

Vulnerability and adaptation to climate change for milkfish farming in the Philippines: Policy and institutional adaptation measures

Policy brief



Breakwater constructed to protect the coast from storm surge and encourage natural mangrove buffer.

Policy recommendations

- **MAKE THE PROVINCIAL DISASTER RISK REDUCTION MANAGEMENT COUNCIL (PDRRM) THE OVERALL COORDINATOR:** PDRRM is a multi-sectoral council with a legal mandate headed by the Governor as the chairperson. Hence it has the necessary legal and political mandate and should be given the coordinating role for implementing climate adaptation program at the province level. Climate change impacts on aquaculture should be strengthened within this initiative.
- **STRENGTHEN COASTAL SYSTEM AGAINST STORM SURGE AND SEA LEVEL RISE:** Storm surge hazard mapping should be conducted for the whole of Panay island, identifying the coastlines and fishpond lease agreements (FLAs) that are most vulnerable and high risk for aquaculture and milkfish farming.
- **IMPROVE EARLY WARNING AND WEATHER FORECASTING SYSTEMS:** This will help to increase farmers' preparedness and reduce losses. Although weather forecasting is already in place, there is a need to target the information to milkfish farmers.
- **CONDUCT TARGETED TRAINING OF TRAINERS AND FARMERS ON CLIMATE CHANGE ADAPTATION STRATEGIES:** Training the trainers can be done at the Climate Field School with funding from the Department of Agriculture. This should be followed by a targeted short/or long term training of caretakers and operators at the next level on climate change adaptation strategies. Replicating such schools in other province should be recommended.
- **FOLLOW AN ECOSYSTEM MANAGEMENT APPROACH AND SECURE FUNDS FOR "CLIMATE SMART AQUACULTURE":** Linking the ongoing Integrated Coastal Resources Management Plan ("Ridge to Reef") with climate adaptation should be made possible. Local government units should facilitate the inclusion of flood reduction measures during the planning of watershed and marine waters. Local government units should also develop ordinances regarding the clearing of rivers and estuary waterways and strengthen river banks.
- **SECURE CALAMITY FUNDING AND INSURANCE/OR SOFT LOANS FOR FARMERS:** Funds can be made available through the Department of Budget and Management and National Disaster Risk Reduction and Management Council; through the Philippine Crop Insurance Corporation; and via local government units. The Department of Agriculture, in conjunction with the Development Bank of the Philippines, Land bank of the Philippines can provide soft loans to small-scale farmers.
- **DEVELOP AN INVENTORY OF FISHPOND LEASE AGREEMENT ACROSS THE COUNTRY:** Such mapping will further help in identifying vulnerable areas and zoning for better planning. Although BFAR has the mandate to do the job, local government units can hasten the process. Logistics should be in place so that local government units can execute the work.
- **INCREASE WOMEN'S PARTICIPATION IN FUTURE ADAPTATION MEASURES:** It is recommended that the role of women should be increased, especially in implementing adaptation measures. One of the initiatives that were undertaken by the Provincial Government is the implementation of the "Great Women", programme, wherein it is required that in all trainings undertaken by the different departments, participation of women should be highlighted.



Milkfish and climate change

This brief summarises the results from the interdisciplinary study conducted within the Aquaclimate project in Iloilo province in the Philippines looking at the impacts of climate change on small scale milkfish farming. The brief provides guidelines for adaptation and policy development to address the climate change impacts on small scale milkfish farming in the Philippines and how adaptation measures should be implemented in the region.

Significance of Milkfish farming

The milkfish farming industry in the Philippines and specifically in Iloilo is a significant industry and a substantial source of livelihoods. In 2009 national production was around 220,000 tonnes of which 76,000 tonnes was produced in Region VI. The industry is however facing challenges such as a 4,982 hectare reduction in production area, rising cost of inputs, climatic changes such as sea level rise and natural disasters, which cause stock loss and destruction of farms.

Milkfish farmers in the Philippines generally operate in brackish water ponds at the extreme coastal fringe and are reliant on natural resources including wild caught fry. The majority operate ecosystem-based aquaculture, relying on natural pond productivity to feed the fish, which is greatly influenced by the prevailing weather conditions.

