow the actual level of vulnerability of the aquaculture activity itself to be determined. This calls for caution in the use of the findings of such studies for policy development. In the case of Chile, experience shows that aquaculture activities not characterized as vulnerable under this method (seaweed and mussels) are in fact those most constrained by contextual conditions (e.g. oligopsonistic market structures, poverty) and among the most vulnerable.

The objective of the third study¹² was to propose a methodological approach and action plan to cope with the impacts of climate change on Chilean fisheries and aquaculture. The study adopted a Socio-Economic-Ecological Systems (SEES) approach considering interactions between the ecological and the socio-economic systems, their linked vulnerability to climate change and the human dependence on natural resources and the environment. The proposed methodology included both direct and indirect components of vulnerability and their effects on the five dimensions of the SEES, namely: ecological, socio-economic, technological, institutional and ethical. It applied a quali-quantitative scale of impacts (0 = null, 1 = low, 2 = medium and 3 = high) and relied on a participatory process eliciting available information and expert knowledge and experience (scientific and local-traditional) to determine the degree of exposure, sensitivity and adaptive capacity.

⁹ www.ucv.cl

¹⁰ Quiñones R., Salgado, H., Montecinos, A., Dresdner, J. y Venegas, M. 2012. Evaluación de potenciales impactos y reducción de la vulnerabilidad de la pesca al cambio climático: el caso de las pesquerías de la zona centro-sur de Chile. Concepción: Centro de Investigación Oceanográfica en el Pacífico Sur Oriental (COPAS), Universidad de Concepción, Subsecretaría de Pesca y Acuicultura de Chile y FAO.

¹¹ González E., Norambuena, R., Molina, R. y Thomas, F. 2011. *Evaluación de potenciales impactos y reducción de la vulnerabilidad de la pesca y la acuicultura al cambio climático, estudio de caso: acuicultura Chile*. Valparaíso, Chile: Escuela de Ciencias del Mar, Pontificia Universidad Católica de Valparaíso, Subsecretaría de Pesca y Acuicultura de Chile y FAO.

¹² Cubillos, L., Alarcón C., Norambuena R., Quiñones, R., y Pantoja, S. 2012. *Propuesta metodológica y plan de acción para abordar los impactos del cambio climático en el sector pesca y acuicultura en Chile*. ID4728-40-LE11. Informe Programa Copas Sur-Austral y Subsecretaria de Pesca y Acuicultura.

From a methodological point of view, key lessons learnt from these experiences include: (i) the chosen approach needs to adjust the definition of time, spatial and social scales with the central objectives of the assessment and of adaptation; and (ii) a sound vulnerability assessment needs to: (a) rescue traditional and local community knowledge, (b) recognize the value of past stakeholder experience in adaptation processes; and (c) ensure timely, effective and efficient transfer of all knowledge and information (traditional-local, scientific) to local communities.

4. Social-ecological vulnerability of coral reef fisheries to climate change.

Mr Allison, on behalf of Mr Josh Cinner and colleagues at James Cook University in Australia,¹³ briefly presented a study that piloted a modified version of the vulnerability framework used by the IPCC. Specifically, this framework was advanced by considering how ecological and social elements of vulnerability are linked. The combination of ecological exposure, ecological sensitivity and recovery potential were considered as determinants of the ecological vulnerability of a site, which in turn can be considered as the exposure experienced by the social system. Social vulnerability is then understood as a combination of this exposure plus social sensitivity and social adaptive capacity. A quantitative approach was used to evaluate climate change impacts (specifically coral bleaching) in well-studied Kenyan coral reef fisheries¹⁴. The modified framework was operationalized by developing and testing community level indicators to build each of the social-ecological vulnerability components. The method provides a useful holistic diagnostic approach that can help identify where critical sources of vulnerability lie and it should have broad application to other social-ecological systems.

2.2 Discussions

The participants very much appreciated the overview of the vulnerability assessment concept as well as the examples of their application from around the world. Discussions among the participants included the difficulty of taking uncertainty into account in the models, especially when calculating socio-economic indicators, and the potential use of scenarios versus predictive models to acknowledge such uncertainty.

The role of governance as a determinant of adaptive capacity was also raised as well as the importance of including fishers' and communities' perceptions through application of a mix of methods and approaches. The issue of reconciling civil servants and vulnerability assessors' desires for bottom-up approaches with policy-makers' preference for top-down management was raised. It was highlighted that top-level decision-makers are to be involved in the project preparation and implementation and that this should enable the integration of these two approaches and increase information transparency. Interest in combining top-down and bottom-up information collection systems was expressed and it was suggested that the project asking different vulnerability questions by different groups at different scales, including allowing for the use of different methods as appropriate.

¹³ www.coralcoe.org.au

¹⁴ See www.fao.org/docrep/018/ap972e/ap972e.pdf for a write-up of methodologies and results.

3. PRESENTATION OF THE NANSCLIM PROJECT

Ms Kathrine Michalsen of the Centre for Development Co-operation in Fisheries (CDCF), Norway,¹⁵ on behalf of Harald Loeng of the Norwegian Institute for Marine Research (IMR)¹⁶ presented the objectives and results to date of the NansClim project, “Climate effects on biodiversity, abundance and distribution of marine organisms”.¹⁷ The objective of the project was to identify and describe possible trends in ocean climate and corresponding changes in marine biodiversity and fisheries in the Benguela Current system, using data collected through the “Nansen Programme” together with relevant regional data.

In collaboration with the National Institute of Fisheries Research (INIP), Luanda, Angola, the National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia, and the Biodiversity and Ecosystem Research, Department of Environmental Affairs (DEA), Cape Town, South Africa, the main questions asked by the project were:

- Are there any identifiable ecosystem changes as a result of climate change?
- How will the distribution and abundance of marine species and communities alter with climate change?
- Which species are candidate indicators for climate change impacts?
- Where are sensitive areas or hotspots of change?
- How will ocean productivity alter with climate change?

Ms Michalsen noted that the NansClim focused on climate variability and not climate change as the time series data available were not long enough to determine long-term change in the system. The project has so far produced six scientific articles, will produce between 15 and 20 more papers, a special volume in the Fisheries Oceanography Journal as well as a project synthesis report in 2013. During the project, six different ecosystems are identified within the Benguela Current large marine ecosystem. In these, a general trend in temperature increase was observed in some areas, but in other areas, no significant temperature changes were documented. In addition, some of the recorded processes are driven by external environmental factors; while in other areas it is the local winds that have the greatest influence. The project has also documented shifts in fish distributions some areas and that, generally, smaller bodied fish tended to be more responsive to changing environmental conditions.

In conclusion, Ms Michalsen noted that the results of the study highlighted the complex nature of the response of fish populations to climate or other changes and that a sustained increase in depth of fish populations in BCLME will have ecological (via trophic interactions) and economic consequences (increased fishing cost to the fishing industry). Currently, there is a lack of policy guidance to address socio-economic, conservation and biodiversity consequences of climate-related changes in BCLME and consequences for the affected fisheries. Vulnerability of various components of ecosystem (and supported economic sectors) to climate change and related phenomena need to be assessed, and potential adaptation strategies need to be formalized.

3.1 Discussion

The participants were very interested in learning more about the results of the NansClim project and it was agreed to involve the Norwegian and national NansClim counterparts in the project preparation phase. Interest in evaluating the use of NansClim information in mixed modeling and participatory approaches to understanding questions of social-ecological vulnerability was voiced.

¹⁵ www.fisheries.no/resource_management/International_cooperation/Fisheries_development_cooperation/

¹⁶ www.imr.no

¹⁷ www.nansclim.org

4. THE EAF/EAA AND ITS LINKS TO CLIMATE CHANGE

Given the long history of the application of the ecosystem approach to fisheries and aquaculture in the Benguela region, Ms. De Young provided a brief reminder of the EAF principles and management planning steps and how issues relating to climate variability and change are incorporated into these.

4.1 Principles and purpose of the EAF/EAA

The EAF/EAA is the realization of sustainable development in fisheries and aquaculture (maintaining ecosystem integrity, improving human well-being and equity and promoting enabling governance) – stressing holistic, integrated and participatory processes. The purpose of an EAF is to plan, develop and manage fisheries and aquaculture in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by the aquatic systems. Accordingly, application of the EAF/EAA should follow the following principles:

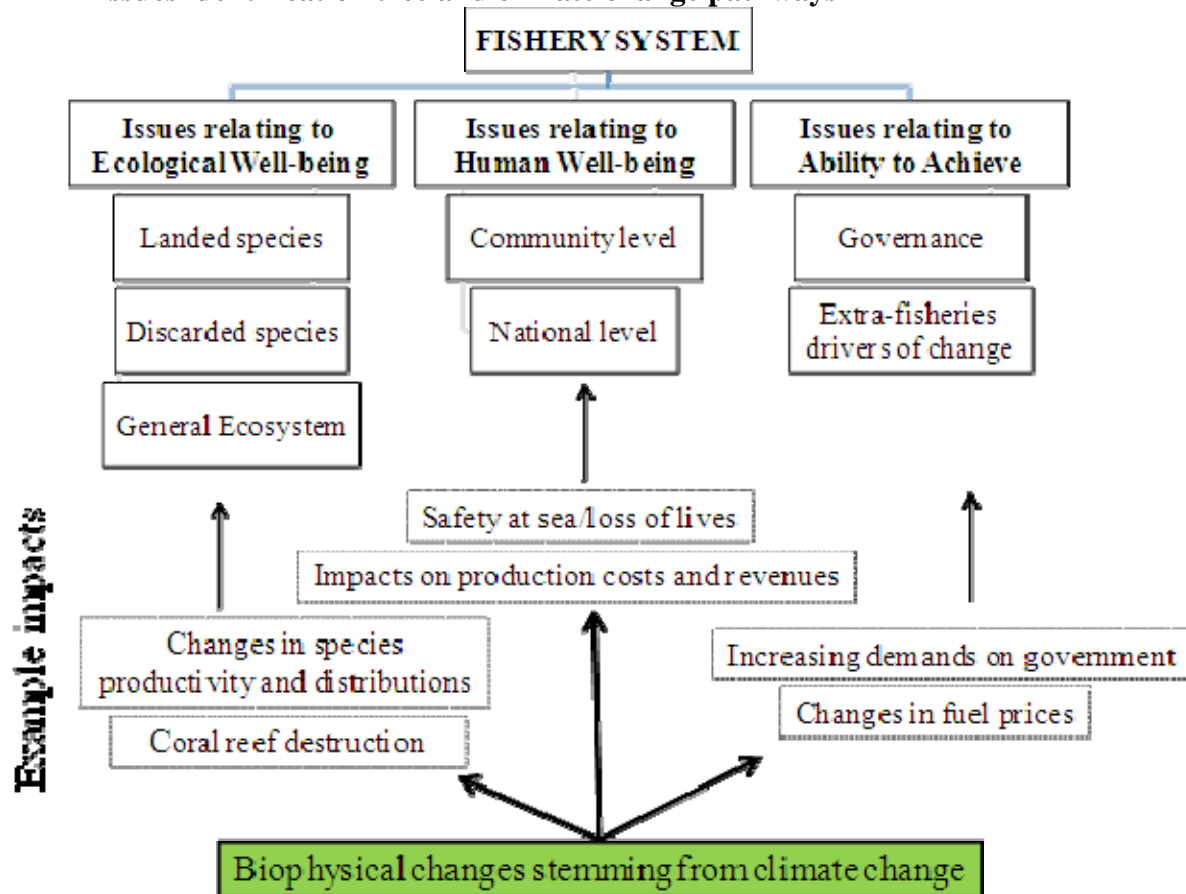
- apply the precautionary approach when faced with uncertainty;
- use best available knowledge, whether scientific, traditional or both;
- acknowledge multiple objectives and values of ecosystem services;
- embrace adaptive management;
- broaden stakeholder participation;
- use the full suite of management measures; and
- promote sectoral integration and interdisciplinarity

4.2 Using EAF/EAA to identify key climate change issues

As the EAF/EAA calls for a broader and more holistic approach to analysis of issues and management actions, the EAF/EAA management process itself assists in the monitoring of climate change impacts. A key step in any EAF/EAA management plan development process includes the identification of issues (and their prioritization through a risk assessment¹⁸) that need to be addressed by management, including all direct and indirect impacts of the fishery/farm on the broader system. Included in this process is the identification of any non-fisheries/aquaculture issues (those that are external to the fisheries/aquaculture management system) that are affecting, or could in the future affect, the performance of the system and its management such as climate variability and change. Examples of climate change impacts that can be examined by a typical EAF issue analysis tree are presented in Figure 1. Having the broadened and integrated monitoring system that an EAF/EAA would imply would allow for the monitoring of changes in the aquatic ecosystems and their impacts pathways through the fisheries and aquaculture systems.

¹⁸ A risk assessment would look at the likelihood of a change occurring and the consequences to ecosystem and human well-being and governance structures if the change arises and would form part of a vulnerability assessment.

Figure 1
EAF issues identification tree and climate change pathways



Source: De Young et al, 2012¹⁹

4.3 Using EAF/EAA to build resilience to climate change

To build resilience to the effects of climate change and to derive sustainable benefits, as a top priority fisheries and aquaculture managers need to adopt and adhere to best practices such as those described in the FAO Code of Conduct for Responsible Fisheries and the EAF/EAA. Progress in this direction would be an important contribution to maintaining biodiversity, preserving the resilience of human and aquatic systems to change, and improving our capacity to anticipate and adapt to inevitable climate-induced changes in aquatic ecosystems and related fish production systems. Some direct potential benefits of implementing the EAF/EAA include:

- creating resilient ecosystems, human, and governance communities through 1) decreasing the exposure of the sector by increasing the aquatic systems' resilience, 2) decreasing the fishing communities' sensitivities to change; as well as by 3) increasing the sector's adaptive capacity;
- supporting inter-sectoral collaboration (e.g. integrating fisheries and aquaculture into national climate change adaptation and disaster risk management (DRM) strategies and supporting integrated resource management, such as integrated coastal zone or watershed management, water planning);
- promoting integrated monitoring and information systems - incorporating scientific and local knowledge sources;

¹⁹ De Young, C., Soto, D., Bahri, T., & Brown, T. 2012. Building resilience for adaptation to climate change in the fisheries and aquaculture sector. In *Building resilience for adaptation to climate change in the agriculture sector - Proceedings of a Joint FAO/OECD Workshop 23–24 April 2012*. Rome. (also available at www.fao.org/docrep/017/i3084e/i3084e.pdf.)

- improving general awareness of climate change within and without the sector;
- promoting context specific and community-based adaptation strategies;
- avoiding “mal-adaptations” (e.g. overly rigid fishing access regimes that inhibit fishers’ migration, or adaptation actions that would increase fishing effort in an over-fished fishery);
- embracing adaptive management, decision-making under uncertainty and the precautionary approach; and
- promoting natural barriers and defenses rather than hard barriers that would impact the ecosystem.

Improving the general resilience of fisheries and aquaculture systems will reduce its vulnerability to climate change. For example, biodiversity rich systems are less sensitive to change than overfished and biodiversity poor systems. Healthy coral reef and mangroves systems provide, *inter alia*, natural barriers to physical impacts. Fisheries and aquaculture-dependent communities that have strong social systems and a portfolio of livelihood options have higher adaptive capacities and lower sensitivities to change than those without. Larger scale production systems under effective governance systems and having high capital mobility would tend to be more resilient to change in that they may more easily, for example, switch gear types or fishing zones and timing to adapt to changes in fish availability.²⁰

In addition, by assisting in improving our understanding about the role of aquatic systems as natural carbon sinks and how fisheries impact this role and by supporting a move to environmentally friendly and fuel-efficient fishing, aquaculture and post-harvest practices, implementing the EAF/EAA will also feed into global greenhouse gas mitigation efforts.

²⁰ It should note that local communities, labor, and economies may benefit or lose if companies decide to relocated as an adaptation option.

5. INITIAL VULNERABILITY ANALYSIS IN THE BCLME SOCIO-ECOLOGICAL SYSTEM

Mr Ian Hampton of Fisheries Resource Surveys, South Africa presented the results of a 2011 review of the regional biophysical features and decadal trends in the BCLME as well as an initial vulnerability assessment of the fisheries in the Benguela region²¹. With regard to the overview of the regional biophysical features and decadal trends in the BCLME, Dr. Hampton noted the following in his presentation.

