

## **PART A – CONCEPT NOTE**

### **I. APPLICANT AND PARTNERS**

Name of the applicant:	Benguela Current Commission (BCC)
Nationality <sup>1</sup> of the applicant and date of establishment:	N/A 31 January 2007
Applicant's EuropeAid ID number <sup>2</sup> :	NA-2009-ELH-2509919961
Ongoing contract /Legal Entity File number (if available) <sup>3</sup> :	N/A
Legal status <sup>4</sup> :	Intergovernmental
Partner 1:	Name: Technical University of Denmark EuropeAid ID number <sup>5</sup> : DK-2007-DOO-2711217490 Nationality and date of establishment <sup>6</sup> : Danish, 01/01-2001 Legal status <sup>7</sup> : Public body
Partner 2:  NB: Add as many rows as partners	Name: EuropeAid ID number: Nationality and date of establishment: Legal status:

<sup>1</sup> The statutes must make it possible to ascertain that the organisation was set up by an act governed by the national law of the country concerned. In this respect, any legal entity whose statutes have been established in another country cannot be considered an eligible local organisation, even if they are registered locally or have a “Memorandum of Understanding”. In the case of international organisations, indicate N/A.

<sup>2</sup> This number is allocated to an organisation which registers its data in PADOR. For more information and to register, please visit [http://ec.europa.eu/europeaid/onlineservices/pador/index\\_en.htm](http://ec.europa.eu/europeaid/onlineservices/pador/index_en.htm)

<sup>3</sup> If the applicant has already signed a contract with the European Commission / has been informed of the relevant Legal Entity File number. If neither of these apply, indicate N/A.

<sup>4</sup> E.g. non profit making, NGO, international organisation etc.

<sup>5</sup> See footnote **Error! Bookmark not defined..**

<sup>6</sup> See footnote **Error! Bookmark not defined..**

<sup>7</sup> See footnote **Error! Bookmark not defined..**

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<b>Applicant's contact details for the purpose of this action:</b>	
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**Any change in the addresses, phone numbers, fax numbers and in particular e-mail, must be notified in writing to the European Commission. The European Commission will not be held responsible in case it cannot contact an applicant.**

**II. THE ACTION**

**1. SUMMARY OF THE ACTION**

Please complete the table below.

Title of the action:	Development of ecological sustainable fisheries practices in the Benguela Current Large Marine Ecosystem (ECOFISH)
Lot N°	ENRTP Priority 2 / Lot 8: Fisheries
Location(s) of the action: <i>- specify country(ies), region(s) that will benefit from the action</i>	Angola, Namibia, South Africa  Benguela Current Large Marine Ecosystem (BCLME)
Total duration of the action ( <i>months</i> ):	60
Amount ( <u>in EUR</u> ) requested from the European Commission	1 500 000
Objectives of the action	To promote the ecosystem approach to fisheries (EAF) in the BCLME through: 1) Adaptation of state-of-art assessments methods and Marine Protected Areas (MPA) planning tools to the BCLME; 2) Validation or modification of current assessment practices based on spatially explicit analyses; 3) Incorporation of stakeholders' knowledge in data collection and analysis; 4) Strengthening of regional capacity to apply the developed assessment tools on a regular basis
Target group(s)	Fishery managers, fishermen, fishery scientists, scientific advisors, ecologists
Final beneficiaries	Governments of the three countries, fishermen and regional communities
Estimated results	1) Common cooperative practice for achieving maximum sustainable yield for hake, horse mackerel and sardinella in 2015 2) Increased awareness of fishermen of the EAF and towards responsibility based management 3) Provision of the scientific basis for the design and implementation of MPAs 4) Improved sampling and precision of assessment methods taking explicitly account for environmental effects on the distribution of key species 5) Enhanced international cooperation and regional capacity for the implementation of the EAF in the BCLME
Main activities	Implement operational statistical methods with focus on simple and understandable outputs: Catchability and individual based vital rate modelling. GeoPop <sup>1)</sup> cases based on survey data, commercial catches and fishermen knowledge. Validating models. Development of local expertise

