

The future is now: How scenarios can help Senegalese and Mauritanian fisheries adapt to climate change

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Abstract:

Localized changes in the productivity of marine and inland waters induced by climate change will pose new challenges to the fishery and the aquaculture sectors in West Africa. However, climate change does not occur in isolation of other drivers of change: processes of environmental, economic and social change can affect the fishery sector, potentially creating additional vulnerability to climate change. Scenarios are a useful tool to explore uncertainties and understand non-climatic drivers of change. Despite their prevalence in global environmental change research, few have focused on the fisheries sector. This article presents the construction of fisheries sector scenarios for Senegal and Mauritania required for the analysis of climate change adaptation policies.

Introduction:

In Senegal, 47% of animal protein intake comes from fisheries (FAO 2005) and the sector generates 600 000 direct and indirect employment³. In Mauritania, the sector is export oriented, contributing to foreign exchange earnings and the budget envelope: 20% of the government budget came from the sector between 1993 and 2000 (MAED 2002). In these countries uncertainties exist on how future biophysical changes due to climate change will interact with other stressors and impact the fisheries sector. Scenario building can be a creative method that provides a robust framework for strategic decision-making and understanding of uncertainty. Scenarios are not forecasts or projections; they are plausible stories about how the future might unfold. They can help strengthen the policy development process in confronting uncertainty and change, and the development of alternative adaptation strategies. The WorldFish Center and the Leibniz-Centre for Tropical Marine Ecology invited experts from Ghana, Mauritania and Senegal to a workshop held on the 14-16 April 2010 in Dakar, Senegal, to debate critical issues facing their fisheries in the next 40 years and construct plausible scenarios for 2050. The scenarios developed during the workshop are based on assumptions related to various drivers identified by the experts in an electronic survey where they were asked: "Given your area of interest or expertise, list 10 drivers you think would have the most significant impact (positive and negative) on fisheries and aquaculture production systems over the next 40 years". These were ranked according to their importance in terms of impact, and their level of uncertainty in terms of rate and direction of change. In this article we focus on the preliminary results from Senegal and Mauritania.

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Figure 1 A space for creative thinking at the regional level: some of the participants of the workshop “Envisioning 2050 Climate Change, Aquaculture and Fisheries in West Africa”

Senegal 2050: Is a blue revolution possible through aquaculture development?

For Senegal, participants felt that the most uncertain and important drivers were market forces, from a regional/localized market to a globalized one, and the different paths aquaculture could take, from extensive to intensive high input aquaculture. This resulted in four possible scenarios (Figure 1). In the “Accelerated” scenario high technology, global market orientation and intensive production combine for a strong push in technology and growth. The policy implications are that substantial input in education and training as well as a clear legislative framework to curb potential environmental problems is needed. In addition considerable pressures exist with regard to product standardization and certification leading to new forms of competition in international markets.

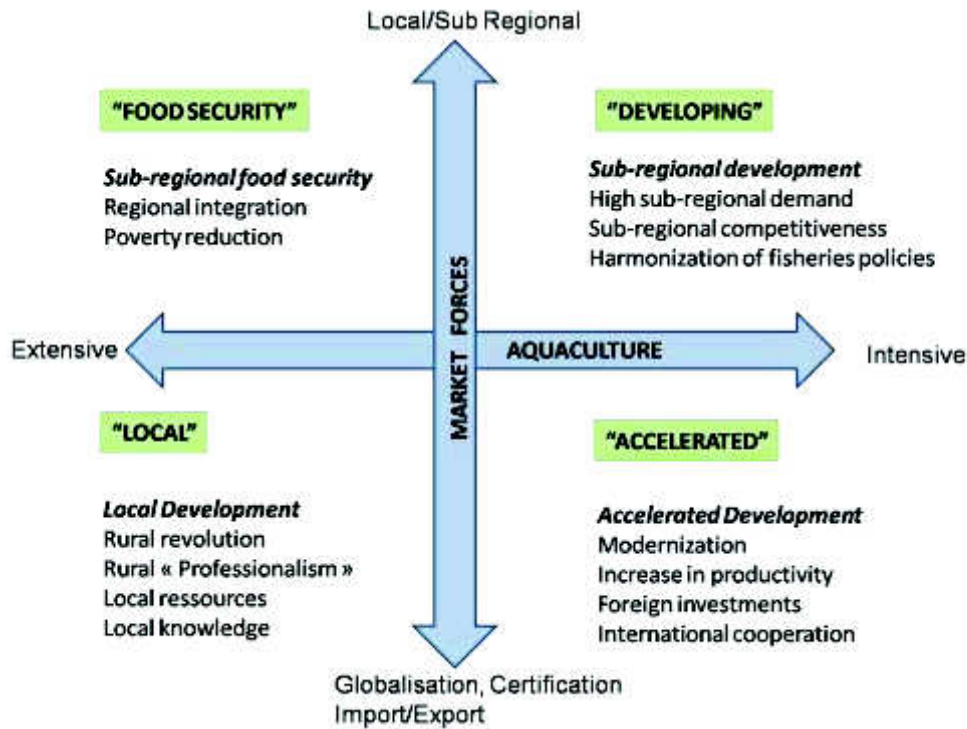


Figure 1: Senegal Scenarios

In the “Developing” scenario high-tech, intensive aquaculture is combined with economic development oriented toward the sub-region as opposed to global markets. Some members argued that this approach would go well with the rising demand in fisheries products at the regional level. However, in terms of policy this would entail substantial capacity building and awareness with regard to the potentially detrimental environmental effects of intensive aquaculture. It would also need a strong effort at the regional level to create a framework for harmonized regulations and regional market access.