The Northern regime of the BCLME has tropical features while the Southern regime consists of a colder nutrient rich upwelling. Lüderitz, Namibia, has the strongest upwelling in the region. Changes that have occurred/are occurring on a decadal period are primarily:

1. Change in wind speed and direction – intensified in offshore direction in the summer months.
2. Sea surface temperature (SST) trends over the same period include:
 - a general warming of surface waters in both the northern and southern part of the system, but a cooling of the inshore waters off western and southern coasts of South Africa, leading to an intensification of cross-shelf SST gradients in this part;
 - recurring intrusion of warm, low salinity and low oxygen water down into more southern parts, around Walvis Bay, from the most northern parts (e.g. through Benguela Niños), leading to warming of waters and lowering of oxygen levels (the latter affecting the hake stocks). This is the most important perturbation in the northern Benguela.
3. Chlorophyll concentration (relating to primary production: phytoplankton) – no long-term trend in phytoplankton concentrations has been detected.
4. Trends in oxygen level (primarily in the St Helena Bay area) – oxygen level below thermocline has been declining. This has been extending further offshore.
5. Zooplankton abundance – this has greatly increased in the southern part since the 1950s, but has declined from 2000. In the northern Benguela, the trend has been less clear since the 1970s but there has been a noticeable decline since 2000. A reduction in the larger animals may mean changes in overall size structure as well. The cause could be change in abundance of small pelagic stocks or environmental anomalies.
6. Changes in catches of major resources – all countries have suffered some major declines in catch. Dramatic changes have occurred in the northern parts (essentially with no small pelagic fish left in this region; and some changes in catch of horse mackerel, hakes, snoek, and rock lobster) and in the southern parts, catch of small pelagic fish is not as high as in the 1950s, with some changes in catch of horse mackerel, hakes, snoek, and rock lobster. There are not many detailed data from Angola available, although there has been a known decline in sardinella catches.
7. Shift in distribution of sardine and anchovy biomass from west to east of Cape Agulhas between 1985 and 2005 – this was first believed to be the result of climate change but the trend has now been reversed. Hence, it does not look like regime shift, but is possibly caused by environmental changes or fishing pressure on the west coast. Rock lobster has made the same shift.
8. Changes in top predator abundance – in the northern parts, there has been a general increase in seals. Although the population dropped dramatically following a major low oxygen event in 1993/94 and the 1995 Benguela Niño, it recovered rapidly. Gannets have suffered a rapid and continual decline in the northern parts, generally associated with anchovy and sardine decline in Namibia. Penguin populations have declined but are now stable.

²¹ See www.fao.org/docrep/017/i3053e/i3053e.pdf for the full reports.

Mr Hampton suggested that the most dramatic long-term change in the BCLME was the major decline in exploited resources, which was primarily due to overfishing, not to environmental changes. With regard to prediction of long-term changes, Dr. Hampton explained that so far such predictions had not been very good, but noted that early warning had more chance of success in this system. The difficulty in long-term prediction relates to the wide-ranging natural variability of the system, which makes it very difficult to detect long-term trends related to global climate change. One exception with regard to prediction is the Benguela Niños, which can be predicted up to two months in advance. Furthermore, long-term warming of SST at both extremes of the system as well as cooling of inshore water on the west and south coasts of South Africa is a fact. Lastly, Mr Hampton noted that responses to future, unprecedented environmental changes were currently purely conjectural, but could be profound. For example, increased leakage of the Aghulas Current water into the south Atlantic in response to global warming could change the entire upwelling regime.

Based on his review of the biophysical features and decadal trends, Mr Hamilton then undertook an initial vulnerability assessment to answer the questions: how vulnerable the exploited fish resources of the BCLME are to climate change and how vulnerable industries, communities and individuals dependent on these resources are to climatically induced changes in abundance and/or distribution of these resources. Mr Hampton further explained that his assessment had followed an adjusted IPCC framework and evaluated “sensitivity” as the degree to which the resource is likely to be affected by the indicated change, “impact” as the importance of the resource to humans in terms of, for example, commercial value, employment and food security and “adaptability” as the degree to which industries and people dependent on the resource can adapt to changes in resource abundance and/or availability.

The three aspects had been scored for each of the fisheries and multiplied to form a vulnerability index (vulnerability index = sensitivity index × impact index × adaptability index). He noted that the scoring system was subjective, particularly in relation to “sensitivity”. Table 2 below provides a relative ranking of vulnerability within each country’s fisheries based on this analysis.

Table 2: Qualitative within country vulnerability rankings for Angolan, Namibian and South African fisheries

ANGOLA		NAMIBIA		SOUTH AFRICA	
Fishery	VI	Fishery	VI	Fishery	VI
Demersal trawl	M	Demersal trawl	H	Hake (including long-line) and other trawled species	L
Industrial pelagic	M	Small pelagic	H	Small pelagic	H
Semi-industrial pelagic	H	Midwater trawl	L	Midwater trawl	L
Crustaceans	L	Line fishery	M	Line fish (excluding hake long-line)	M
Artisanal	H	Rock lobster	H	Rock lobster	H
		Crab	L	Large pelagic	L
		Recreational	L	Recreational	L
		Artisanal/subsistence	M	Artisanal/subsistence	M

Note: Vulnerability Index (VI) was ranked High (H), Medium (M) or Low (L) based on a composite indicator of sensitivity, impact and adaptability.

Following this, Mr Hampton gave some examples of how and why he had given certain scores to certain fisheries and also pointed out some extremes, e.g. the low vulnerability of the foreign-operated Namibian mid-water trawl fishery and the high vulnerability of the artisanal fishery of Angola. Mr Hampton concluded that large, highly organized and capital-intensive fisheries were generally the most adaptable ones (one exception being the South African small pelagics fishery, which is sensitive to environmental changes, and also operates with a low profit margin). The most vulnerable fisheries were found to be those with a large number of people living in communities heavily dependent on fish for food and livelihoods, with almost no ability to adapt. More specifically, Mr Hampton explained that his assessment had found the most vulnerable fisheries of the BCLME to be the artisanal and semi-industrial fisheries in Angola, the rock lobster fishery in South Africa (and to a lesser extent in Namibia), and the small-scale line fishery in South Africa. He then suggested some measures that could contribute towards increasing adaptive capacity, including research aimed at better prediction of environmental changes and responses to them. Lastly, he proposed some ways of adapting to reduced abundance or availability of stocks such as changing target species, improving catching, processing and distribution efficiency and improving product value.

6. IDENTIFYING NATIONAL CLIMATE CHANGE ISSUES

Ms Cecile Brugere presented the following vulnerability assessment principles and steps proposed during a global vulnerability assessment workshop²² held prior to this regional workshop to identify current options and best-practices in identifying vulnerability frameworks, including for the Benguela region.

6.1 Principles for a “good” vulnerability assessment

A “good” vulnerability assessment should:

- be linked to concrete adaptation actions, leading to the achievement of societal objectives;
- acknowledge that climate change is typically one among many risks and drivers of change (it may be an amplifier of existing changes) and that its compounded effects may be difficult to single out from these other drivers, or to clearly quantify and predict;
- be based on an established and agreed-upon framework;
- use an approach that relies on established and robust methodologies (to ensure accountability and replicability), while allowing for uniqueness inherent to each context;
- consider combining and reconciling the strengths of top-down and bottom-up approaches;
- be based on best available scientific information (evidence-based data, objective, models) but also account for and/or include perceptions and/or subjective information from stakeholders);
- be a transparent process, acknowledging limitations and uncertainties as well as disciplinary biases;
- be aware that there may be winners and losers who need to be identified at different (time, geographical) scales;
- acknowledge the benefits and limitations of working at any particular scale and that vulnerability assessment findings might be limited to a predetermined scale deemed of relevance to the assessment itself;
- account for the different needs of end users and use context-relevant communication channels;
- be an iterative, participatory and multistakeholder process.

6.2 Proposed steps for a vulnerability assessment in fisheries and aquaculture

Below are proposed steps to assist vulnerability assessment practitioners support stakeholders in the development and application of a vulnerability assessment. The level of detail and language used in the process will depend on the information available, the stakeholders involved and the end users of the results.

Step 1: Why a vulnerability assessment? – assessment “warm-up”

This step enables defining the broad context within which the assessment will take place. It is essential to reflect and decide on why a vulnerability assessment is needed:

- Who is driving/requesting the assessment and why?
- Define the objective (or objectives) of the assessment: its immediate objective and links to longer-term/higher level goals. This implies distinguishing between the specific output (product) of the assessment and the outcomes (changes) the assessment will lead to.
- To what extent is the assessment anticipating (*ex ante*), reactive (*ex post*) or a mix of both?
- Who are going to be the users of the assessment? (direct and indirect users, at several possible levels)

²² FAO. 2013. *Report of the PaCFA expert workshop on assessing climate change vulnerability in fisheries and aquaculture: available methodologies and their relevance for the sector. Windhoek, Namibia, 8–10 April 2013*. FAO Fisheries and Aquaculture Report 1047. Rome. (available at www.fao.org/docrep/018/i3357e/i3357e.pdf).

- Who will undertake the vulnerability assessment? What is their expertise/disciplinary background?

Operational constraints also need to be identified:

- What issues need to be considered relating to the funding source for the assessment?
- Are there time constraints for the assessment?
- Are there financial and human constraints?

Step 2: Identify the system and drivers – “scoping” activity

This step enables an **initial** scoping of who/what is vulnerable to what and why, within the context determined under Step 1. It is **not** the assessment as such, but it should enable obtaining a broad picture of vulnerability to help define the scope, range and possible methods of the detailed vulnerability assessment to be undertaken.

a) Important things to consider:

- What is the specific system, sector or group at stake: socio-economic, biophysical, combined human–environmental?
- What are the major drivers of change in the system: climate change, economic, social, policies, micro/macro? A rapid analysis of impact pathways may be useful here and will provide the broad picture of changes in the system.
- What is the temporal scale to be considered: long term, short term, past history, projections?
- What is the spatial scale of the assessment: national, local, regional, ecological scales, combination of scales?
- Can some thresholds and/or tipping points be identified at this stage, i.e. up to what point can the system be and/or can people do what they do until change is unavoidable?
- Who are stakeholders to involve in the assessment? At this stage, a rapid stakeholder analysis, including considerations of their likely perceptions and of external stakeholders may be useful.

Examples of initial vulnerability questions and issues specific to fisheries and aquaculture are given in Box 1. At this point, future projections of climate and vulnerability are not necessarily required, as it is mostly “contextual” vulnerability (see Annex 3) that is focused upon.

Box 1

Example questions and issues specific to fisheries and aquaculture for use in a vulnerability scoping exercise

Understanding the *exposure* of the human and aquatic system to change: Identification of the biophysical changes expected over different time scales (annual, decade, century) and their impacts on the system under evaluation and the larger communities dependent on the system

- Review of any existing climatic, oceanographic, etc. models predicting biophysical changes and system (ecosystem) impacts within the context of other drivers of change on the system (e.g. pollution, irrigation, land use, other users of the aquatic system, fishing).
- Analysis of the various pathways to impacts on the fisheries/aquaculture system and communities within the context of other drivers of change (e.g. globalization, changes in markets, war, policies). For example, fisheries management, use of resources by other sectors, pollution, runoff all affect the fisheries resources and environments. Social, political and economic drivers are also impacting fisheries and their communities.
- It would help to know to what extent changes are climate change driven and, further down, how sensitive the system is to the various drivers.
- How likely are these changes to occur? Gender-specific differences?
- If no formal information is available, opinion and perceptions would be useful.

Understanding the *sensitivity* of the human and aquatic system to change

- Description of the biological and ecological state of the resources in the system:
 - How sensitive are the ecosystem and fisheries species to changes in temperatures, sea level, salinity, precipitation, ocean circulation and other predicted impacts? What are the consequences to ecosystem well-being if the change comes about?
- Description of the social and economic contributions to, for example, food/nutrition security, livelihoods, employment, export earnings, social stability, and dependence of the relevant communities (local, regional, national) on the system:
 - How sensitive are these to changes in the various drivers, including climate change? What are the consequences to human well-being if the change comes about? Gender-specific differences?

Evaluating the current *adaptive capacity* of the human and aquatic system

- Description of the resilience and adapting capabilities of the aquatic system, such as through indicators on biodiversity within the ecosystem, genetic diversity of species, biomass, age and size structures, water quality, amount of habitat destruction/rebuilding, proximity to threshold limits.
- Description of the adaptive capacity of the human economic–social system, such as:
 - The ability of institutions, communities and individuals to learn, use and store knowledge and experiences:
 - How is (market, climate, policy) information shared at the local level? National level?
 - What information is collected and how/when is it collected (e.g. research surveys, local knowledge surveys)?
 - How is this information used to assist management and manage uncertainty and change?
 - Et cetera.
 - Flexibility in decision making and problem solving:
 - Are adaptive, participatory, integrated approaches to management in place?
 - Et cetera.
 - Existence of power structures that are responsive, effective and consider the needs of all stakeholders:
 - Who is responsible for fisheries management?
 - Who is responsible for disaster risk management, general aquatic health, water management, coastal/lake/river/basin management?
 - Is it the same agency for the above items?
 - Do relevant plans exist and are they coordinated across institutions (e.g. does an integrated coastal management plan exist that incorporates disaster risk management)?
 - Who takes the decisions?
 - What are the consultation processes?
 - How is uncertainty built into the decision-making process?
 - Et cetera.
 - Existence of alternatives and access to services:
 - Are there social safety net systems in place (e.g. community-level insurance, shared recovery costs)?
 - Alternative livelihoods availability? Job mobility? Training?
 - Access to alternative markets?
 - Alternative sources of food and nutrition?
 - Access to public services (potable water, health systems, education)?
 - Are there gender-specific differences in adaptive capacities?

b) Methods to organize information from point 2.a)

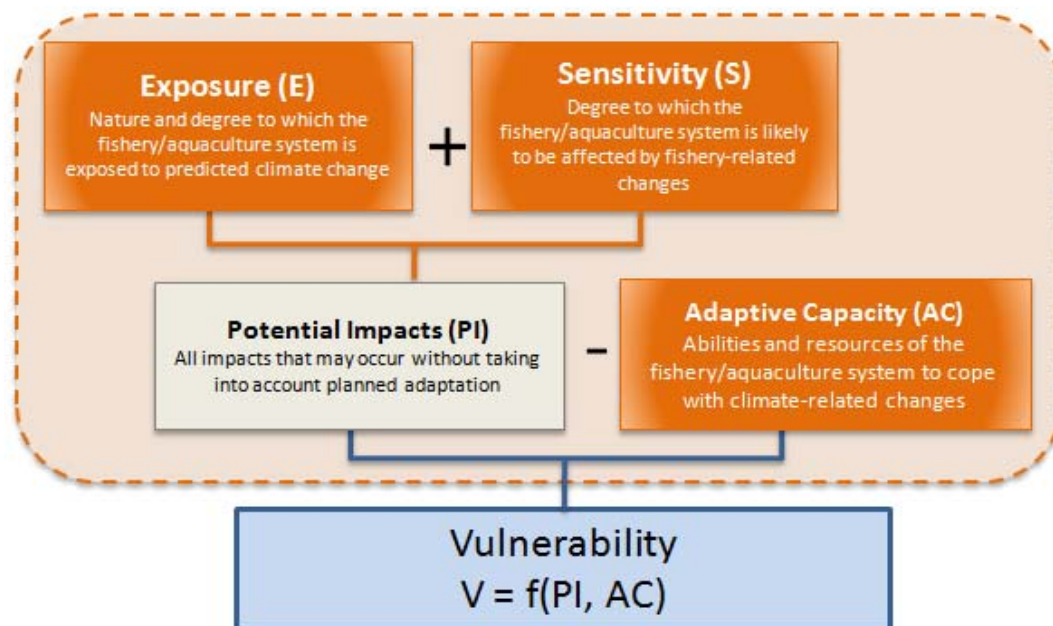
Organizing the information gathered from point 2.a) will depend on the preferences of the stakeholders defining and working on the vulnerability assessment. Some possibilities include structuring information in:

- matrix/table form;
- decision trees;
- axis/gradients;
- maps;
- freely, in narratives;
- according to the five livelihood capitals (natural, physical, financial, social and human).

It may also be useful to organize the information according to the IPCC components of vulnerability (exposure, sensitivity, adaptive capacity – Figure 2) for different types of stakeholders, or scales (spatial and/or temporal).

Figure 2

Generic IPCC vulnerability analysis framework for fisheries and aquaculture systems



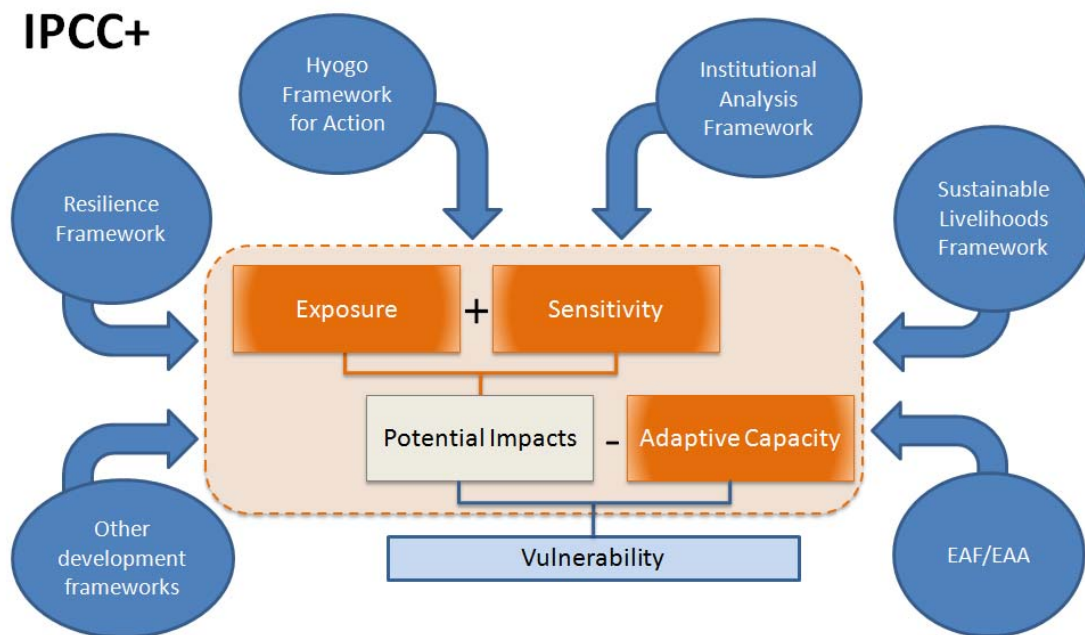
Source: Derived from IPCC. 2001. *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Third Assessment Report of the IPCC. (also available at www.grida.no/publications/other/ipcc_tar/).