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	<p>on running the operational models.</p> <p>Establishment of EAF management procedures, focusing on integration of stakeholders: identify potential MPAs in collaboration with stakeholders based on GeoPop output and other auxiliary data. Qualitative interviews of fishermen and local workshops with spokesmen of fishermen associations to integrate stakeholders' knowledge, statistical models and auxiliary data in fixed management procedures.</p> <p>Project management and local capacity building using key local scientists as spokesmen/women for understanding and implementing new ecological sustainable tools in EAF and climate change context and facilitate subsequent national and regional cascading effects</p> <p><sup>1)</sup> GeoPop: Geostatistical modelling from size of individual fish to spatial distributions of Populations</p>
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**2. RELEVANCE OF THE ACTION**

**2.1. Relevance to the objectives/sectors/themes/specific priorities of the Call for Proposals**

Benguela Current Large Marine Ecosystem (BCLME) shared by Angola, Namibia and South Africa is an important centre of marine biodiversity and marine food production. The fishery resources in the region are under severe pressure due to socio-economic factors such as increasing demand for export revenue and local consumption, and the effect of notable decline in resources abundances and distribution has resulted in lowering the livelihood of coastal communities who for centuries has depended on these resources. This action will support efforts to halt the decline of commercially important shared fish stocks such as hake, horse mackerel and sardinella in the BCLME region. Sustainable management of these stocks will be based on implementation of the ecosystems approach to fisheries (EAF) using robust geostatistical-modelling techniques (GeoPop) and involvement of all stakeholders. The methods that will be employed in this proposed action will also be tested in relation to the identification of Marine Protected Areas (MPAs) and vulnerable marine habitats.

The application of GeoPop is an innovative approach to support EAF to management and MPA testing, which has been successfully implemented for European cod stocks and fisheries. Further, the action is transboundary and contributes to poverty alleviation through protection of natural resources that constitutes the foundation for the fisheries industry and food production, and is of great importance to the coastal communities in the region.

The action will contribute to all expected results of the call, and the focus on fisherman-scientists partnerships and joint responsibilities for long-term ecological sustainability will ensure a durable effect. Currently, the basic stock assessment in the three countries depends on swept-area, acoustics and production models, whereas the GeoPop techniques will incorporate various ecosystem variables, all types of available data and allow for formal validations. The input of the knowledge of fishermen in the current management regimes in the three countries need to be enhanced to improve sustainability of the resources.

Skills development and enhancement of human capacity are keys to the long-term success of sustainable management of the living marine resources in the BCLME region. Under this action, training and capacity building will target fisheries scientists in areas such as size spectra approaches and modelling of trophic interaction of species in order to enhance capacity in the region for applying the ecosystem approach to fisheries. The GeoPop training programmes for local scientists will be directed towards local ownerships.

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The action is also expected to increase the awareness of fishermen to the need for EAF and responsibility based fishing activities, and their knowledge about management of the ecosystem

This action establishes a strong collaborative partnership between the Danish research institute and the national marine/fisheries research institutes within the three member states of Benguela Current Commission (BCC). This partnership will serve as a basis of enhanced cooperation and information/experience exchange through which developing coastal states will derive significant benefits.

### **2.2. Relevance to the particular needs and constraints of the target country/countries, region(s) and/or relevant sectors (including synergy with other EC initiatives and avoidance of duplication)**

