

Climate change linked to failing fisheries in coastal Ghana

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What is the issue?

Around the world, fisheries employ millions of people and make substantial contributions to national economies and diets. In Ghana, small scale fisheries contribute 70-80% of the total fish catch and provide a livelihood for about 2 million people, including around 135,000 small scale fishers (AGRER, 2011; NAFAG, 2014). Furthermore, fish consumption provides 60% of the nation's protein requirements.

Hampered by minimal investments and limited use of technologies, the small scale fisheries sector in Ghana is considered very vulnerable and poorly adaptable to climate change (Macfadyen and Allison, 2009). The sector is highly dependent on natural marine productivity, which in turn is impacted by climate change. However, there is currently a limited understanding of the present and anticipated impacts (FAO, 2008; WorldFish Center, 2007), which hinders the development of policies to ensure that fisheries continue to support livelihoods and food security. In this context, the IDRC-funded *Climate change adaptation research and capacity development in Ghana* project has provided evidence-based knowledge to support the development of interventions that could minimize climatic impacts on poor fishery communities in coastal areas.

What did we do?

The study covered the coastal area of Accra, where small scale fishing is the dominant source of livelihood, especially for indigenous communities. The project analyzed past

Key messages

- In the coastal area of Accra, Ghana, fish catch has significantly decreased over the last two decades as average sea surface temperatures have steadily risen. For example, the catch of round sardinella, a climate-sensitive species, decreased by 75% between 1992 and 2010.
- Fishers are becoming highly indebted due to reduced fish catch, increasing risks and growing investment costs. With limited alternatives for livelihood, small scale fishers are highly vulnerable to the impacts of climate change. New livelihood options need to be identified and training will need to be provided.
- The end of the rainy season traditionally signals the start of the main fishing season, but this is becoming unpredictable due to variability in rainfall distribution patterns, increasing the risks of investment for fishers and exacerbating poverty and indebtedness.
- The Marine Fisheries Research Division (MFRD) and meteorological authorities should intensify data collection and monitoring activities, to improve forecasting about the onset and productivity of the fishing season, and should make this information available to fisherfolk.

and future changes in seasonal patterns for atmospheric temperature, rainfall, surface

temperature of seawater and fish catch. A mathematical model was then applied to use seawater temperature as an indicator of fish food availability.

Three fish species of commercial importance were studied, all of which have different sensitivities to atmospheric and seawater temperature changes. These include round sardinella, flat sardinella and anchovy. The research team also conducted interviews with a number of key stakeholders to seek their knowledge, perceptions and observations on changes in climate, impacts on fish catch and related activities, and existing coping strategies. Interviewed stakeholders include representatives from the National Canoe Fishermen Council, National Fisheries Association of Ghana (NAFAG), MFRD, fishermen and women working in fish preservation, processing and sales.



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In the coastal area of Accra small scale fishing is the dominant source of livelihood

- Fishers are losing income and falling into debt, due to reduced fish catch, rising investment costs, and increasing risk of lost investment. Alternative livelihoods are limited, making fishers more vulnerable to the negative impacts of climate on fisheries. In response, the National Canoe Fishermen Council plans to initiate a lending scheme to assist its members in ensuring that daily needs are met.
- Fish catch is strongly related to surface water and atmospheric temperatures; generally, the lower the temperatures, the higher the fish catch. This does vary somewhat across species, however: the catch for round sardinella peaks when sea water temperature is at its lowest, the catch for anchovy peaks when sea water temperature is at its highest during the main fishing season, yet no visible pattern has been observed between sea water

What did we learn?

- There has been a steady rise in atmospheric and sea water temperatures since the 1960s, with the latter increasing by an average of 0.011°C yearly.
- The main fishing season, which lasts for an average of three months, contributes up to 60% of total annual fish catch. Since the early 1990s, however, fish catch has been steadily declining. For instance, the annual catch of round sardinella has decreased by nearly 75% between the years 1992 and 2010.