Step 3: Choosing a framework of analysis

From the broad picture and initial scoping of drivers and vulnerabilities drawn from Step 2, stakeholders will need to agree upon a particular framework for the vulnerability analysis. The choice of framework will depend on the questions to be asked by the vulnerability assessment, how and to whom the vulnerability assessment and its findings will be communicated, operational constraints and what people need and want from the vulnerability assessment.

As a starting point, consider using an “IPCC+” framework, i.e. a framework based on the IPCC definition and components but one that allows for drivers other than climate change to be considered. The IPCC+ framework can then be complemented by other relevant or appropriate frameworks, such as the Hyogo Disaster Risk Framework, the Sustainable Livelihoods Framework, the Resilience Framework and others to improve the basic IPCC framework (Figure 3). This enables not only acknowledgement of the existence and relevance of these other frameworks, but also the option to build a layer of complexity over the basic IPCC vulnerability components with complementary considerations and perspectives.

Figure 3
Schematic representation of the place of non-climate specific frameworks to enrich the basic IPCC vulnerability framework



Step 4: Identify data/information needed to answer the vulnerability questions

Now that the questions to be answered by the vulnerability assessment have been established, depending on the purpose, the objective and the time, financial and human constraints of the vulnerability assessment, this step should establish which information and/or data are needed, which are already available and which need to be collected.

Depending on the various elements underlying the vulnerability questions, the assessment may consider using a mix of various types of data: qualitative, quantitative, primary (gathered at the source), secondary (derived from other sources) of any kind (e.g. scientific climatic, biological, socio-economic data, perceptions information).

This inventory of data/information can be organized according to the method used in Step 2.

Step 5: Identify how to obtain these data and information

There are many methodologies available for collecting data and information on the vulnerability components. The choice of methods will depend on issues such as the scale of the assessment and resource constraints, as well as whether participatory approaches or other approaches to collecting information are to be used.

Some questions to consider include:

- How to obtain the missing data/information: reviews, secondary data (e.g. census), surveys, expert or stakeholder workshops, etc.?
- Who can collect it?
- Where/who from? (if available)
- Are present data, future projections, historical information included?

Links to guidance on information-gathering methodologies that could be adapted to the context of a vulnerability assessment include the online EAF Toolbox²³ and the list of process-oriented methodologies and information management tools for use in the implementation of the EAF.²⁴

Step 6: Analysing the data/information within the chosen framework

This step is about analysing the collected data and information according to the framework chosen for the assessment. There are many methodologies available for pulling together the information on the vulnerability components, such as modelling-based (e.g. downscaling, modelling), indicator-based (computation of indices and indicators), and stakeholder-based (livelihood narratives, institutional analyses, etc.) methods. The choice between these methods will depend on the scale, the information collected and available, and the purpose of the assessment itself.

The results of this step should provide refined answers to the questions as to who and/or what is vulnerable to what (Step 2), as well as clearly point to the causes or reasons for vulnerability, i.e. answering why a system or people are unable to adapt and vulnerable, in such a way that recommendations and priorities for action become clear.

Step 7: Report and communicate findings

Depending on the objectives and users of the findings, this step considers how and in what forms the findings of the vulnerability assessment should be communicated for adaptation planning and used to influence decision processes.

It is essential at this step to decide upon target audiences and users and the most appropriate communication channels for these audiences.

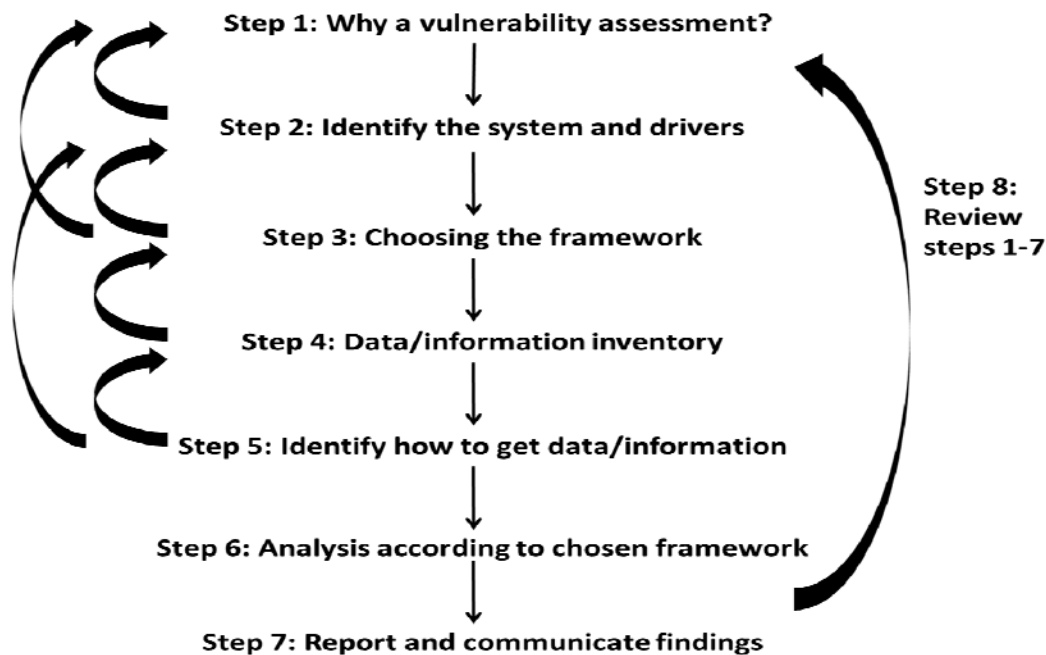
Step 8: Review Steps 1–7

As the vulnerability questions may evolve during the vulnerability assessment process (Steps 1–7), this step is to remind the assessor to review each step continuously along the way and make the necessary adjustments to the vulnerability assessment methodologies followed (Figure 4).

²³ www.fao.org/fishery/eaf-net/topic/166272/en

²⁴ De Young, C., Charles, A. & Hjort, A. 2008. *Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods*. FAO Fisheries Technical Paper No. 489. Rome, FAO. 152 pp. (also available at www.fao.org/docrep/010/i0163e/i0163e00.htm).

Figure 4.
Proposed vulnerability assessment process



6.3 Group and plenary work and discussions on defining vulnerability assessment frameworks

Steps 1 and 2 – Group work

Three working groups were formed to initiate, on a trial basis, the vulnerability assessment steps proposed above for Angolan, Namibian and South African fisheries and aquaculture systems. The purpose of this exercise was to raise awareness among participants on the types of questions and issues that will need to be considered in preparation for the project and during the implementation of the vulnerability assessment itself. Although time for group work was limited, this exercise exposed participants to the Steps and enable to sketch out information in each national group that could feed into the subsequent stages of project development (rather than trying to arrive at final answers), especially as different groups selected different scales and examples to work on. As a consequence, Steps 1 and 2 were focused on in priority in each group and reported in plenary. The initial outputs from each country's reflection and discussion are reproduced in Annex 6. Comments were made in the discussion that followed on:

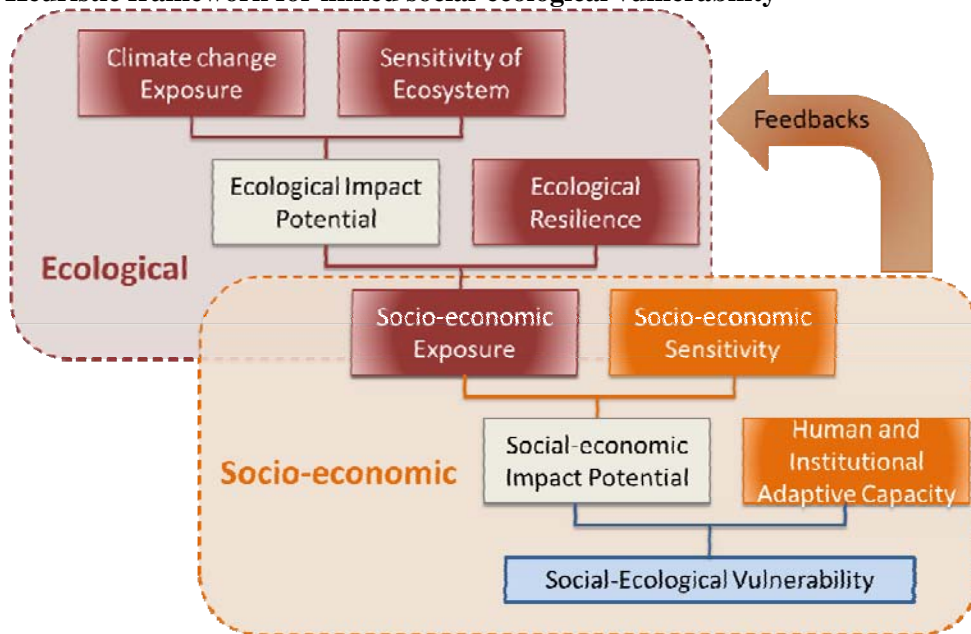
- The issue of the monitoring of vulnerability, and whether this would involve a repeat of the vulnerability assessment throughout the project duration;
- Concerns related to the capacity of countries (and in particular Angola and Namibia) to handle the vulnerability assessment itself;
- The issue of focus of each national vulnerability assessment, i.e. whether the vulnerability assessment should a-priori focus on climate as the main driver of change and fisheries, or lead to the identification of this and perhaps other drivers and encompass other activities and livelihoods than those just based on fishing;
- The importance of including inputs from, and accounting for the perception of the region's fishing industries as important stakeholders in the vulnerability assessment, although it was recognized that they may have more immediate concerns (e.g. increases in prices) than climate change;
- The process through which national assessments would be pulled together into a regional assessment;

- The identification of national champions to channel the influence of the project (and vulnerability assessment process) to all stakeholders and levels of governance.

Step 3 – Plenary work

Due to limited time, the participants proceeded to Step 3 in plenary through the piloting the joint social-ecological vulnerability framework that had been highlighted by Mr Allison in his earlier presentation (Figure 5) to Angola’s small-scale fisheries. This exercise proved useful to familiarize participants with the analytical “gymnastics” that need to be undertaken to consider what constitute exposure, sensitivity and *how* these two factors influence resilience or adaptive capacity in ecosystems and human systems respectively. For example, under the latter two categories, it is not sufficient to state a fact (how the system is affected) but to reflect on its capacity, ability, potential to evolve. This therefore implies considering a *range* of possible outcomes, which can then be evaluated. Although what follows (Tables 3a and 3b) is illustrative of the result of this exercise applied to small-scale Angolan fisheries, it is by no means exhaustive and only represents some of the types of vulnerability elements that may be explored under the future project.

Figure 5
Heuristic framework for linked social-ecological vulnerability



Source: Cinner et al., 2013²⁵.

²⁵ Cinner, J., McClanahan, T., Wamukota, A., Darling, E., Humphries, A., Hicks, C., Huchery, C., Marshall, N., Hempson, T., Graham, N., Bodin, Ö., Daw, T. & Allison, E. 2013. *Social-ecological vulnerability of coral reef fisheries to climatic shocks*. FAO Fisheries and Aquaculture Circular No. 1082. Rome, FAO. 63 pp (also available at www.fao.org/docrep/018/ap972e/ap972e.pdf).

Table 3a
Example elements of ecosystem vulnerability in Angola small-scale fisheries (SSF) system

Climate change exposure	Sensitivity of ecosystem (closeness to threshold limits?)	Ecological resilience (is this making the system more or less adaptive?)
Changes in SSF – increasing temperatures have been documented	Changes in fish species composition and distribution – decreases in availability and productivity (e.g. blacktail seabream) (e.g. driving Cob south)	Availability of remaining biomass left in the system (it is low as overfishing is a problem). Ability of fish recruitment in marine system to be maintained despite increased fishing effort in estuaries.
Extreme events – e.g. floodings leading to higher freshwater discharge into Benguela system	Changes in fish species composition and distribution	Capacity of the ecosystem to respond positively to stress reduction (e.g. reduced fishing pressure)
Acidification ?	Changes in fish biomass and production	Scope for fish species physiology to adapt to different environmental conditions and habitats.
Local knowledge: observed changes in climate variables (rough seas periods becoming longer – from 1 day to 2 weeks)	Observed changes in species (e.g. grouper no longer available)	Potential of the food web to withstand the removal of some species.

Table 3b
Example elements of social vulnerability in Angola SSF system

Socio-economic exposure (what are the risks that you face)	Sensitivity of socio-economic system (how important is that risk if it occurs?)	Adaptive capacity (how capable are you of dealing with that risk? How well prepared are you?)
<i>Large-scale (coastal regions) and local-scale</i>		
Sea surges/roughness measured by met. office leading to increased periods of no fishing combined with sea level rise impacting coastal communities (potentially measured by infrastructure damage)	Increased reliance on coastal fisheries because of population increases	Ability to spread risk to infrastructure damage. Access to improved post-harvest facilities and procedures (indicator – access to ice). Access to improved infrastructure to decrease post-harvest losses so decreased availability of fish is compensated Ability to diversify – e.g. indicator - education levels (higher levels gives access to alternatives elsewhere in economy). Strength of community tradition of collaboration (if strong, high adaptive capacity, if low, low adaptive capacity) (e.g. indicators – cooperatives, informal insurance/credit).
<i>Small-scale (individual, household, community, sub-sector) and “bottom up”</i>		
Risk perceptions (community/local scale and sector and national)	Cultural/social preferences and dependencies on fishing	History of past adaptation to variability and change
Accidents at sea, conflicts over access to fishing areas	Needing to go further out to sea and spend more time (from 1 day to 3-4 days) and causing conflicts among the fishing sectors	Capacity of management systems to mitigate and resolve conflicts over fishing grounds. Capacity of fishers to improve the safety of their boats.

A number of considerations were discussed by participants at the end of this exercise on:

- Ensuring that promoted coping (short-term) strategies do not erode long-term adaptation capacity in both environment and human systems.
- Thinking how to measure exposure and sensitivity can help define their characteristics.
- Taking into account people’s aspirations and hopes into the design of future adaptation capacity interventions in order to move further than the status quo and tangibly improve adaptive capacity.

7. IDENTIFYING REGIONAL/TRANSBOUNDARY CLIMATE CHANGE ISSUES

To initiate discussions of what types of issues might require a regional level vulnerability assessment, the participants provided an initial scoping of the transboundary fisheries and issues that they felt might be most susceptible to climate related changes:

Environmental/fishery-related:

- Hake species (vulnerability of species to change as well as economic importance of the fishery)
- Seals as general ecosystem vulnerability indicator
- Possible snoek distribution/abundance changes and impacts on SSF across the three countries (as well as potential implications on lobster fisheries)
- Horse mackerel (Cunene and Cape), sardinella (aurita, madeira), deep sea red crab, sardine (pilchard) – both natural and human and governance (e.g. transboundary management plans)
- Changes in sea birds' migration (e.g. changes in food sources etc.)
- Sharks and turtles decreasing abundance
- Mining-fisheries issues (as another driver)
- Transboundary Ramsar²⁶ sites and MPAs and their vulnerability to change
- Migration of dusky cob (from Namibia to Angola)
- Etc.

Human and institutional (including management):

- Transboundary migration by fishers including implications on human disease (e.g. spread of HIV/AIDS) and gender
- Impacts of industrial fishing on small-scale fisheries
- Availability of alternative livelihoods in small-scale fishing communities and moving towards improved governance at the local level²⁷
- Regional allocation rights and how these are vulnerable to change
- Vulnerability of transboundary management efforts to climate induced changes

²⁶ The Ramsar Convention on Wetlands

www.ramsar.org/cda/en/ramsar-kiribati-rs-homeindex/main/ramsar/1%5E26163_4000_0

²⁷ This was however deemed as more of a “cross-cutting” issue than a transboundary one.