Support is urgently needed for the conservation of the most important species for Angola, Namibia and South Africa, notable sardinella and hake. Today, the major problem in the assessment of hake is that there is no coherency in numbers-at-age from research surveys, commercial data or the modelled populations with current techniques. This implies that the trophodynamics and environmental driven vital rates (growth, mortality, recruitment) variability are not yet understood for the species. In Angola, the state of important pelagic stocks is similarly poorly understood and reliable size-based assessment methods are desperately needed. Thus, we need to implement an assessment tool that simultaneously can utilize all available data and produce coherent results so we can address the important issues of MPAs and EAF in an operational manner. The knowledge of fishermen needs also to be utilized. Furthermore, as an important performance criterion it must be possible to perform proper statistical validations with a holistic assessment tool. GeoPop satisfy these conditions. As indicated, the understanding and modelling of vital rates are also lacking in particular in Namibia and Angola, the exception being the predation by seals on juvenile hake. To improve this situation and at the same time create input to GeoPop, innovative vital rate modelling must be implemented. Our Danish partner has long-standing expertise in implementing state-of-art stomach content, food consumption, growth, otolith increment, early life history and predation modelling. This will create the ecosystem trophodynamics linkage from pelagic species as forage fish, to hake as top piscivorous predator to seal predation.

GeoPop as a tool will build on results from Benguela Environment Fisheries Interactions and Training (BENEFIT) and ongoing activities in the BCLME (e.g. (a) EAF Nansen project (b) Geochemistry and ecology of the Namibian Upwelling System (GENUS – funded by German Federal Ministry of Education and Research and (c) Climate Effects on Biodiversity, Abundance and Distribution of Marine Organisms (NANSCLIM) – funded by NORAD). Fortunately, large databases are available. The NANSCLIM, and the proposed action will supplement each other: NANSCLIM will carry out reviews and desk studies of present knowledge and practices as regards ecosystem indicators and develop indicators tailored to the climate variability over the past 30 years in the BCLME region. In contrast GeoPop represents a scaling tool from size of individuals to heterogeneous populations that are tailored to base line studies for MPAs and sustainability in the ecosystem approach to fisheries in a changing climate.

The proposed action can be considered the next generation in a continuation of the FAO/DANIDA project “Training in fish stock assessment and fisheries research planning” (GCP/INT/392/DEN) in which our Danish partner during 1983-1998 provided a series of regional and national training courses on length-based fish stock assessment including the BCC-region. Many problems were encountered world-wide because of ‘noise’ (the number of fish per length group was considered independently of each other in traditional length-based assessment). In contrast, GeoPop is a method of modelling the underlying variability in trawl catches such that significant population signals can be extracted in most cases.

There are potential synergies to FP6 IMAGE and FP7 MEECE regarding ecosystem indicators and with FP7 FACTS concerning the use of size-spectra modeling to model the forage fish, and their interactions with the rest of the fish and zooplankton community. In addition to these EU projects, in which our Danish partner, DTU Aqua is involved with a leading role, experience from Danish National projects such as Sunfish

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(Description of the life cycle and recruitment of cod) and REX (fishermen-science collaboration on cod in the North Sea) will be utilized in the proposed action.

### **2.3. Describe and define the target groups and final beneficiaries, their needs and constraints and how the action will address these needs**

#### **Four prominent target groups in the three countries:**

1) Fishery managers – have important responsibilities in advising their Ministers based on the outcome of scientific investigation or stock assessments. For them to succeed, they need to be provided with the best scientific available information in a clear and understandable way. This action will contribute significantly to the improvement of the scientific advice to managers. In addition to using the results of current methodology the results from state-of-art geostatistical modelling will add value to the advice and hence improve management.

2) Fishermen – this group plays an important role because of their traditional knowledge of the fisheries. This knowledge is however not always appreciated or included in management even though their needs are to be considered in the decision-making. Because of the lack of involvement of fishers and the failure to use the traditional knowledge, fishers are sceptical about stock assessments by fishery scientists. One of the key elements of this project is that it will involve fishermen and incorporate their knowledge into management. In this way, the mistrust will be narrowed and in long-term removed. We will take advantage of our Danish partner's experience in developing true dialogue with fishers towards elimination of destructive fishing practice and sound use of scientific information.

3) Fisheries scientists – have an important role to play for the success of this project and its sustainability. They need to be updated on the use and application of geostatistical modelling and trained in all activities related to data requirements. Their concern is their inability to provide credible assessment that the fishermen cannot easily question. It is expected that this action will equip the scientists to better understand the dynamics of the system to be able to provide better advice.