The “Food security” scenario moved from a solely economic perspective present in the first two scenarios towards a food security one. Local and regional markets are favoured by an extensive aquaculture and small holders are at the centre of the “blue revolution”. The feasibility of such an approach was doubted by several members of the group, and even more so the desirability of such a combination. However, discussions highlighted that this might be interesting in terms of rural poverty reduction. Finally, the last scenario “Local” focused on local self-determination and rural ‘grassroots’ development but turned toward global seafood markets. Policies would push for a “rural revolution”, including the mobilization of local knowledge and rural education (and extension) to cope with the challenges of a ‘village-based’ production for a globalized world.

These four scenarios identified several issues for the future of the Senegalese fisheries sector including: can aquaculture address both national food security and macroeconomic growth? Should regional trade be promoted or access to global markets? Can intensive high input aquaculture benefit small holders in rural areas? The participants realized that while discussion currently existed in Senegal on aquaculture development, the different development pathways as well as the impact of climate change on each of them had been so far seldom addressed.

Through a “backcasting” exercise, where participants identified what policies are needed to be in place to reach successful outcomes in a scenario (Food security) and avoid negative ones, adaptive water resource management was perceived as essential to adapt to future climate change. Additionally, climate change should be mainstreamed within fisheries policy and in order to achieve this sub-regional institutions and actor’s network should be strengthened. In terms of research and development (R&D), climate-to-fish modelling and identifying species that could adapt to new environmental conditions were seen as priorities. In the long term environmental and adaptation policies’ objective should include ecosystem restoration to increase the resilience of inland fisheries and aquaculture.

Mauritania 2050: Raising alarm bells!

For Mauritania, participants labelled the most uncertain and important drivers as “overexploitation”, from fully exploited fisheries, where management actions can still reverse trends, to overexploited ones where management actions have failed, and “climate change”, ranging from slow onset resulting in small incremental changes that can be palliated by adaptation strategies to severe climate change and extreme events. The ability to predict climate change was also mentioned as an important element of this driver (from good to inexistent). The four possible scenarios based on these two axes are presented in Figure 2.