8. RECOMMENDATIONS FOR THE PLANNING OF THE LDCF/SCCF PROJECT PREPARATION INCEPTION WORKSHOP AND BEYOND

Recommendations for the Inception Workshop:

The workshop participants suggested the following objectives for the Project Preparation Inception Workshop:

1. To introduce the overall project and project development phase: the history of the project proposal, the proposed framework and the roadmap for the development of the project document.
2. To start identifying issues of concern (from impacts to vulnerabilities) at local and regional levels
3. Prioritization of regional issues
4. To identifying stakeholders and partners in the project development and implementation

Given these objectives, the workshop participants suggested the following agenda items for the Inception Workshop:

1. Transboundary issues: to prioritize and identify those to target in the project.
2. Implementation of the vulnerability assessments: how and type of expertise needed.
3. Time must be allowed at the Inception Workshop for bringing people currently unfamiliar with climate change and vulnerability up to speed on the subjects so that they could contribute to discussions and decisions.
4. Provision of a thorough introduction to the GEF Project Identification Form (PIF).
5. Planning of the project preparation: timeline, activities, responsibilities etc.
6. Overview of current state of knowledge of the system (it was requested that this be done by NANSCLIM).
7. Session on vulnerability analysis (why we need to deal with climate change, steps etc.) ahead of national workshops. In parallel with issue identification method of the EAF .

It was also recommended that the inception workshop report be comprehensive so as to become an important and reliable resource for the rest of the project development phases.

Recommendations regarding key stakeholders to involve:

It was suggested that the agenda of the inception workshop be detailed enough but not too technical to trigger buy-in and encourage people to attend. Participants should include a balanced mix of scientific expertise, Universities and researchers²⁸, Ministries of Fisheries, Environment and other line ministries²⁹, non-governmental organizations (NGOs) working with fishing communities, representatives of coastal communities and of the fishing industries³⁰ prevalent in the region, UNFCCC and other climate change focal points, policy communications experts all together totaling approximately 30 participants (approximately 10 per country). National focal points and champions for the project preparation phase should be identified.

Suggested timeframe outline for the project preparation milestones:

- Inception workshop to be held in July 2013
- National workshops to be held between mid-July and mid-September 2013
- Draft project document to be ready by December 2013
- Technical clearance by GEF to be done by mid-April 2014.

²⁸ For example, EMG, MARE, PLAS in South Africa.

²⁹ It was suggested that Director levels be targeted for participation in the Inception Workshop.

³⁰ Such as representatives of the mariculture, small pelagic and rock lobster industries in South Africa, the artisanal fisheries sub-sector and commercial fishing industry (sardinella, horse mackerel) in Namibia.

9. CONCLUDING REMARKS AND CLOSURE OF THE WORKSHOP

Ms De Young of the FAO thanked the participants for their fully engaged concern for assisting the fisheries sector of the Benguela current understand impacts and vulnerabilities from climate change as well as other drivers faced by the sector. She thanked the BCC for hosting the event and the international experts for their contributions in providing examples for consideration by the region.

Mr Hashali Hamukuaya of the BCC thanked the participants and international experts for sharing their wealth of knowledge and experiences and assured the participants that the results of this workshop will be applied in the adaptation project under development in the Benguela region. Mr Hamukuaya thanked the FAO and PaCFA for their technical support and the governments of Japan and Norway for their financial support. Mr Hamukuaya then officially closed the meeting.

**LDCF/SCCF PROJECT CONCEPT FOR ENHANCING CLIMATE CHANGE RESILIENCE
IN THE BENGUELA CURRENT FISHERIES SYSTEM**



PROJECT IDENTIFICATION FORM (PIF)¹
PROJECT TYPE: FULL-SIZED PROJECT
TYPE OF TRUST FUND: LDCF, SCCF

PART I: Project Identification

Project Title:	Enhancing climate change resilience in the Benguela Current fisheries system		
Country(ies):	Angola, Namibia and South Africa	GEF Project ID:²	5113
GEF Agency(ies):	FAO	GEF Agency Project ID:	619123
Other Executing Partner(s):	Benguela Current Commission (BCC)	Submission date:	September 19, 2012
GEF Focal Area (s):	Climate change	Project duration (months):	60
Name of parent program (if applicable): ➤ For SFM <input type="checkbox"/>		Agency fee:	472 500

A. FOCAL AREA STRATEGY³

Focal area objectives	Expected FA outcomes	Expected FA outputs	Trust Fund	Indicative grant amount (\$)	Indicative co-financing (\$)
CCA-1	Outcome 1.1: Mainstreamed adaptation in broader development frameworks at country level and in targeted vulnerable areas	Output 1.1.1: Adaptation measures and necessary budget allocations included in relevant frameworks	SCCF LDCF	268 000 150 000	936 000 400 000
	Outcome 1.2: Reduced vulnerability in development sectors and sources of income for vulnerable people in targeted areas	Output 1.2.1: Vulnerable physical, natural and social assets strengthened in response to climate change impacts, including variability	SCCF LDCF	536 000 300 000	1 872 000 800 000

¹ It is very important to consult the PIF preparation guidelines when completing this template.

² Project ID number will be assigned by GEFSEC.

³ Refer to the reference attached on the Focal Area Results Framework when filling up the table in item A.

	Outcome 1.3: Diversified and strengthened livelihoods	Output 1.3.1: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	SCCF LDCF	536 000 300 000	1 872 000 800 000
CCA-2	Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas	Output 2.1.1: Risk and vulnerability assessments conducted and updated Output 2.1.2: Systems in place to disseminate timely risk information	SCCF LDCF	615 200 348 800	2 120 000 908 000
	Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate induced economic losses	Output 2.2.1: Targeted population groups covered by adequate risk reduction measures	SCCF LDCF	461 400 261 600	1 590 000 681 000
	Outcome 2.3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	Output 2.3.1: Targeted population groups participating in adaptation and risk reduction awareness activities.	SCCF LDCF	461 400 261 600	1 590 000 681 000
Sub-Total				4 500 000	14 250 000
Project management cost⁴				225 000	400 000
Total project costs				4 725 000	14 650 000

⁴ GEF will finance management cost that is solely linked to GEF financing of the project.

B. PROJECT FRAMEWORK

Project Objective: To build resilience and reduce vulnerability of the Benguela Current marine fisheries systems to climate change through strengthened adaptive capacity and implementation of participatory and integrated adaptive strategies in order to ensure food and livelihood security.

Project component	Grant type	Expected outcomes	Expected outputs	Trust Fund	Indicative grant amount (\$)	Indicative co-financing (\$)
1. Integrating fisheries climate change considerations into fisheries policies and planning as well as into broader inter-sectoral development and climate change policies and programmes.	TA	1.1 Regional and national authorities, as well as major stakeholder groups, informed of vulnerabilities across the region to predicted impacts of climate variability and change Indicator: Risk information disseminated to target stakeholder groups (men and women) and regional and national authorities (as defined in the LDCF/SCCF AMAT)	1.1.1 Participatory and integrated vulnerability assessments of fisheries and fishery-dependent communities undertaken for all three countries (using methodology and approach developed during project preparation) and results disseminated. 1.1.2 Adaptation actions identified and prioritized with broad stakeholder involvement for at least 50% of the most vulnerable fishery systems. 1.1.3 Vulnerability assessment and planning processes incorporated into the Benguela Current Commission SAP and in the planning and managing frameworks of the National Authorities in all three countries to ensure vulnerability assessments and relevant adaptation plans and actions are updated every 3–5 years	SCCF LDFC	1 029 000 581 000	4 337 200 1 855 000
		1.2 Climate change adaptation in fisheries and fishery-dependent communities mainstreamed into broader sectoral, food-security and climate change frameworks in all of the three countries. Indicator: Number of	1.2.1 Gaps and opportunities for mainstreaming climate change adaptation in fisheries into national and regional food security, development, climate change and related policies identified in	SCCF LDFC	441 000 249 000	1 858 800 795 000

		national and regional policies that incorporate climate change adaptation in fisheries (target to be defined during project preparation)	consultation with decision-makers. Draft policies, or addenda to existing policies, submitted to the National Authorities and BCC for adoption 1.2.2 Working through the multi-sectoral BCC and its national member Ministries, opportunities will be created for inter-agency/inter-sectoral communication and joint discussion on vulnerabilities and adaptation requirements and strategies, including participatory workshops; thereby strengthening cross-sectoral collaboration and facilitating multi-disciplinary cooperation to anticipate and respond to adaptation needs			
2. Piloting of improved climate-resilient fisheries practices.	TA	2.1 Vulnerability to climate change and variability reduced in local, small-scale fisheries and fishing communities identified as being at high risk, considering all stages from production through to post-harvest and trade Indicator: Vulnerability and risk perception index disaggregated by gender has increased from 1/2 (extreme/high vulnerability) to 3/4 (medium/low vulnerability) in targeted fishing communities	2.1.1 Based on outputs 1.1.1 and 1.1.2, stakeholder- and community-based adaptation action plans (addressing, as necessary, resource management, social and economic responses, governance issues, alternative and diversified livelihoods, local monitoring and surveillance systems), piloted in at least six high-risk local fisheries or communities	SCCF LDCF	384 000 216 000	990 800 424 000
		2.2 National and regional institutions are prepared and have the capacities for	2.2.1 Management plans developed or strengthened to incorporate	SCCF LDCF	288 000 162 000	743 100 318 000

		integration of climatechange adaptation (CCA) in fisheries in practice, based on thorough consultative planning processes	monitoring and adaptative response to climate variability and change in at least 3 national or regional fisheries			
		2.3 Strengthened institutions and frameworks for effective monitoring and early warning to facilitate contingency planning at the regional and national levels	2.3.1 Existing national and regional frameworks for monitoring, processing and disseminating information on extreme weather events and climate-induced risks in fisheries (e.g. incidence of Benguela Niños, low oxygen events, severe storms) analysed, in collaboration with national agencies and the BCC. Any existing gaps and limitations identified and addressed through, for example, training in relevant skills, identification of additional specialised staff required, creation of focal points for cross-institution collaboration, and identification of equipment or infrastructure needed	SCCF LDCF	288 000 162 000	743 100 318 000
3. Capacity building and promotion of improved climate-resilient fisheries practices	TA	3.1 At least 50% of stakeholders and other affected individuals have moderate to high understanding and awareness (as defined in the SCCF/LDCF AMAT disaggregated by gender) of likely adverse impacts of climate change and variability on the fishery sector and appropriate response measures	3.1.1 Targeted, user-friendly information on impacts, risks and vulnerability to climate change and variability and adaptive responses has been produced and disseminated to national and regional stakeholders, and to local communities in the most highly vulnerable areas	SCCF LDFC	128 000 72 000	357 600 153 200
		3.2 Local, national and regional institutions have	3.2.1 Knowledge and understanding of at least 300	SCCF LDFC	192 000 108 000	536 400 229 800

		strengthened capacity to reduce vulnerability to climate-induced risks through inclusion of adaptation into fisheries and multi-sectoral planning and management processes	stakeholders from communities strengthened through targeted training on climate change risks and best adaptation practices in fisheries 3.2.2 Knowledge and understanding of at least 150 stakeholders from government, universities, non-governmental organizations and industry strengthened through targeted training on climate change risks and best adaptation practices in fisheries 3.2.3 Results and best-practices arising from pilot and other project activities synthesised and shared within Benguela Current fisheries stakeholders, other African Large Marine Ecosystems (LMEs), regional fisheries bodies (RFBs) and economic communities (RECs), NEPAD Agency and other African high-level technical and policy fora			
4. Monitoring and evaluation	TA	4.1 Project implementation based on results-based management monitored and continually evaluated to ensure successful achievement of project objective, outcomes and outputs.	4.1.1 Project monitoring system established and functioning efficiently to provide systematic information on progress in meeting project outcome and output targets, and adjustment of approaches as required to ensure this 4.1.2 Midterm and final evaluations conducted	SCCF LDCF	51 200 28 800	165 200 70 800

		4.2 Application in future planning and operations of project findings and lessons learned facilitated	4.2.1 Project-related “best-practices” and “lessons-learned” assessed, published and disseminated 4.2.2 Website developed and maintained to share experiences and to facilitate awareness creation and information dissemination	SCCF LDCF	76 800 43 200	247 800 106 200
Sub-Total					4 500 000	14 250 000
Project management Cost					225 000	400 000
Total project costs					4 725 000	14 650 000

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
GEF Agency	FAO	Grant	150 000
GEF Agency	FAO	In-kind	500 000
Executing partner	Benguela Current Commission (BCC)	Grant	80 000
Executing partner	BCC	In-kind	700 000
National Government	Angola	In-kind	5 000 000
National Government	Namibia	In-kind	3 000 000
National Government	South Africa	In-kind	5 000 000
GEF Agency	UNDP	In-kind	20 000
Bilateral Aid Agency	BCC/ECOFISH project	In-kind	100 000
Bilateral Aid Agency	BCC/NansClim project	In-kind	100 000
Total co-financing			14 650 000

D. GEF/LDCF/SCCF RESOURCES REQUESTED BY AGENCY (IES), FOCAL AREA(S) AND COUNTRY*

GEF Agency	Type of Trust Funds	Focal Area	Country Name	(in \$)		
				Project amount (a)	Agency Fee (b)	Total c=a+b
FAO	SCCF	Climate Change	Namibia	1 512 500	151 250	1 663 750
FAO	SCCF	Climate Change	South Africa	1 512 500	151 250	1 663 750
FAO	LDCF	Climate Change	Angola	1 700 000	170 000	1 870 000
Total Grant Resources				4 725 000	472 500	5 197 500

* In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table.

PART II: PROJECT JUSTIFICATION

A. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

A.1.1. THE GEF FOCAL AREA OR SCCF/LDCF STRATEGIES:

The project is consistent with the “*Strategy on Adaptation to Climate Change for the Least Developed Countries Fund [LDCF] and the Special Climate Change Fund [SCCF]*”. In particular, by assessing the vulnerability of fisheries and fishery-dependent communities, piloting appropriate climate-resilient fisheries practices and building adaptive capacity at all levels from local and national (local, national and regional), the project will contribute to the achievement of CCA *Objective 1: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level* and CCA *Objective 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level* and their associated outcomes. In conformity with these strategies, the project will build resilience and reduce vulnerability of the Benguela Current marine fisheries systems by facilitating strengthened adaptive capacity at all levels from local and national to regional.

A.1.2. FOR PROJECTS FUNDED FROM LDCF/SCCF: THE LDCF/SCCF ELIGIBILITY CRITERIA AND PRIORITIES:

Country ownership: The three countries of the Benguela Current region, Angola, Namibia and South Africa, ratified the UNFCCC in 2000, 1995 and 1997, respectively, and are classified among the non-Annex 1 parties. These countries have developed and submitted their National Communications. Angola has also prepared a National Adaptation Programme of Action (NAPA). They are therefore entitled to benefit from the SCCF Fund for the implementation of priority measures identified in their respective climate change strategies while Angola is also eligible for funding from LDCF. In implementing priority interventions identified in the NAPA and National Communications, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18.

The project concept has been developed ensuring a high degree of country ownership and conformity with their programs and policies. It focuses on adaptation, which is the priority of both SCCF and LDCF. It will pursue an holistic approach to addressing vulnerabilities in the fisheries sector and increasing resilience. The project will address several of the priority areas of the two Funds, in particular support to capacity building including institutional capacity, food security, natural resource management, and support in implementation of Angola’s NAPA.

Compliance with programme and LDCF/SCCF Fund policies: The project complies and draws its focus from urgent needs identified in the NAPA and National Communications which are directly relevant for supporting national development goals.

Institutional Synergy and Coordination: The project activities will be primarily implemented through the Benguela Current Commission (BCC), the pre-eminent body in the region with a mandate and responsibility for coordinating activities related to cross-sectoral and ecosystem-wide management of the shared marine resources of the region, including undertaking relevant research. The BCC is an inter-governmental organization and works with the national authorities in the three member countries responsible for key sectors using and impacting on the marine environment. It has been established to achieve regionally defined objectives related to, amongst others, fisheries utilization and management, conservation of marine biodiversity, minimizing and correcting environmental impacts from activities such as marine prospecting, mining and dredging and the exploration and development of oil and gas fields, and others, as outlined in the BCC Interim Agreement and the Strategic Action Plan (SAP). Angola, Namibia and South Africa will sign a binding legal instrument within the next few months that will establish a comprehensive framework to facilitate the implementation of an ecosystem approach to the conservation and development of the Benguela Current Large Marine Ecosystem. The

project is focused on strengthening the capacity of the BCC, the national agencies that it works with, and other local, national and regional entities in the Benguela Current region to reduce vulnerability and to strengthen the capacity at all scales for adaptive management and decision-making in the face of climate change. This will include assessing and understanding the vulnerability of fisheries and dependent communities at different scales and monitoring of climate variability and change.

Modalities of the institutional coordination will be detailed in the project document prepared during the PPG phase with the full participation of key stakeholders in each country including GEF OFP, UNFCCC FP, regional, national and provincial Government, private sector, civil society, research and other development partners.