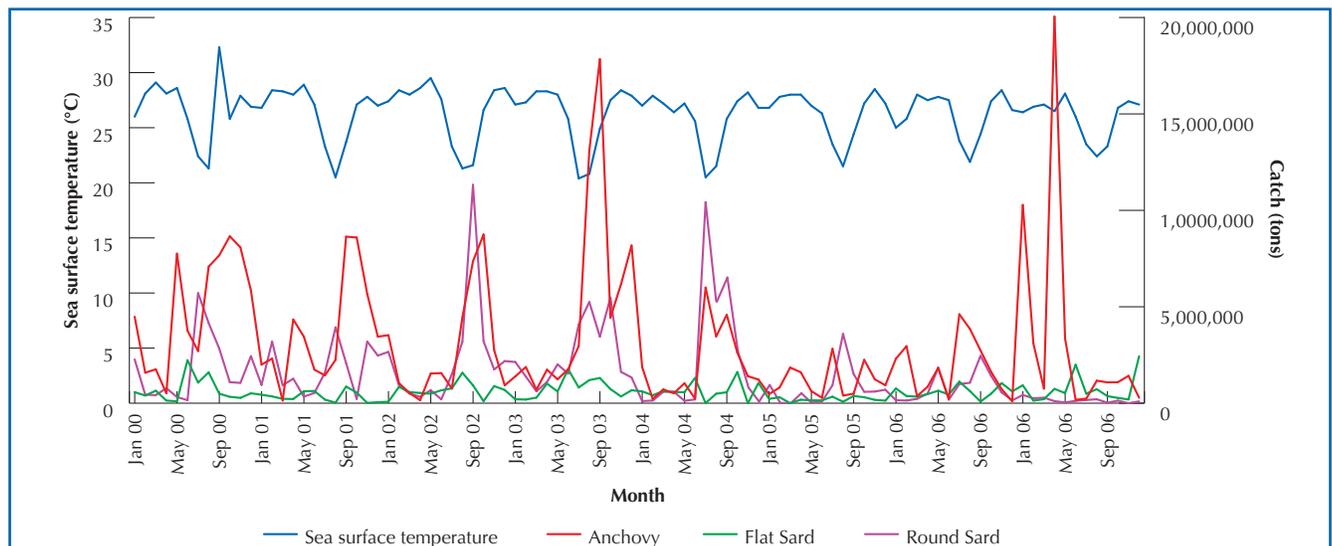


Figure 1: Fish catch generally peaks when the surface temperature of sea water is lowest during the fishing season (with the exception of some species, such as anchovy, for which the opposite occurs). This is indicative of the sensitivity of fish populations to climate change

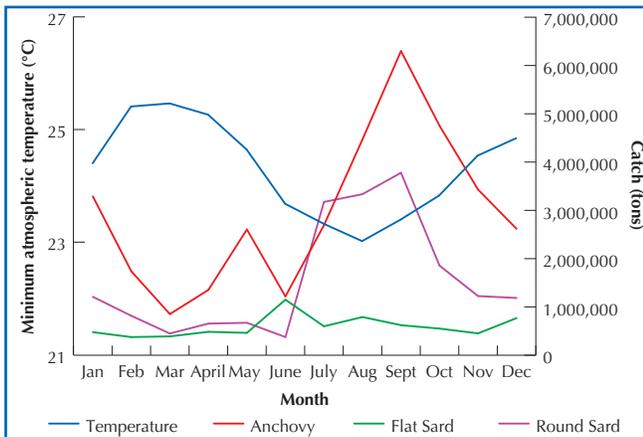


Figure 2: The catch for round sardinella and anchovy peaks when atmospheric temperature is lowest. It is not clear how temperature variation impacts the catch for flat sardinella.

temperature and catch for flat sardinella. Therefore, changing sea water temperatures is expected to impact the catch of these species differently.

- Fishers traditionally use the end of the rainy season to predict the start of the fishing season. However, increasing variability in rainfall patterns is making it difficult to forecast the onset and productivity of the fishing season.