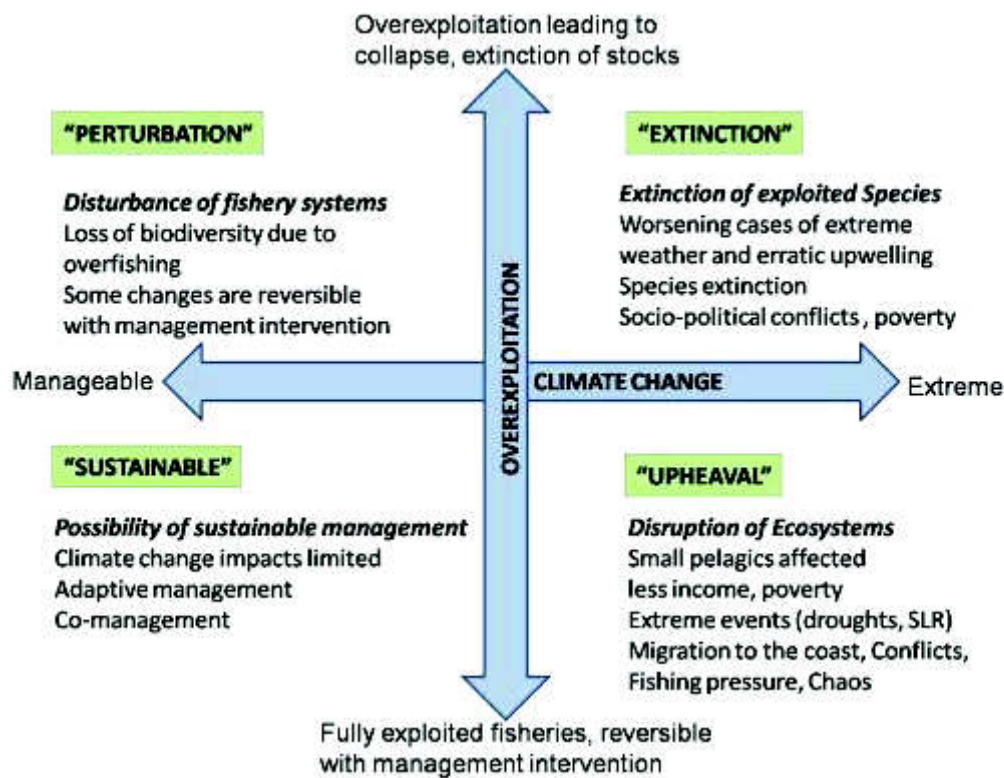


Figure 2: Mauritania scenarios

As opposed to Senegal, the Mauritanian scenarios were pessimistic: climate change is ineluctable and its magnitude and rate of change is creating a heightened level of uncertainty. Overexploitation is inevitable albeit in the “perturbation”, “sustainable” and “upheaval” scenarios management interventions could still reduce impacts through for instance increased capacity building and research, and aquaculture development. Overall the scenarios are an “alarm bell” for the Mauritanian fisheries sector and are described in more details below.

In the “Perturbation” scenarios, disturbances in the fisheries sector are mainly driven by anthropogenic factors. Even though climate change impacts will not be as severe as in other scenarios, overexploitation and collapse of main aquatic resources are compounded by increased pollution, leading to a decrease in water quality, modification of habitats and loss of biodiversity. These have a widespread socio-economic impact on the country. In the “Extinction” scenario climate extremes are worsening are causing the total collapse and extinction of commercial stocks, loss of biodiversity and a high level of poverty. Failure to adapt to environmental changes is due to inadequate management and policy responses, resulting in poverty reduction efforts and economic growth being drastically curbed since fisheries play a critical role in the national economy. Policy makers are overwhelmed and have to deal with social and political conflicts. By adopting policies that enabled overexploitation and ignored climate change, the sector has entered a “road of no return”.

The “Sustainable” scenario is characterized by limited climate change effects due to the ability to successfully adapt. Adaptive management is adopted: scarce resources are managed while maintaining fishing equity, efficiency, and protection of the

environment. The perceptions and uncertainties of sectoral actors are taken into account and a portfolio of participatory management approaches, including co-management, are implemented. Despite adverse conditions, the sector can still remain sustainable, “ride out the storm”. Finally, in the “Upheaval” scenario droughts, floods, increases in temperature and sea level rise are worsening. Inland areas are receiving less rain, resulting in a massive population exodus to coastal zones: the coast is considered a zone of ultimate “resort” and there is exponential pressure on aquatic resources. In the ocean the lowest trophic species with no commercial value dominate the fishery. Small pelagic fisheries are greatly affected as they are extremely sensitive to environmental fluctuations. Despite this turmoil, society still tries to respond to these extreme environmental changes through adaptive management, which might include exiting capture fisheries.

Like the Senegalese group, participants identified what policies needed to be in place to reach successful outcomes in a scenario (“Upheaval”) and avoid negative ones. In the short term the Sub-Regional Fisheries Commission was considered to play a crucial role in increasing cooperation and technological transfer related to climate change, including the promotion of energy efficiency. Strengthened regional cooperation will result into a stronger presence and “united front” in international fora related to climate change. For R&D, the integration of climate change issues in education curricula was seen as a priority and by 2030 academic centres of excellence on fisheries and climate change should exist throughout the region. However capacity building is not limited to the scientific community, in order for decision makers to design evidence-based adaptation policy at the national and regional level that are implement by 2020-2030, their awareness on climate change issues needs to increase in the short term.

4. Looking ahead to adapt now: what we have learned

Scenarios are often used for strategic planning in the private sector, and increasingly so in the public sector in Europe and North America, but with few such initiatives in Africa, especially regarding fisheries. Experts at the workshop expressed the desire to see this type of planning process and creative thinking more widely applied to fisheries, with special emphasis on the rigorous methods used in the workshop. The opportunity for creative thinking was recognized as an important part of adaptation planning to climate change. Indeed more careful attention to “processes” of learning and sharing knowledge could have more lasting impact on decision-making, and challenge assumptions about potential solutions to environmental changes (Allison 2002). Mamadou Ngom, a Senegalese aquaculture expert, reported to the organizers how the exercise made him realize that developing aquaculture to supply globalized export markets had quite different implications than if regional trade and food security were the primary focus. Clearly, he added, these differences should be taken into account by experts developing national aquaculture strategies, especially in a context of water scarcity fuelled by changes in demand and climate changes.

The scenarios exercise presented here is the first step of an iterative process and the following recommendations will be acted upon:

- Participants identified the development of a methodological brief on scenarios as a high priority. The WorldFish Centre is in the process of developing such a brief
- Quantify the scenarios and combine with climate-to-fish models developed within the QUEST_fish project (see <http://web.pml.ac.uk/quest-fish/default.htm>)

The final message of the workshop is that, in the face of high uncertainty, where coupled climate and fisheries models have difficulty predicting fishery productivity in upwelling regions such as West Africa, opportunities are needed to map plausible pathways and futures in a collaborative manner. While fishery policymakers cannot foresee the future in a crystal ball, by imagining plausible scenarios, taking into account the likely impacts of climate change and other drivers, they stand a better chance of preparing the region to face the challenges ahead.

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