A.2 NATIONAL STRATEGIES AND PLANS OR REPORTS AND ASSESSMENTS UNDER RELEVANT CONVENTIONS, IF APPLICABLE, I.E. NAPAS, NAPS, NBSAPS, NATIONAL COMMUNICATIONS, TNAS, NIPS, PRSPS, NPFE, ETC.:

The project builds on and is consistent with the perspectives, priorities and particular concerns of Angola, Namibia and South Africa in relation to fisheries, the marine environment and climate change. These have been presented as follows:

- **Angola** submitted its National Adaptation Programme of Action (NAPA) in December 2011 and its Initial National Communication to the UNFCCC in January 2012, identifying vulnerability and adaptation in fisheries as one of its main priorities. Fisheries contribute 7.8% of the Angolan GDP and the NAPA and National Communication identify fisheries as being among the most vulnerable sectors. Important threats particularly relevant to marine fisheries that were identified include sea level rise, changes in the Benguela Current, as well as changes in wind frequency and intensity. It is recognized in the NAPA that changes to the Benguela Current may have implications for inshore fisheries, dependent communities and for the fishing industry as a whole. The NAPA further notes that there is currently insufficient knowledge, scientific research, or data to be able to assess the specific amplitude of likely impacts on water, soil, forests or coastal zones. Furthermore, there is insufficient data and technical capacity available in climate monitoring to be able to produce legitimate and timely forecasts, early warnings or long-term projections. Lastly, to address these issues, the NAPA lists a number of priority actions, including the need to study the vulnerability of fisheries, create early warning systems (e.g. for flooding and storms), and soil erosion control. The NAPA includes Project 4: “Study the vulnerability of the fisheries sector to climate change and current modifications” as the fourth highest ranked priority action in a list of 15 priorities identified in its preparation.
- **Namibia** adopted a national climate change policy in October 2011 (*ref: National policy on climate change for Namibia, Government of the Republic of Namibia*), which notes the potentially catastrophic impacts on livelihoods caused by the reliance of the majority of the population on climate-sensitive sectors such as agriculture, livestock management and fishing. To address climate change uncertainty, Namibia sets out to: promote integrated fisheries and marine resources management; encourage any other approach that leads to sustainable management and utilization of fisheries and marine resources; and strengthen and encourage integrated coastal zone management plans for the protection of marine life. Namibia’s Second National Communication to the UNFCCC from July 2011, recognizes the significant contribution of its commercial fishing and fish processing sectors to the economy in terms of employment, export earnings, and contribution to GDP and also notes that its participation in the BCC has contributed towards attaining sustainable fisheries, including rebuilding fish stocks. Lastly, Namibia’s Third National Development Plan recognizes the importance of the impacts of environmental/climatic change on marine capture fisheries production. In addressing such impacts, one of the goals of the Plan is to strengthen joint management of shared fish stocks between Namibia, South Africa and Angola through the BCC.

- **South Africa** notes in its Second National Communication to UNFCCC of November 2011 that the coastal and marine environment around southern Africa is one of the most varied in the world. With regard to the South African part of the Benguela, some of the anticipated effects of climate change include increased seasonal storm activity and anticipated sea level rise. It is further recognized that South Africa has experienced significant declines in catches and the loss of many species both as a result of over-fishing, and due to the natural migration of fish populations related to environmental changes. Subsistence fishing and other marine resource harvesting practices, although small and localized compared to some other national sectors, constitute important coastal subsistence livelihoods. In responding to climate change impacts, the Communication suggests that sound integrated ecosystem management practices will be key as they contribute to increasing resilience. In a presentation by the South African Department of Environmental Affairs during the UNFCCC COP 17 Ocean's Day, South Africa proposed some further actions to address climate change from an African coastal and ocean perspective, recognizing that both local and regional actions are required. Noting that decision-making on climate issues needs to be underpinned by regular and timely reports of observations, the proposed actions included assessing coastal vulnerability around South Africa, implementing early warning systems for ocean and coastal hazards, enhancing observing and reporting capabilities around the coasts of Africa, as well as instituting effective governance and legislation.

B. PROJECT OVERVIEW:

B.1. DESCRIBE THE BASELINE PROJECT AND THE PROBLEM THAT IT SEEKS TO ADDRESS:

The problem

The Benguela Current Large Marine Ecosystem (BCLME) spans some 30 degrees of latitude, extending from Angola's Cabinda Province in the north, to just east of Port Elizabeth in South Africa. It is one of the world's richest marine ecosystems and supports an abundance of life; sustaining both artisanal and large-scale fishery activities which contribute to local food security and employment for hundreds of thousands of people in areas of limited alternatives, and serve as important drivers of economic development. Angola's fisheries are very important for domestic food supply (90% of fish produced is sold in the domestic market) and, especially small-scale, artisanal fisheries are the main or sole means of livelihoods and food provision for a large part of the population in coastal areas. Namibia does not have a well-developed artisanal fishery because of the harsh coastal environment and its fisheries are primarily commercial but still provide essential employment, livelihoods and cheap sources of protein for Namibia and neighbouring countries. Fisheries are the third largest contributor to the country's GDP. In South Africa, while making a small percentage contribution to GDP, fisheries also provide essential benefits to coastal populations and economies, often in areas with very limited alternative sources of livelihood. South Africa has well developed high value large-scale fisheries, small-scale, artisanal fisheries and economically important recreational fisheries.

Despite, or because of, their social and economic importance, the fisheries sectors in the three countries are facing a number of serious challenges to ensuring sustainable use of the productive but vulnerable marine resources that support them. These include over-exploitation of resources by fisheries, impacts on the aquatic ecosystems from land and aquatic resource use within other sectors including coastal zone development and offshore mining and oil and gas extraction, and a highly variable and changing climate. All three countries have demonstrated the ability to manage their fisheries but the available capacity is heavily stretched and needs urgent strengthening to cope with the growing pressures on resources and ecosystems, the additional demands of implementation of an ecosystem approach, and the challenges of climate change and variability. In addition, joint management of important transboundary and shared fish in the region has yet to be achieved.

The region has a good history of scientific research which, in particular, has provided valuable information on the biological status of commercially important species and the ecosystems supporting these fisheries. Considerably less attention has been given to understanding the social and economic characteristics and contributions of the fisheries, particularly the small-scale, artisanal fisheries and the challenges that they face. The current governance frameworks have tended to be top-down and science-driven which has been a contributory factor in over-fishing and generated some of the challenges faced by the management agencies in achieving sustainable fisheries. There is an urgent need, recognised in the countries, to strengthen participatory and adaptive co-management within the framework of ecosystem approaches. This will be an essential component in building human and ecological resilience to the climate change and variability that is already impacting the region.

In the BCLME, biophysical variability and trends have already led to changes in surface water temperatures, an increased frequency of Benguela Niños and other such intrusions of warm, nutrient-poor water from southern Angola, an increase in winds in the summer months, a general decline in oxygen concentration, and sea level rise. Changes in the aquatic food web have also been identified, including: distributional shifts of important fish species away from the normal fishing grounds, for example in South Africa and Angola; likely decreases in abundance and production of some species; as well as a shift to a less productive regime in the northern Benguela, believed now to be dominated by gobies, jelly fish and horse mackerel.

The high degree of natural and typically unpredictable variability and the possibility of unprecedented large-scale environmental changes which could affect the system profoundly, compound existing pressures on fisheries and those dependent on them. The likely impacts are still uncertain and little is known at present about the vulnerabilities of the fishery sectors and dependent communities to climate change impacts directly on aquatic systems as well as impacts on other systems such as human health and land and water resources. However, there is growing evidence of changes taking place. For example, the distribution of *Argyrosomus coronus*, a socially and economically important fish species in northern Namibia and southern Angola, has been found to be shifting to the south, almost certainly as a result of increasing temperatures. If sustained, this will lead to important negative impacts on coastal fishing communities in southern Angola while Namibian coastal and recreational fisheries could begin to experience better catches. In both cases this will require adaptive changes in management and use. In South Africa, an eastward shift in the distribution of important inshore fishery resources including West Coast rock lobster, sardine and anchovy on the continental shelf has been observed in the past decade, generating significant economic and planning challenges for the affected fisheries. In Namibia, there has been a trend of warmer sea surface temperatures in the Northern Benguela ecosystem which could be a contributory factor in the declines observed in some fish stocks in recent years.

These indicators of change taking place demonstrate the urgency of assessing the vulnerability of the different fisheries and fishing communities to ongoing climate change and variability and taking steps to increase the resilience of those considered most vulnerable. In a region already facing serious challenges in terms of poverty and food insecurity, with likely gender-specific differences, the countries must be well-prepared to minimize the risks to fisheries and fish production and to take advantage of any positive impacts that will arise from climate change and variability.

The Baseline Programme

Notwithstanding the threats and challenges to sustainable development of the marine fishery resources of the Benguela Current Large Marine Ecosystem, the region has a reasonable to good record of effective management of fisheries and other human uses of marine goods and services. However, the three countries that share the ecosystem face increasing demands and pressure on already stretched capacity coupled with an ongoing loss of skilled personnel, especially in Namibia and South Africa, which give rise to considerable concern.

The Benguela Current Commission provides a vehicle for the three member countries to cooperate in implementation of an ecosystem approach to fisheries and cooperative management of biodiversity and ecosystem health. Signatories to the Interim Agreement were the Ministers of Fisheries, Urbanisation and the Environment and Petroleum of Angola, the Ministers of Fisheries and Marine Resources, Environment and Tourism, and Mines and Energy of Namibia, and the Minister of Environmental Affairs and Tourism in South Africa. The BCC is therefore in an excellent position to facilitate and coordinate work on climate change and fisheries, ensuring good communication and cooperation with the national authorities responsible for other users of the marine ecosystem. The overall goal of the BCC Science Plan is to “ensure optimal and sustainable utilization of the resources of the Benguela Current Large Marine Ecosystem while restoring, maintaining and conserving the ecological integrity of the system” and it is recognized in the Plan that climate change is an important potential threat to that goal. The Science Plan focuses on the implementation of an ecosystem approach to fisheries (EAF), which is directly linked to adaptation to climate change. Any efforts to implement one have to incorporate the other, a principle being followed by the BCC. Through its SAP Implementation Project, the BCC will contribute approximately US\$800 000 in in-kind and grant co-financing to CCA activities.

There are also several fisheries-specific international projects taking place in the region that are directly relevant to this project proposal. They include the following:

- The FAO/Norway EAF-Nansen Project is working with the BCC in the development of a tracking tool to monitor the implementation of an ecosystem approach to fisheries management; enhancing the integration of the human dimension of EAF into fisheries management and including the identification of appropriate institutional arrangements. Climate change pervades all of these activities. A new, 3-year transition phase of the Project started on 1 January 2012 and includes a new activity specifically on climate change. This project will provide an estimated US\$100 000 in co-financing towards understanding the bio-physical impacts of climate variability and change in the Benguela system and linking these to an ecosystem approach to fisheries. The GEF-funded project will build on and add value to these results, using them as background information and input into the integrated vulnerability assessments of fisheries and fishery-dependent communities that will be undertaken, reinforcing the close links between EAF and adaptation to climate change.
- The Norad-funded NansClim project (1st phase 2009-2012) is focusing directly on climate change and variability in the region and its expected outcomes include suggestions for marine ecosystem indicators, future scenarios of climate effects on marine resources, and regional capacity building on ecosystem effects of climate change and variability. This project will provide an estimated US\$100 000 in co-financing towards the identification and description of possible trends in ocean climate and corresponding changes in marine biodiversity and fisheries in the Benguela current system. The NansClim project will provide important baseline information for the vulnerability assessments and will also inform the work under Component 2 on strengthening institutions and frameworks for effective monitoring and early warning systems.
- ECOFISH is a six-year (2011-2016) project supported by the European Commission and is being coordinated by the BCC with participation by scientists and fisheries managers in the three countries and specialists from the Technical University of Denmark. Its overall aim is to develop a new framework for the ecosystem approach to fisheries (EAF) in the Benguela Current Large Marine Ecosystem (BCLME). While not explicitly focusing on climate change, it will have to give serious attention to climate change and variability in order to fulfill this aim. This project will provide an estimated US\$100 000 co-financing as a contribution to improving knowledge of basic ecosystem processes, improving the assessment of fish stocks, and involving stakeholders in the management of Benguela fisheries, complementing the work taking place in the FAO/Norway EAF-Nansen Project relevant to this PIF.

In addition, the 5-year (2009-2014) global Japanese-funded FAO project, entitled *Fisheries Management and Marine Conservation within a Changing Ecosystem Context*, will provide approximately US\$75 000 in co-financing to assist in a global understanding of vulnerability and adaptation planning within fisheries and aquaculture and in sharing of lessons-learnt during project implementation.

The Government of Angola is implementing a number of actions to support development of sustainable artisanal marine fisheries and aquaculture in inland water bodies. With financing from the African Development Bank, the Government has created 10 Artisanal Fisheries Support Centres along the marine coast and shall construct 4 and rehabilitate 2 artisanal fish landing sites/centres to reduce post harvest losses and improve access to markets. In total 16 landing sites will receive assistance with respect to fishery resource and fishery infrastructure management. In addition, the Monitoring, Control and Surveillance (MCS) system and the fisheries statistical system for improving the sustainable management of Angolan fisheries are being reinforced. At the moment, there is limited understanding and inclusion of climate change vulnerability reduction in these actions. This is one of the gaps that will be addressed by the proposed project. Public investment in the fisheries sector during the 2007-2008 period was approximately \$380 million. Through its implementation of the National Strategy on Food and Nutritional Security (ENSAR), Angola will contribute US\$5 million in baseline support to the sustainable management of marine capture fisheries.

The government of Namibia endeavors to responsibly manage living aquatic resources to ensure a conducive environment for the fishing and aquaculture sector to prosper. In the financial year 2009/2010, the total budget of the Ministry of Fisheries and Marine Resources was over ND 150 million (approximately US\$18 million) of which nearly ND 31 million was allocated to resource management, ND 72 million to operations and surveillance and the remainder to a range of other support services in fisheries and aquaculture governance and development. The total budget included an income, in 2009, of some ND 96 million from fees and levies charged to the commercial fisheries sector, demonstrating the good progress being made by Namibia towards cost-recovery in commercial fisheries. In June 2012, the Ministry of Fisheries and Marine Resources organized and hosted a National Fisheries Conference, Olupale Leeshi, that brought together all stakeholders in the fisheries and aquaculture sector to develop a blueprint for sustainable development which provides a good indication of its commitment to responsible fisheries for the benefit of the country as a whole. The government supports research on the state of commercially important stocks which is used to advise decision-makers on total allowable catch limits, and its oceanographic monitoring program provides regular data on marine oxygen, temperature and other important parameters needed to understand the Benguela ecosystem. The government implements a value addition, employment and marketing policy through the recent development of 25 fish processing facilities, market expansion efforts and a fully operational MCS system. The government's strategy (the Ministry of Fisheries and Marine Resources Strategic Plan 2009-2014) has identified the sector's climate change vulnerability as a strategic issue and has commenced actions to decrease the sector's vulnerability to change, such as through the promotion of relevant dialogue among stakeholders, contingency planning, conducive environments to withstand external factors affecting operations and fisheries management plans based on EAF principles. Namibia continues to monitor environmental variability and to make use of marine protected areas and other management tools to support the resilience of harvest fish species within the framework of an ecosystem approach. Namibia is also working toward a national approach to climate change adaptation in Namibia, which would include agricultural adaptation, aquaculture, rain-water harvesting, water demand management and protection of watershed areas. These activities are estimated to contribute co-financing of US\$3 million. The proposed project will benefit from the fisheries, oceanographic and biological research, support its use in understanding and reducing vulnerability of the sector and will support inclusion of fisheries-specific needs and best-practices in national climate change efforts.

The mid-term strategic plan of the government of South Africa strives to promote the management, monitoring and sustainable use of marine living resources and the development of South Africa's

fisheries sector. The government, through the Department of Agriculture, Forestry and Fisheries (DAFF), has a good record of responsible management of its fishery sector, with a particular emphasis on sustainable use of resources and is committed to the implementation of an ecosystem approach to fisheries. In the financial year 2010/2011, the DAFF spent over ZAR 300 million (approximately US\$35 million) in fulfilling its mandate on fisheries. These funds were targeted at the following three Departmental strategic goals: SG 2: Sustained management of natural resources; SG 4: A transformed and united sector; and SG 5: Increased contribution of the sector to economic growth and development. Over the next five years, South African fisheries management will continue to conduct fishery-specific research to inform the setting of total allowable catches and effort in 22 fishing sectors; will implement a stock recovery strategy for 4 major species; will finalize and implement the small-scale subsistence fisheries policy; broaden the scope of the aquaculture sector; develop and implement a stakeholder engagement strategy; develop and finalize a fisheries charter; develop and implement the Integrated Fisheries Security Strategy to ensure better compliance, monitoring and enforcement efforts; and promote job creation and sustainable economic livelihoods. Variability in oceanographic conditions and ocean productivity coupled with noted shifts in the distribution of certain fish populations has been observed in the southern Benguela system. The observed changes in the physical environment (long-term change in sea surface temperature) have yet to be conclusively linked to the changes in fish populations and their impact on the management of these fisheries has yet to be assessed or quantified, but some studies into this are underway. Climate change is explicitly recognized as a challenge potentially limiting fisheries' ability to contribute to key government imperatives of sustainable use of living resources and ensuring food security. The 2012-2015 DAFF allocations in support of fisheries and aquaculture management are estimated at approximately \$140 million, with a corresponding co-financing estimated at US\$5 million in baseline related support. The proposed project will support the government's planning and implementation efforts through a better understanding of the overall risks and vulnerability of the fisheries sector to climate change. The project will also inform management on ways to plan for measures to adapt and mitigate climate-related changes that affect the abundance and distribution of fish populations and ecosystems and any resulting social, economic and management consequences for the fisheries sector and those dependent on it.