Stories of change

The coastal community of Ussher Town in Accra is looking to minimize the impact of dwindling fish catch on livelihoods, drawing on the research findings from this project. The research team at the Regional Institute for Population Studies (RIPS) has been supporting the community through the construction of two fish smoking facilities, to improve fish preservation and secure better prices for fish during the off-season. This will improve incomes, especially for women, who are involved in the preservation portion of the value chain.

The Ussher Town Community Climate Change Club (UTCCC) has been created and includes over 150 community members. As a result of the club's activities, there is increased awareness of climate change impacts on fishing livelihoods and the need for community mobilization as a means to reduce the vulnerability of those who depend on fish. For instance, women who in the past worked individually from their homes have since started working together in a cooperative, which has a range of benefits.

Banks are now more willing to grant them loans, since repayment levels tend to be higher when individuals are subject to group pressure. The cooperative initiative also brings the benefits of a social network, helping the women to expand their businesses.

"It is not only about the loans. Getting fish from other places too is important and you need to make arrangements with fishermen in other places to get fish at a good price. Through the group connections we are able to purchase fish from other areas. Now that we are going to start using the fish smoking facilities that RIPS is constructing we will be able to preserve greater quantities of fish at a time and sell it over a longer period of time."

Awonye, Fishmonger, Ussher Town

What are the policy implications?

- The National Canoe Fishermen Association and the MFRD need to collaborate to sensitize and educate fishers about the impacts of climate change on small scale fisheries, and the need to reduce vulnerability by diversifying their livelihood base. Efforts should build on the fishers' knowledge to enable more accurate predictions about the start and productivity of the fishing season.
- Local governments should initiate programs to train fishers in alternative livelihoods, in order to reduce their dependence on small scale fisheries. This should be done in collaboration with relevant NGOs, government agencies and the private sector.
- The MFRD and the Meteorological Department should intensify data collection



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Fish catch in the study area has decreased significantly over the last 20 years

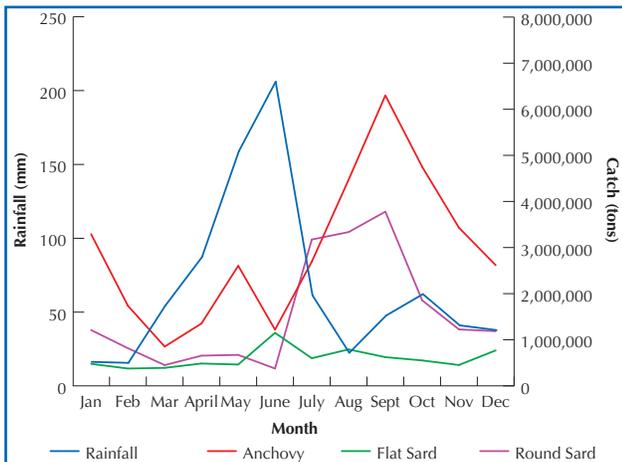


Figure 3: Fishers use the end of the rainy season as an indicator for the start of the fishing season. Variability in the timing of rainfall cessation has introduced uncertainty in fisher predictions.

and monitoring activities to enhance capacity for accurate forecasting and communication relating to the start and anticipated productivity of the fishing season.

What next?

- Additional research is needed to build understanding of the barriers limiting the adoption of alternative livelihoods by fisher communities. This would inform interventions and incentives that could help people reduce their dependence on small scale fisheries as a source of livelihood.

- There is a need to investigate community and scientific knowledge in order to develop indicators and strategies for monitoring, forecasting and communicating the start and productivity of fishing seasons. Improved forecasting will enable fishers to maximize their catch during the fishing season and reduce their risk of lost investment in the fishing business.
- Further studies are needed on the impacts of climate change on small scale fisheries in other coastal fishing areas, which have different circumstances and dynamics. This will inform broader policy frameworks to reduce the sensitivity of small scale fisheries to climate change at the national level.

Need more information?

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