4) Scientific advisors – this group provides advice to the Ministers. Ministers usually value advice from this source. It is important that the advisors are able to interpret information that includes a range of scenarios. This action will enable the advisors to appreciate the need for considering various scenarios in the management of resources in addition to existing assessments.

Final beneficiaries of the action are the governments of the three countries through strengthening of their fishery research institutions and fishery management capacity. Ultimately, this would be translated to the sustainable management and improved livelihood of the fishers and regional communities.

Selection criteria – target groups were selected based on the crucial roles that they play in the sustainable or unsustainable management of the fishery resources. The BCC umbrella has good working contact to the target groups.

### **2.4. Particular added-value elements**

Innovation and best practice methods are at the heart of this action but in several dimensions that usually are not synthesized and this is why we expect this action to create innovative implementations of EAF and MPAs. The synergies created between this action and ongoing Norwegian and German environmental projects will not only increase public awareness of climate change in relation to fisheries and marine environment but also equip the ecologists to better understand the challenge of how to use interrelationships between climate and biodiversity changes to secure long-term ecological sustainability.

### **3. DESCRIPTION OF THE ACTION**

The need for the proposed action and the long-standing expertise of our Danish partner in successfully implementing state-of-art fish stock assessment methods form the background. The key stakeholder groups have a positive attitude towards the action and are ready to join this BCC international engagement for the coming 5 years.

The goal of promoting EAF requires that a coherent picture of the state of the fish stocks in a BCLME trophodynamics understanding is accepted by key stakeholders. This is not the case for key species such as hake. The immediate objective is therefore to adapt a consistent assessment method which must be spatially explicit or area-based (MPA demand) and capable of incorporating a wide spectrum of different abiotic and biotic data including fishermen's knowledge of fish occurrence patterns on various spatio-temporal scales. The latter together with sufficient capacity building for target groups will also promote responsibility based management for long-term ecological sustainability. Finally, to promote immediate progress it is imperative that the adapted assessment method permits model validation.

Capacity building becomes an integral part of the action throughout the project, and shall be ensured by the participation of key persons from all groups (scientists and fishermen's representatives) in the project management, a mobility scheme including regional workshops and bilateral work.

Environmental data will be used for initial analysis to relate fish abundance to thresholds of e.g. wind speed, water colour and dissolved oxygen. The results will be used to correct interannual bias in the survey estimates. A full state-space fish stock assessment model (SAM) is introduced for this purpose. Quantification of uncertainties is an integrated part of the model. It allows selectivity to evolve gradually in the data period and is able to handle missing data (e.g. missing catches in a year).

Environmental driven vital rates (growth, mortality, recruitment) will be studied and state-of-art stomach content, food consumption, growth and predation modelling will be implemented. To address the potential problems of cannibalism as well as to quantify multispecies interactions, it is necessary to transform data on stomach contents into actual consumption rates. An adequate gastric evacuation model is a necessity for this purpose. A general model that properly describes evacuation in a number of marine fishes has been developed at DTU Aqua, but needs to be parameterized for hake.

Geostatistical modelling from size of individual fish to spatial distributions of populations (GeoPop) is an advanced and innovative tool that can explain e.g. apparent changes in catchability because it includes space, time and size-correlations. In other words – length frequencies are changed when corrected due to estimated correlations. The model incorporates at the individual level general growth, mortality and recruitment function and can estimate stock biomass with proper confidence limits.

The action is planned for 5 years (2010-2014). The overall design of the action is coherent through the line from knowledge to methods to management and with its basic focus on environmental-oriented size-based synthesis and implementation of GeoPop for a demersal and pelagic species. The timeframe takes into consideration that reasonable fast progress can be reached with hake for several reasons. Implementing vital rate modelling of the selected pelagic species (forage fish) need to be accomplished at midterm since this serve as important input to finalize the geospatial modelling of hake. Utilizing e.g. acoustic data for sardinella in Angola to implement GeoPop will most likely first be finished in the second part of the project.