The baseline provides a good platform for catalytic intervention to lead to major on-the-ground progress. The general threats are largely understood by the three beneficiary countries and the project responds to priorities in the NAPA from Angola, the Namibian National Policy on Climate Change, and priorities described in the National Communications to UNFCCC of those two countries and South Africa. What is missing, however, is a targeted and comprehensive effort to assess the vulnerability of the coastal population to climate change, focusing on fisheries-dependent communities, and to initiate actions to reduce the vulnerability of those most at risk, including through the provision of the knowledge and tools essential for this purpose. To effectively address climate change and variability risks in the region, and as agreed by participants from the three countries at a November 2011 regional workshop organized by the BCC on "Climate change implications for fisheries of the Benguela current region: making the best of change",⁵ there is urgent need for:

- 1) Better understanding of the vulnerability of the human and aquatic systems to climate change and variability within the Benguela Current fisheries systems;
- 2) Coordinated and collaborative actions to decrease vulnerability of the human and aquatic systems and broader progress toward sustainable development in the Benguela Current fisheries systems;
- 3) Integrated and participatory processes to support the fisheries and aquaculture sectors to reach consensus on vulnerabilities and appropriate adaptation actions within national and regional climate change and development priorities and strategies;
- 4) Pilot projects to explore options and demonstrate best practices and tools that can be used for implementing practical actions for adaptation to climate-induced change;

⁵ Climate change implications for fisheries of the Benguela Current region: making the best of change. FAO/Benguela Current Commission Workshop, 1–3 November 2011, Windhoek, Namibia. FAO Fisheries and Aquaculture Proceedings. No. 27, Rome, FAO, 2012.

- 5) Capacity building to support the participation of the Benguela Current fisheries and aquaculture sectors within national, regional and global climate change discussions and actions; and
- 6) Building on the existing political commitment and integrated institutional arrangements of the BCC, to facilitate and coordinate a regional programme on climate change adaptation in the BCLME region.

B. 2. INCREMENTAL/ADDITIONAL COST REASONING: DESCRIBE THE INCREMENTAL (GEF TRUST FUND) OR ADDITIONAL (LDCF/SCCF) ACTIVITIES REQUESTED FOR GEF/LDCF/SCCF FINANCING AND THE ASSOCIATED GLOBAL ENVIRONMENTAL BENEFITS (GEF TRUST FUND) OR ASSOCIATED ADAPTATION BENEFITS (LDCF/SCCF) TO BE DELIVERED BY THE PROJECT:

The countries of the Benguela Current region have demonstrated that they are aware of the risks brought about by climate change and variability and are beginning to take steps to address those threats. They are being supported in these efforts by the Benguela Current Commission and by a number of directly relevant projects. However, the preceding sections of this document have revealed that the progress that is taking place has been slow, with much still at the level of intention rather than action, and that it is very fragmented in terms of the institutions involved, the sectors and regions being addressed, and activities that are planned or taking place. Importantly, although the region has benefitted from extensive research on the bio-physical and biological conditions of the Benguela Current system, relatively little focus has been placed on the implications of climate variability and change on food and livelihood security of the communities dependent on this system and how decision-making, fisheries management and investment plans need to incorporate the additional uncertainty and change to support the system's resilience and contributions to well-being. The net result is that the countries are not responding adequately to changes that are already taking place and are poorly prepared for the ongoing change still to come.

This project is designed to build on this fertile but still under-developed ground and will provide essential additional benefits to enable the BCC and its member countries to pull together and build on what is already known and activities currently underway. Oceanographic and biological information will be combined with community and industry knowledge to understand factors relating to climate exposure, sensitivity and adaptive capacity of the socio-ecological systems. Identifying the underlying factors of climate change vulnerability within the fisheries sector will lead directly into focused adaptation planning and implementation. The project will help to formalize the consideration of climate change implications for fisheries in decision-making, planning and development both within the sector and in inter- and multi-sectoral plans, ensuring the issues are not overlooked and lost in the midst of other competing concerns. Transboundary implications of climate variability and change on the viability of the sector and the current regional management framework will be identified and addressed during the project. The project will support climate change capacity building at the community, sector and institutional levels and will ensure that lessons learnt will be captured and communicated for further adaptation support within the Benguela Current region and elsewhere.

In summary, the **adaptation benefits** of the project include 1) increased understanding of vulnerabilities to climate variability and change of the Benguela current socio-ecological system by and national authorities, as well as the major stakeholder groups presented below; 2) directed fisheries adaptation planning at the community, sector, institution and regional levels; 3) vulnerability reduced through the implementation of identified and prioritized adaptation actions specific to the sector, such as improved safety at sea, flexible marine spatial, temporal and rights-based planning and as well climate proofing activities along the post-harvest supply chains; 4) strengthened adaptive capacity of local, national and regional institutions through targeted training on climate change risks and best adaptation practices in fisheries and the collection and integration of targeted climate change information for adaptive fisheries management and development planning; 5) climate change adaptation in fisheries and fishery-dependent communities supported and mainstreamed into broader sectoral, food-security and climate change frameworks in the three countries; and 6) adaptation

lessons learning and dissemination for further investments and up-scaling of adaptation activities within the Benguela Current and beyond.

Component 1. “Integrating fisheries climate change considerations into fisheries policies and planning as well as into broader inter-sectoral development and climate change policies and programmes” will add to the existing initiatives in the region by ensuring that all relevant authorities and stakeholders are well informed and aware of the vulnerabilities of the different fisheries and fishing communities across the region. Nearly US\$ 9 million co-financing is available on this component through the various activities described in Baseline Programme in Section B.1. These baseline activities are making progress in creating awareness of the impacts of climate change and the need to address those impacts in fisheries and multi-sectoral policy and planning, but the baseline projects are doing so in a fragmented and frequently poorly coordinated manner. In the cases of the BCC and national governments, initiatives and actions have yet to move from discussion and review into implementation. The added value of the project will be to assist in bringing the results and the relevant activities of these dispersed efforts together and ensuring that climate change moves from being a largely scientific exercise of which policy makers are generally aware, to being a serious and explicit issue in revised policies and programmes. Working with all stakeholders, comprehensive vulnerability assessments of the socio-ecological systems will be undertaken across the participating countries and adaptation actions will be identified for the most vulnerable fishery systems. This knowledge and awareness, which will include addressing gender-specific features, will be channelled into the planning processes at regional and national levels to ensure that it is taken into account in national and regional policy and management, both within the fisheries sectors and in broader local, national and regional actions in connection with poverty alleviation, food security and development. Relevant training and hands-on experience of national and BCC authorities in undertaking and using vulnerability assessments for fisheries management in the face of climate variability and change - combined with explicit incorporation of climate risk information and decision-making into the BCC SAP and national management processes – will form an integral part of this component. High priority risks will be identified and, using participatory approaches and best available knowledge, adaptive strategies for increasing resilience to those risks will be developed. Strategies will encompass as required: resource management, social and economic responses, and governance issues. Alternative and diversified livelihoods will be considered where considered advantageous. In addition to other stakeholders, involvement of national fisheries authorities in broader national climate change deliberations will be strengthened through better understanding of the sector-specific vulnerabilities and specific support to inter-agency/inter-sectoral activities and processes. These outputs and outcomes will represent a major step forward compared to the fragmented and non-specific information that is currently available and will give impetus to the limited progress made to date in increasing resilience and reducing vulnerability within the fisheries sector.

Component 2. “Piloting of improved climate-resilient fisheries practices” will demonstrate that real progress in strengthening resilience is possible and feasible in the three countries and highlight the benefits that result. It will work with and build on the approximately US\$ 3.5 million co-financing represented by the relevant Baseline Programme. This Baseline Programme includes, for example, valuable initiatives in implementation of the ecosystem approach to fisheries through several projects, initiatives to support artisanal fisheries in Angola and a range of far-reaching efforts to improve the sustainable management and governance of fisheries in all three countries. However, it is apparent from Section B.1. that at present there are no efforts to embrace building of climate resilience in the existing Baselines, despite the recognition that it is required. This project will enable and facilitate that additional step through piloting of explicit actions for climate resilience, thereby demonstrating the advantages of doing so across the three countries. Based on the vulnerability assessments and initial adaptation options identification under Component 1, this component will further support adaptive capacities at three levels: actions to be taken at the community level, at the fishery level and at national and regional institutional level. Community-based adaptation action plans will be developed and implemented to the extent possible in at least six high risk communities or fisheries. At least 3 fisheries management plans will be developed or strengthened to incorporate climate change variability and change and national and regional monitoring and information systems will be

evaluated for climate-related gaps. Actions to address gaps identified will include training in relevant skills, development of terms of reference for additional human capacity requirements, creation of focal points for cross-institution collaboration, and identification of any equipment or infrastructure needed as part of national and regional investment programmes. Collectively, these activities will contribute to integrated institution-building at local, national and regional levels. Working with communities at local level and with national and regional fisheries, with full involvement of stakeholders, it will measurably reduce vulnerability to climate change and variability in selected pilot fisheries and empower the stakeholders to maintain and build on the improvements that have been made in the future. In doing so, it will transfer knowledge and expertise from the currently limited number of specialists in the region to the people and institutions who are most at threat and need to take action. The outcomes that will result from the project will include greater resilience amongst the more vulnerable local fisheries and fishing communities, and implementation of national and regional management plans that are aware of and respond to significant climate change and variability in a way that minimises negative impacts and makes optimal use of any positive impacts. In addition, the project will result in regional and national early warning systems, supported by monitoring programmes, that will inform and enable adaptive responses to changes taking place. The net result will be healthier and more resilient marine ecosystems being harvested by fisheries and communities in selected pilots who will also be aware of the threats to their livelihoods from climate change and equipped to mitigate and adapt to them, thereby increasing their longer-term security and general well-being.

Component 3. “Capacity building and promotion of improved climate-resilient fisheries practices” will complement the first two by reinforcing and widely disseminating the awareness and knowledge of vulnerability and approaches to adaptation to climate change, and ensuring a body of stakeholders, across all interest-groups and functional roles, able to maintain and build-on the knowledge gained and the practical progress made through the pilot studies. Capacity limitations of national and regional management authorities and stakeholders are an important constraint to achievement of effective governance and management of fisheries in the region, even without the additional challenges of climate change. Capacity losses in the management agencies of South Africa and Namibia were highlighted as serious concerns during the first phase of the BCLME Project. The BCC has a Training and Capacity Building Programme to help to address this problem but that is limited by funds and is not currently addressing climate resilience. In total, just under US\$ 1.3 million is available in co-financing for this Component. This is considerably less than the co-financing for Components 1 and 2, and reflects the relatively low level of attention being given to focused and sustained capacity-building in the sector in the region, other than through the normal secondary and tertiary educational programmes of the countries. Within this context, this Component will add considerable value to the Baseline Programme through production of information products aimed at capacity building and through targeted training sessions that will use modern, best-practice methods and approaches. These activities will lead to broader and deeper capacity on climate change vulnerability and adaptation in the region and contribute to ensuring that resilience is strengthened in fisheries and fisheries-dependent communities wherever climate change is, or could be, a significant threat to ecosystems and to the people dependent on them. This component will also help to reinforce the existing national and regional efforts to improve fisheries management and rebuild over-exploited stocks by ensuring that climate change and variability, currently generally overlooked in fisheries in the region, is included as an important factor driving change and adaptive action is taken as required.

Component 4. “Project monitoring and evaluation” (M&E)” will provide the project with the specific M&E system that will be needed in order to ensure effective implementation. This will result in rigorous monitoring of project indicators, including AMAT indicators in order to ensure that the project achieves its objective and will include midterm and final evaluations which will identify the main findings and lessons learned for application in the future. The project will also ensure that the results and best-practices identified during implementation will be widely available and readily accessible. In addition to publication and dissemination of the main findings, a project website will be developed and maintained to contribute to maximizing overall impact and incremental benefits.

B.3. DESCRIBE THE SOCIOECONOMIC BENEFITS TO BE DELIVERED BY THE PROJECT AT THE NATIONAL AND LOCAL LEVELS, INCLUDING CONSIDERATION OF GENDER DIMENSIONS, AND HOW THESE WILL SUPPORT THE ACHIEVEMENT OF GLOBAL ENVIRONMENT BENEFITS(GEF TRUST FUND) OR ADAPTATION BENEFITS (LDCF/SCCF). AS A BACKGROUND INFORMATION, READ “MAINSTREAMING GENDER AT THE GEF.”:

As explained in Section B1, marine fisheries make important social and economic contributions in all three countries. There are an estimated 102 fishing communities along Angolan’s 1 650 kilometre coastline, made up of artisanal fishers and others involved with associated activities on land. The total number of people involved in artisanal fishing activities is estimated at 130 000 to 140 000 but this still does not include individuals involved in buying, processing, distribution and marketing of fish. In addition, fisheries contribute approximately 7.8% of the Angolan GDP. While fishing at sea is largely done by men, women are involved in some shore-based fishing and make up the majority of the fish processors, sellers and traders, including cross-border trading into neighbouring countries.

Namibia has a very different structure in its fisheries. Approximately 6.5% of the country’s population, or 100 000 people, live on the coast and most of these people live in the main coastal centres of Swakopmund, Walvis Bay, Luderitz, Oranjemund and in Henties Bay. Many of them are directly or indirectly dependent on living marine resources for their livelihoods. About 14 000 people are thought to be employed in the formal marine fishing industry. Women are an important part of the workforce in the processing factories. The sector has contributed between 4 and 5% to the country’s GDP in recent years and had an estimated value of US\$ 372.2 million in 2005.

The fishery sector in South Africa covers the full range of scales from subsistence to high-value commercial fisheries. A total of approximately 26 000 people are employed in the sector, most in the commercial fisheries. There are approximately 34 communities engaged in subsistence or informal fishing along the Benguela part of South Africa’s coastline, comprising 2 438 households and 2 373 informal fishers. As in the other two countries, women are mainly engaged in post-harvest activities. The contribution of fisheries to the national GDP was estimated to be US\$ 322.5 million in 2008.

These numbers give an indication of the importance of fisheries along the Benguela coastline and the social and economic disruption that could result if the sector is not well-prepared for the likely impacts of climate change. By reducing vulnerability through developing and implementing adaptation strategies in the social-ecological fisheries systems of the BCLME, the socio-economic benefits will be made more secure. At both national and local levels, increased awareness, strengthened adaptive capacity, early warning systems and improved intra- and inter-agency collaboration and communication (e.g. in relation to distribution information/warnings) will contribute towards early active responses aimed at reducing the risks to peoples’ lives and livelihoods. This will need to take into account the very diverse socio-economic situations of the different interest groups across the three BCLME countries, from the artisanal and subsistence fishing communities to the employees of high-value commercial fisheries. In addition the benefits obtained from fisheries and the risks imposed by climate change differ in important respects according to gender. The project will include in-depth analysis of the situation of both genders, providing a solid basis for developing actions to address the potentially different needs of men and women under the project.

B.4 INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS THAT MIGHT PREVENT THE PROJECT OBJECTIVES FROM BEING ACHIEVED, AND IF POSSIBLE, PROPOSE MEASURES THAT ADDRESS THESE RISKS TO BE FURTHER DEVELOPED DURING THE PROJECT DESIGN:

Risk	Level of risk	Mitigation strategy
Inability to develop and implement a sufficiently holistic vulnerability assessment methodology, resulting in a failure to detect more obscure vulnerabilities in the fisheries systems.	Low	Considering the diverse nature of the fisheries systems in the three countries, much effort will be put into broad and comprehensive considerations of impacts and vulnerabilities. The participative processes employed should ensure that all aspects are covered.
Insufficient time dedicated by collaborating and partner organizations and agencies to successfully implement the project components.	Low	During the project preparation phase, time availability and commitments will be discussed among the participating organizations and agencies to ensure that none is carrying a heavier burden than it can sustain.
Inadequate participation by all stakeholder groups to identify and prioritize adaptation needs in a sufficiently objective manner.	Medium	Careful attention will be given to ensuring the involvement of all relevant stakeholders at an early stage and throughout the project implementation process. This will facilitate consideration of all points of view and balanced, objective prioritization.
Some stakeholders (e.g. small-scale fishers) lack sufficient negotiation strength vis-à-vis others.	Medium	The project will clearly indicate the contributions of the sector to food and livelihoods security and economic development and build the capacity of sector partners to advocate in broader planning discussions. Meetings, workshops and other consultative events will be professionally facilitated to ensure full and fair participation and influence.
Climate-induced events, such as shifts in shared stocks, occur faster than the project is able to prepare and plan for	Medium	The project is aiming to build the capacity of fishers, communities, and regional management to better deal with the current climate variability including extremes and future climate change through adaptation and resilience-building practices. The vulnerability assessment will identify any particularly urgent cases which can then be targeted in the pilot studies and other activities.

B.5 IDENTIFY KEY STAKEHOLDERS INVOLVED IN THE PROJECT INCLUDING THE PRIVATE SECTOR, NGOS, CIVIL SOCIETY ORGANIZATIONS, LOCAL AND INDIGENOUS COMMUNITIES, AND THEIR RESPECTIVE ROLES, AS APPLICABLE:

Key stakeholders	Roles
Fishers and fish processing workers (from small-scale as well as industrial fisheries) represented by CSOs, NGOs, trade unions etc from each of the countries. The specific partners will be identified during the project preparation phase.	Participation and support in Components 1-3.
Fishing companies/cooperatives including processing sectors represented by the relevant industry associations active in the three countries. The specific partners will be identified during the project preparation phase.	Participation and support in Components 1-3.
National government representatives, including resource managers and scientists, from fishery, environment and climate change Ministries or Departments, in particular, the Department of Fisheries of Angola, the Department of Fisheries and Marine Resources in Namibia, and the Departments of Agriculture, Forestry and Fisheries and of Environmental Affairs in South Africa.	Facilitation and participation in Components 1-3. Participation and support in Component 4.
Representatives from regional and local government from fishery and other relevant Departments in each of the three countries. The details will depend , in part, on the sites selected for pilot studies which will be done during project preparation.	Facilitation of Components 1-3. Participation and support in Component 4.
National scientists and experts in economics, natural and social science, climate experts, development experts, etc. from universities and other research bodies in the region	Participation and support in Components 1-3.
Inter-governmental organizations: BCC, NEPAD Agency, SADC, FAO, UNDP	BCC will coordinate the implementation of the project through its role as the executing agency, with support from the GEF implementing agency FAO. Other organizations will participate as partners in Components 1-3.
NGOs, CSOs., Specific partners will be identified during the project preparation phase.	In addition to NGOs and CSOs already referred to in this list, environmental NGOs and other relevant NGOs and CSOs will be invited to participate in and support Components 1-3.
Other extractive and service sectors e.g. mining industry, oil and gas industry, tourism.	Will be invited to participate in and support Components 1-3. In addition, there will be a need for specific multi-sectoral consultations and discussions in Components 1 and 2 and particular efforts will be made to involve these sectors in those events.

B.6. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

The proposed project would be coordinated by BCC (as executing agency), with the assistance of FAO as GEF implementing agency. Collectively, these organizations have close existing and historical links with the relevant government agencies, NGOs, CSOs, fishing industry and other stakeholders in the BCLME region. In addition, one or both organizations are already involved in the main related initiatives underway and planned in the region. These linkages will greatly facilitate coordination. Using and extending these networks where necessary during the Project Preparation phase, the project will reach out to and liaise with all key related initiatives to ensure partnerships and good coordination.

Key initiatives that the proposed project will need to work with include:

- The NEPAD Agency – FAO joint fisheries programme (NFFP), supported by funding from SIDA, includes three components of which one is “Component C: Vulnerability of fishers, fish farmers and their communities is reduced through development and implementation of community based Disaster Risk Management (DRM) and CC adaption plans, and strategies addressing climate change at the national and regional levels”. Based on inclusive stakeholder consultations, priority needs across the African continent identified under Component C include strengthening policy integration at regional and national levels and improved collaboration and coordination of DRM and CCA in fisheries and aquaculture, and identification and utilization of best practices on integration of DRM and CCA. Although providing an overall programme of priority areas, current funding is limited and, therefore, limited national level work will be funded directly by the NFFP and the programme will focus on awareness raising, coordination of activities across the continent and sharing of lessons learned. The detailed implementation plan is still under development but the proposed project will benefit NFFP by building on the largely educative role of NFFP, including practical applications. In turn, this project will complement and, through coordination, utilize results and activities funded under the NFFP. Equity and gender will be important considerations in the project activities.
- WWF South Africa: building on its work in relation to Ecological Risk Assessments with regard to EAF implementation in the major fisheries of BCLME;
- National statutory institutes in Angola, Namibia and South Africa: building on their collaboration to date; and
- Relevant Departments at local universities and parastatal institutes, such as the Council for Scientific and Industrial Research (CSIR) in South Africa, University of Namibia, Agostinho Neto University, Angola.

Furthermore, Namibia is currently implementing the Africa Adaptation Programme-Namibia Project (AAP-NAM Project, funded by the Government of Japan through UNDP), which has established a national adaptation framework and coordination mechanism within the Ministry of Environment and Tourism. The intended outcomes of this project fit well with the established national adaptation framework and policy outcomes in particular can be fed into the established set-up to achieve optimal policy impacts.

During the project preparation phase, a formal coordination mechanism will be established between BCC, FAO and other supporting and partner organizations, departments and agencies. Respective roles will be clearly defined. Preliminary discussions between these organizations are already underway.

C. DESCRIBE YOUR AGENCY'S COMPARATIVE ADVANTAGE TO IMPLEMENT THIS PROJECT:

FAO, with 191 member countries, is the United Nations agency with competency in all areas of fisheries and aquaculture and enjoys a worldwide reputation for the quality and effectiveness with which it is fulfilling this mandate. FAO has a long and successful track record of building capacity and promoting regional collaboration in fisheries through its normative programmes, country offices, FAO regional fisheries bodies, and through cooperation with other non-FAO regional fisheries bodies, other IGOs, UN Agencies and others. It has also led global work on implementing the FAO Code of Conduct for Responsible Fisheries, an ecosystem approach to fisheries and aquaculture and has produced codes of practices and standards related to product safety and responsible trade, including guidelines for the ecolabelling of fish and fishery products. The Organization is currently engaged in developing Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries through a global, participatory process. FAO has worked closely with Angola, Namibia and South Africa on fisheries for decades and with the BCC since its inception. FAO and the BCLME Project, with GEF funding, collaborated on the very successful project "Ecosystem Approaches for Fisheries Management in the Benguela Current Large Marine Ecosystem" (2004-2006) and the Organization is currently engaged with the BCC in several projects within the EAF-Nansen Project. Other joint activities between FAO and the three countries take place almost continuously and FAO has very good relationships with the fisheries Ministries and Departments in the three countries.

Furthermore, FAO is contributing to bringing fisheries and aquaculture into the climate change discussions at a national, regional and global level. This has included release of a Policy Brief on building adaptive capacity⁶, an FAO Expert Workshop on Climate Change Implications for Fisheries and Aquaculture in 2008⁷ and a global review of climate change implications for the sector in 2009⁸. In 2009, FAO helped to form the Global Partnership for Climate, Fisheries and Aquaculture (PaCFA)⁹, a voluntary grouping of 23 international organizations and sector bodies sharing a common concern for climate change interaction with global waters and living resources and their social and economic consequences. With FAO support, the PaCFA has been raising awareness of issues relating to oceans, fisheries and aquaculture within the United Nations Framework Convention on Climate Change (UNFCCC) processes. FAO is currently engaged in a number of projects and activities around the world towards strengthening adaptation and mitigation of climate change in fisheries and aquaculture including through the project "Climate Change, Fisheries and Aquaculture: Understanding the Consequences as a Basis for Planning and Implementing Suitable Responses and Adaptation Strategies funded by the Government of Japan, the EAF-Nansen Project and the NEPAD Agency – FAO Fisheries Project, Furthermore, climate change is always an important consideration in planning and implementation of an ecosystem approach to fisheries and therefore enters into all of FAO's extensive normative and field-based programmes of work on EAF.

The mandate of the Fisheries and Aquaculture Department of FAO is to facilitate and secure the long-term sustainable development and utilization of the world's fisheries and aquaculture resources. With respect to the GEF International Waters Program, FAO's areas of comparative advantage include its key responsibility for the Code of Conduct for Responsible Fisheries; enhancing institutional, planning and management capacity for sustainable fisheries; sustainable and ecosystem-based fisheries management, including in particular technical and normative measures for the reduction of environmental impact of fisheries.

⁶ FAO. 2007. Building adaptive capacity to climate change. Policies to sustain livelihoods and fisheries. New Directions in Fisheries – A Series of Policy Briefs on Development Issues, No. 08. Rome. 16 pp.

⁷ FAO. 2008. Report of the FAO Expert Workshop on Climate Change Implications for Fisheries and Aquaculture, Rome, 7–9 April 2008. FAO Fisheries Report No. 870. Rome. 2008. 32 pp.

⁸ FAO. 2009. Climate change implications for fisheries and aquaculture: overview of current scientific knowledge. FAO Fisheries and Aquaculture Technical Paper. No. 530. Rome. 212 pp.

⁹ Current members of the PaCFA are the BCC, CBD, EBCD, FAO, IAEA, ICAFIS, ICES, ICFA, IFAD, ISDR, NACA, NACEE, NEPAD, OECD, OSPESCA, PICES, SEAFO, SPC, UNDP, UNEP, UNESCO-IOC, World Bank and WorldFish Center.

FAO has multi-disciplinary competence at the global level in all thematic areas of marine and freshwater fisheries in general and its Fisheries and Aquaculture Department is well staffed with internationally-recruited specialists at the headquarters in Rome as well as in the regional and country representations.

C.1 INDICATE THE CO-FINANCING AMOUNT THE AGENCY IS BRINGING TO THE PROJECT:

FAO will provide the following indicative co-financing: US\$ 150 000 grant from the FAO Technical Cooperation Programme Facility and Trust Fund Projects, and US\$ 500 000 in-kind.

C.2 HOW DOES THE PROJECT FIT INTO THE GEF AGENCY'S PROGRAM (REFLECTED IN DOCUMENTS SUCH AS UNDAF, CAS, ETC.) AND STAFF CAPACITY IN THE COUNTRY TO FOLLOW UP PROJECT IMPLEMENTATION:

The proposed project objectives are coherent with FAO's overall strategic objectives, which include:

- Sustainable management of fisheries and aquaculture resources;
- Sustainable management of land, water and genetic resources and improved responses to global environmental challenges affecting food and agriculture;
- Enabling environment for markets to improve livelihoods and rural development;
- Improved food security and better nutrition; and
- Gender equity in access to resources, goods, services and decision-making in rural areas.

Furthermore, the project objectives are also in line with FAO Climate Change Strategy and the FAO Adapt Programme, of which the six priority action areas for adaptation (in agriculture, forestry and fisheries) are as follows:

1. Development and application of data and knowledge for impact assessment and adaptation;
2. Support and improvement of governance for climate change adaptation;
3. Building of livelihood resilience to climate change;
4. Targeted approaches for conservation and sustainable management of biodiversity;
5. Identification, support and application of innovative technologies; and
6. Improved disaster risk management (DRM).

The project is directly in line with the 5-year FAO Strategy for fisheries, aquaculture and climate change¹⁰.

This project will also contribute to the **UNDAF** of the three countries, in the following ways:

In the case of **Angola** (UNDAF 2009-2013), it will contribute to *Support Area 1 Governance, justice and data for development* – primarily in relation to establishment of disaster contingency plans. It will also be in line with contributions under *Support Area 4 Sustainable economic development*, particularly with regard to design and implementation of programmes for adaptation to climate change and ecosystem resilience.

With regard to **Namibia**, a new UNDAF is forthcoming in response to the new National Development Plan (NDP 4). However, in terms of UNDAF 2006-2010, the project will primarily contribute to *UNDAF Outcome 2.4 Strengthened national/regional capacities for humanitarian emergency response management* – primarily in relation to: 1) support to capacity building of national, regional and sub-regional institutions in emergency management and preparedness, including the development of emergency plans; 2) assistance in the formulation of Vulnerability Assistance Committees; and 3) support to line ministries and other institutions in capacity development for humanitarian crisis

¹⁰ FAO Strategy for fisheries, aquaculture and climate change: Framework and aims 2011–16. http://ftp.fao.org/fi/brochure/climate_change/stragegy_fi_aq_climate/2011/climate_change_2011.pdf

prevention and recovery as well as support to capacity building for coordination of disaster risk management.

The project will contribute to South Africa's UNDAF (2007-2010) *Outcome 1 - Democracy, good governance administration are strengthened* through the support of participatory planning and management processes; *Outcome 3 - Strengthened South African and sub-regional institutions to consolidate the African Agenda, promote global governance and South-South co-operation* through support to regional shared natural resource management; and *Outcome 5 - Poverty eradication is intensified* through its support to building climate resilient food security and livelihoods strategies.

With respect to staff capacity, FAO has Representations in Angola, Namibia and South Africa with about 15 technical staff members, 21 national staff working in various decentralized projects, 17 administrative and operational support staff and numerous consultants in a range of technical areas of relevance to the project. The FAO Representations can mobilize complementary national and international technical expertise within the pool of projects they manage, and will provide in-country support for the preparation and implementation of the proposed project. In addition, FAO has a Regional Office for Africa in Accra, Ghana and a Sub-regional Office in Harare, Zimbabwe which is responsible for southern Africa. There are fisheries specialists in both offices with solid knowledge of the region. As for all projects, a multidisciplinary Project Task Force will be set up and draw on the range of technical expertise available throughout FAO to support the project, including from the regional and sub-regional fisheries officers, operational and other technical staff as required, as well as from the Fisheries and Aquaculture Department and other technical units, as necessary.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the country endorsement letter(s) or regional endorsement letter(s) with this template).

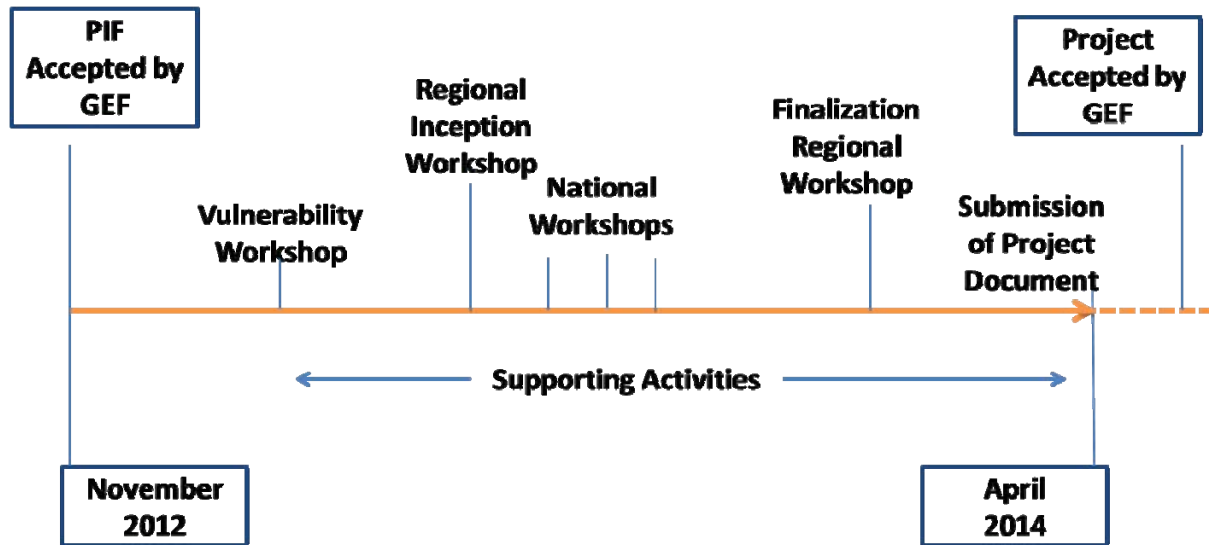
NAME	POSITION	MINISTRY	DATE (month, day, year)
Dr Carlos Avelino Manuel CADETE	National Director of Statistics, Planning and Studies Office	Ministry of Environment, Angola	
Mr Teofilus NGHITILA	Director of Environmental Affairs	Ministry of Environment and Tourism, Namibia	AUGUST 30, 2012
Mr Zaheer FAKIR	Acting Deputy Director-General Department of Environmental Affairs	Ministry of Water and Environmental Affairs, South Africa	AUGUST 31, 2012

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF policies and procedures and meets the GEF/LDCF/SCCF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date (month, day, year)	Project Contact Person	Telephone	Email Address
Garry Smith, OiC Investment Centre Division Technical Cooperation Department FAO Viale delle Terme di Caracalla 00153, Rome, Italy		August 31, 2012	Cassandra De Young Fishery Planning Analyst	+3906 5705 4335	Cassandra.Deyoung@fao.org
Barbara Cooney FAO GEF Coordinator Email: Barbara.Cooney@fao.org Tel.: +3906 5705 5478		August 31, 2012			

ROAD MAP FOR LDCF/SCCF BENGUELA PROJECT DEVELOPMENT PHASE



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AGENDA

**BCC REGIONAL WORKSHOP ON ASSESSING CLIMATE CHANGE VULNERABILITY
IN FISHERIES AND AQUACULTURE**

**Windhoek, Namibia
11–13 April 2013**

Day 1 - 11 April 2013	
9.00 – 10.00	Opening of the workshop <ul style="list-style-type: none"> • Welcome remarks and an overview of the project – Hashali Hamukuaya, BCC Executive Secretary • Workshop objectives and arrangements - Cassandra De Young, FAO
10.00 – 10.15	Health break
Session 1: Experiences in in vulnerability assessments from other regions	
Objective: <i>PaCFA participants will share their experiences in developing and undertaking vulnerability assessments</i>	
10.15 – 12.30	Introduction of the PaCFA international workshop by Cassandra De Young, Cecile Brugere and Kevern Cochrane Overview of vulnerability assessments – Eddie Allison Experiences in Chile – Exequiel Gonzalez Experiences in Tanzania – Robert Katikiro Experiences in Kenya – Eddie Allison Experiences in Brazil – Denis Hellebrandt Results from the NansClim – Kathrine Michalsen
12.30 – 14.00	Lunch
Session 2: Vulnerability Assessment Methodologies	
Objective: <i>Presentation of possible appropriate vulnerability assessment methodologies</i>	
14.00 – 15.30	Ecosystem Approach to Fisheries and its link to climate change - Cassandra De Young Initial vulnerability analysis in the BCLME socio-ecological system - Ian Hampton
15.30 – 16.00	Discussions
16:00 – 16:15	Health break
16.15 – 16.45	Discussions (continued)
16.45 – 17.00	Wrap up of first day and introduction of Day 2
18.00 – 20.00	Cocktail
Day 2 – 12 April 2013	
Session 3: Scoping work	
Objective: <i>Working groups will initiate processes to define relevant vulnerability assessment frameworks for different contexts</i>	
8.30 – 9.00	Overview presentation on the vulnerability assessment process by Cecile Brugere
9.00 – 11.00	Working Groups Session 1 Initial scoping to establish the fisheries/communities to cover during the

	BCLME vulnerability assessment
11.00 – 11.15	Health break
11.15 – 12.45	Working Groups Session 2 Defining the vulnerability questions to be addressed during the BCLME vulnerability assessment
12.45 – 14.00	Lunch
14.00 – 15.00	Working Groups Session 2 (continued)
15.00 – 15.15	Health break
15.15 – 16.00	Reporting by Working Groups to Plenary and Discussions
16.00 – 17.00	Plenary agreement on fisheries/communities to assess
17.00 – 17.15	Wrap up of Day 2 and introduction of Day 3
Day 3 – 13 April 2013	
Session 4: Determining the vulnerability frameworks	
Objective: <i>Working Groups and Plenary to define vulnerability frameworks to be applied in the Benguela fisheries</i>	
8.30 – 10.00	Defining example vulnerability assessment methodologies/frameworks appropriate to the BCLME (small-scale fisheries in Angola and transboundary issues)
10.00 – 10.15	Health break
10.15 – 12.30	Working Groups Session 4 (continued)
12.30 – 13.00	Conclusion and recommendations
13.00	Closing

PRESENTATIONS SLIDES

Welcome remarks and an overview of the project

Hashali Hamukuaya (Benguela Current Commission, Namibia)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/1_Hashali_Welcome%20remarks.pdf

Assessing vulnerability to climate change at multiple scales: to what purpose and how?

Eddie Allison (WorldFish Center, Malaysia and University of East Anglia, United Kingdom)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/2_Assessing%20vulnerability.pdf

Qualitative vulnerability assessment: Case of coastal fishing households, Tanzania

Robert Katikiro (Leibniz-Centre for Tropical Marine Ecology, University of Bremen, Germany)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/3_Qualitative%20Vulnerabilities%20Coastal%20Tanzania%20.pdf

Fisherfolk perspectives of vulnerability: Climate and policy intertwine in small-scale fisheries in Southern Brazil

Denis Hellebrandt (University of East Anglia, United Kingdom) and Patrizia Abdallah (Universidade Federal do Rio Grande, Brazil)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/4_Fisherfolk%20perspectives%20Southern%20Brazil.pdf

Vulnerability to climate change in Chilean aquaculture and fisheries: results and findings.

Exequiel González Poblete (Pontificia Universidad Católica de Valparaíso, Chile), Mr. Ricardo Norambuena and Mrs. Carolina Alarcón (Universidad de Concepción, Chile)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/5_Vulnerability%20in%20Chilean%20Aquaculture%20and%20Fisheries.pdf

A potential framework for vulnerability analysis: Benguela current

Eddie Allison (WorldFish Center, Malaysia and University of East Anglia, United Kingdom)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/6_Potential%20vulnerability%20framework%20for%20Benguela.pdf

Overview of the NansClim project

Kathrine Michalsen (Centre for Development Co-operation in Fisheries (CDCF), Norway)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/7_Overview%20of%20NansClim.pdf

The Ecosystem Approach to Fisheries - its links to climate change

Cassandra De Young (FAO, Italy)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/8_EAF%20and%20CC.pdf

Initial assessment of vulnerability of humans to the effects of climate change on the Benguela Current Large Marine Ecosystem (BCLME)

Ian Hampton (Fisheries Resources Surveys, South Africa)

ftp://ftp.fao.org/FI/DOCUMENT/R1051/9_Initial%20Benguela%20Vulnerability%20Assessment.pdf

PILOTING OF STEPS 1 AND 2 IN NATIONAL CONTEXTS

Angola Step 1: Why a vulnerability assessment?

1. Risk exposure
 - Accidents at sea
 - Scarcity of fish
2. Negative effect
 - Poverty
 - Forced Migration
 - Unemployment
 - Hunger
 - Diseases

Who is driving/requesting the assessment and why?

- Example of integration of various ministries (Environment, Fisheries, Transport, Science and Technology, Interior, and others) while coordinating the Ministry of Environment
- NAPA to Angola. The general vulnerability of climate change is described in the document but not the specific issues related to fisheries
- The motivation is to bring fishing to the center of the discussion, making fishing the focus of vulnerability assessment and the creation of capacity building measures for adaptation.

Who finances?

Is the GEF (Global Environment Fund) and Partner (FAO, BCC Angola, Namibia and South Africa, the EAF-Nansen Programme, ECOFISH, NEPAD-FAO Programme Fish, NansClim and NAM-AAP

Define the objective(s) of the assessment: its immediate objective and links to longer-term/higher level goals?

- Short term prevention
- Intervention
- Setting / Adaptation short, medium and long term

Depending on the situation, the measures to be taken to prevent negative impacts, e.g. have to make awareness among fishing communities while adapting to create new ways of working, new sources of income.

To what extent is the assessment anticipating (ex-ante), reactive (ex-post) or a mix of both?

The type of evaluation would be combination of anticipation and reaction

Who are going to be the users of the assessment?

Users are fishermen and policy-makers. The latter are direct users of the evaluation, with the indirect users are the artisanal fishermen who in turn are the beneficiaries of the evaluation.

Who will undertake the vulnerability assessment?

Prevention evaluators are technical Institute of Development of Artisanal Fisheries, National Technical Institute for Fisheries Research and also external support for analysis if required

Are there time constraints for the assessment?

It needs one (1) year to plan the evaluation, it is not known exactly but the whole project can last 60 months or a little less than 60 months.

Are there financial and human constraints?

The number of fishermen and the length of the coast are enormous, so costs will be high. There is need for training of staff and recruitment of new staff for the purpose.

Angola Step 2: Identify the system and drivers – “scoping” activity

What is the specific system/sector at stake: socio-economic, biophysical, combined human-environmental?

Combined social-ecological

What is temporal scale to be considered: long-term, short-term, past history, projections?

Time scale short and long term, including the history and /or projections past trends and future scenarios

What is the spatial scale of the assessment: national, local, regional, ecological scales, combination of scales?

combination local / regional

What are the major drivers of change in the system: climate change, economic, social, policies, micro/macro?

To better answer some questions, the group undertook the exercise to discuss some changes that occur in fishing communities, examples, causes, scale and temporal vulnerability according to the following table:

No.	Changes	Examples of changes	Causes	Timescale	Spatial scale
1	Change in fishing gear	The most rudimentary to the most efficient / sophisticated	- Decreased resources	Since 2000	National Regional
2	Deployment of infrastructure	Construction of support centers for artisanal fishing	- Policy of the state - Avoid losses after capture	Since 2006	National
3	Migration of fishermen	Search for new fishing areas, in many cases permanent	- Competition among fishermen - Decreased resources	Since 2000	National
4	Increase in the number of fishermen		- Unemployment		National
5	Obstruction of estuaries with fishing gear	Decrease in abundance of some species such as snapper	- Decreased resources		
6	Change uncertain future	Increase in aquaculture depending on better understanding of the benefits generated by aquaculture			
7	Change in household consumption	Fish currently more expensive than meat and frozen chicken	- Population growth (transversal) - Decreased resources		Limited to the capital, Luanda

The group noted more time would be needed to complete the initial vulnerability framework assessment development steps.

Namibia Step 1: Why a vulnerability assessment?

Who is driving/requesting the assessment and why?

The lead agency is the Ministry of Fisheries and Marine Resources. Directorates responsible within MFMR are Resource Management, Policy, Planning and Economics and Aquaculture. The Benguela Current Commission is the facilitating agency.

There are potential threats to the fishing industry and communities of Luderitz and Henties Bay. e.g., what is the threat of ocean acidification to shellfish/mariculture industry?

Who is funder and why are they funding the assessment?

The three countries of Angola, Namibia and South Africa (ANSA) through GEF.
The request came from the three countries through BCC to do an in-depth assessment.

Define the objective(s) of the assessment: immediate objective and longer-term/higher goal? (Distinguish between output and outcome)

- There is a need for a Policy Advocacy to be developed that speaks to climate change in the form of an evidence-based climate resilience policy.
- Promote awareness rising at community and stakeholders levels through the vulnerability assessment.
- Provide information for planning purposes for line ministries and small and medium enterprises (SME's).
- To support sustainable fisheries planning both within the Ministry of Fisheries and Marine Resources and small and large scale industries.
- Identify needs of stakeholders through the VA process to enable for better plan adaptation actions.

Outputs from this would be policy type of information by means of recommendations and developing a map of vulnerable areas

Outcomes would include the incorporation of outputs (recommendation and mapping) into management plans.

To what extent is the assessment anticipating (ex-ante), reactive (ex-post) or a mix of both?

The assessment is **reactive** – changes has been observed in PH levels, how is mariculture vulnerable to that? **anticipating** – how is the fishing sector vulnerable to predicted future changes to BCLME? **a mix of both** – another observation is that of variability in BCLME, how is fisheries vulnerable to that?

Who are going to be the users of the assessment? (direct and indirect users, at several possible levels)

The users of the vulnerability assessment are but not limited to; fishing industry, Ministry of Fisheries and Marine Resources, decision and/or policy makers of the Ministry. Line Ministries can also use it for comparison reasons. Other users can be described as Regional and Local Authorities, e.g. Municipalities, Coastal Communities, Labour Unions, NACOMA. NGO's etc

Who are the assessors? What are their expertise/disciplinary background?

The following institutions are assessors to this assessment; Educational Institutions e.g. Universities/Polytechnic of Namibia, NGO's, Consultants/Research Institutions e.g. (IPPR), other line Ministries, Non Namibian Resources and other projects, e.g. (AAP, Nansclim) etc. The Ministry of Fisheries (Directorates of RM, PPE and Aquaculture) is the direct assessor.

Are there time constraints for the assessment?

There is less time constraints because the project has a 5 year cycle. It is flexible to do multiple assessments. e.g. initial rapid VA followed by in depth VA

Are there financial and human constraints?

The ministry has both natural and social science capacity to carry out the vulnerability assessment. However, the only constraint identified is the shortage of time (esp. for the social science aspects). Regarding other assessors, the capacity thereof is questionable; therefore, there might be a need for capacity building during the VA.

Namibia step 2: Identify the system and drivers – “scoping”

Important things to define:

What is the specific system at stake: Socio-economic, biophysical, combined human – environmental?

The systems at stake is a combination of the socio-economic and biophysical, e.g. of the vulnerability of fishing and aquaculture in Namibia are as follows;

- Vulnerability of biomass and size of fish stocks to the change in climate
- Vulnerability of aquaculture (esp. bivalves) to environmental perturbations (e.g. harmful algal blooms, sulphide events etc.
- Vulnerability of employment to the changes in rock lobster catches due to changes in wind patterns.
- Vulnerability of Namibianization to climate change and vice versa
- Vulnerability of fishing fleet to change in fuel prices and sea surges
- Vulnerability of fishing to other economic activities (oil, tourism, mining)

South Africa groupwork summary

Step 1: Why a vulnerability assessment?

The group felt that only points 1 (Who is driving the assessment?), 3 (Objectives) and 5 (Users) were relevant to their discussions at that stage, while recognizing that the other 5 points listed would need to be addressed in due course in an iterative process which could well result in Points 1, 3 and 5 being re-visited.

Who is driving/requesting the assessment and why?

The group noted that the BCC climate change project had been initiated by the BCC based on the recommendations of the November 2011 workshop. The group noted that the BCC climate change project had been initiated by the BCC. The group was not aware of any direct requests for vulnerability assessments for South Africa's marine and aquaculture fisheries from national government or any of the stakeholders that were present at the meeting. It however recognized the

need to involve additional authorities, organizations and individuals in South Africa in the process as soon as possible.

Although not specifically built into the national adaptation plans as yet, assessment of the vulnerability of South Africa's marine environment to climate change will in due course become necessary, and is likely to become primarily the responsibility of the Department of Agriculture, Fisheries and Forestry (DAFF) and the Department of Environment Affairs (DEA). It was recognized that the Benguela Current Commission, to which South Africa, as signatory, is committed, will be the primary driver and coordinator at regional level.

Define the objective(s) of the assessment: its immediate objective and links to longer-term/higher level goals?

The group considered that, bearing in mind the high vulnerability of the small-scale fisheries and fishing communities in South Africa to environmental perturbations, attention to this sector should be an immediate objective. It was noted that South Africa's first fisheries management policy for small-scale fisheries has just been gazetted and will be implemented soon, and that long-term rights in the commercial rock lobster fishery will be reviewed in two year's time, in 2015, presenting new opportunities for vulnerability assessments to be taken into account in the management of both these fisheries.

Regarding large-scale industrial fisheries, the potential widespread impact of anthropogenically-driven intrusions of warm, high-salinity water from the Agulhas current into the coastal upwelling region on the west coast was seen as the major concern in the longer term, particularly for the purse-seine fishery for small pelagic fish on the West Coast.

Who are going to be the users of the assessment?

- National government (DAFF, DEA, possibly Departments of Trade and Industry (DTI) and Science and Technology (DST))
- Provincial and local government in the Northern, Western and Eastern Cape (and Kwazulu-Natal?)
- Commercial fishing industries and small-scale fishing communities and individuals
- Academic institutions
- NGOs

Step 2: Identification of system and drivers of change (scoping)

The group chose to focus on west coast rock lobster in South Africa as an example, as it is exploited both by a targeted commercial fishery and sporadically by small-scale line-fishermen.

Ecological/biophysical concerns include:

- Migration (from West Coast to South Coast (Western Agulhas Bank))
- Changes in the benthic community structure and food web on the Western Agulhas Bank as an indirect effect of the increased abundance of rock lobster there. A particular concern is the adverse effects on abalone due to the increased predation by rock lobster on sea urchins, which provide shelter for abalone spat.
- Low oxygen water events
- Wind variability.
- Poisoning (people eating walk-out lobster).

Socio-economic concerns include:

- Food security and livelihoods (there is high dependency in small-scale fishing communities).
- Job security in commercial sector (fishermen work on boats, gender issues since post-harvesting activities are mostly carried out by women).

Time scale for assessment

For small-scale fisheries, 3 years would be appropriate as this would coincide with the testing phase for the new small-scale fisheries policy. Moreover, long-term commercial rights allocation for west coast rock lobster will take place in 2015, so it could also support this process. A vulnerability forecast for the next 10 years is also needed for consideration in the awarding of long-term fishing rights in general.

Spatial scale of assessment

The vulnerability assessments need to be carried out everywhere in South Africa where west coast rock lobster occurs, most importantly at the local scale (community level).

Major drivers of change in the system

In the small scale fisheries, change is most likely to be driven by the vulnerability to the effects of environmental change and consequences of the new small-scale fisheries policy. Change in the commercial sector is more likely to be driven by economic factors within and beyond the country, a possible exception being the widespread effect of intrusion of Agulhas Current water into the upwelling region on the West Coast, should that occur. The commercial purse-seine fishery for sardine, anchovy and round herring is the fishery most vulnerable to this effect.

The purpose of the Benguela Current Large Marine Ecosystem Regional Workshop on Assessing Climate Change Vulnerability in Fisheries and Aquaculture was to present an initial review of the bio-physical and biological implications of climate variability and change on the region's fisheries; review the latest stages in research on and application of climate variability and change vulnerability methodologies and discuss their appropriateness to the region's adaptation planning needs; identify key elements of vulnerability for the region, including climate-related drivers of change and adaptive capacities along the entire fisheries and aquaculture value chains. Making the link between expert advice and practical use of vulnerability methodologies from around the globe with fisheries representatives from the region set the scene for fruitful discussions on how to develop vulnerability frameworks appropriate to the region, making the best use of existing information and evaluating means to collect needed information, particularly concerning social and economic vulnerability of the region's fisheries and aquaculture.