The case study sites chosen were two municipalities located in Iloilo, namely the municipalities of Dumangas and Barotac Nuevo. These municipalities have the highest production of farmed milkfish from brackishwater ponds. Milkfish production in Iloilo province in 2008 was 18,956 tonnes from 11,579 hectares of culture area, of this about 4,500 ha were within Dumangas municipality and 1,799 ha within Barotac Nuevo municipality. In the recent years, typhoons, tidal surge, river flooding and seasonal changes have adversely affected the cropping season, production and wild fry collection.

Farmers from Fishpond Lease Agreement (FLA) farms were selected as the target segment for the study. FLA holders generally have extensive milkfish farms of less than 25 ha and can be considered as small-scale farmers. FLAs are lease agreements over coastal government land for the purpose of fish pond development. FLA entitles the holder certain rights but also comes with certain obligations. FLA entitlements include ability to develop fish ponds and undertake aquaculture activities. FLA obligations include establishing and or maintaining a mangrove buffer zone between the fish ponds and the ocean.

Impacts of climate change on milkfish farming

The analysis of the CSIRO climate model for Scenario A2 predict that the predicted mean monthly rainfall on the milkfish farm areas and in the watershed (river flow) are given in the figure below.

The potential consequences of this change in rainfall pattern are that there will be greater river flow in July leading to greater severity of flooding over a larger area than the present time.

The model predicts that the minimum monthly mean temperature for Barotac Nuevo and Dumangas in 2020 will increase by 0.75°C in January and from July to November; and that there will be an increase in 1.2°C in May and December.

Predictions for 2050 are that there will be an increase in minimum mean monthly temperatures of 1 to 1.5°C in January and from July to November; and there will be an increase of 2°C in May and December.

The consequence for milkfish pond culture should be positive as higher minimum pond water temperatures will improve growth rate, food conversion ratio and pond productivity during the colder seasons. The difference in minimum average monthly water temperature will be relatively consistent, however the increase above 2000 temperatures will vary monthly, with higher than average temperatures in May, June and December and lower than average temperatures in February and March.

The AquaClimate Project is a three year initiative to strengthen the adaptive capacities of rural farming communities to the impacts of climate change. The project focuses on small-scale aquaculture in Vietnam, the Philippines, India and Sri Lanka. This brief provides a summary of the project's work with milkfish farmers in the Barotac Nuevo and Dumangas areas. It highlights the policy implications, research agenda and on farm adaptations that will be required to sustain the industry and its contribution to the livelihoods of poor farmers and food security. The project was coordinated by the Network of Aquaculture Centres in Asia-Pacific and funded by the Ministry of Foreign Affairs, Norway, through the Royal Norwegian Embassy, Bangkok, Thailand. The project was undertaken by international partners Bioforsk, Norway, Akvaplan-niva Norway, Kasetsart University, Thailand, in conjunction with the Bureau of Fisheries and Aquatic Resources Central Office and Region VI, Philippines.

Figure 1. Predicted variations in minimum mean monthly temperature for 2020 and 2050.

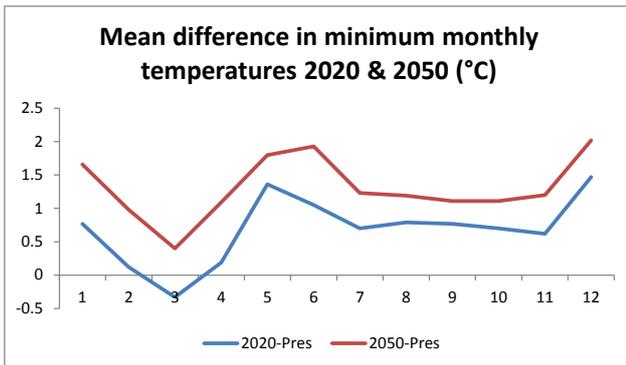
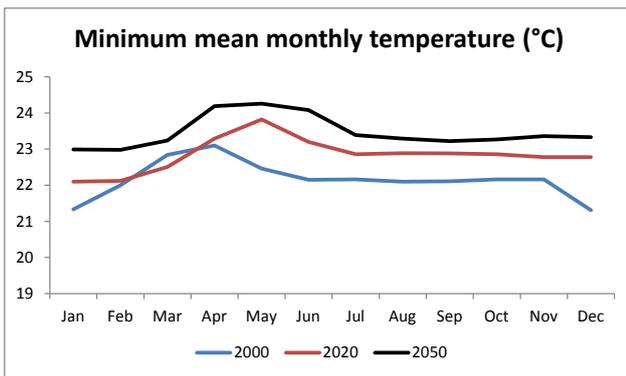
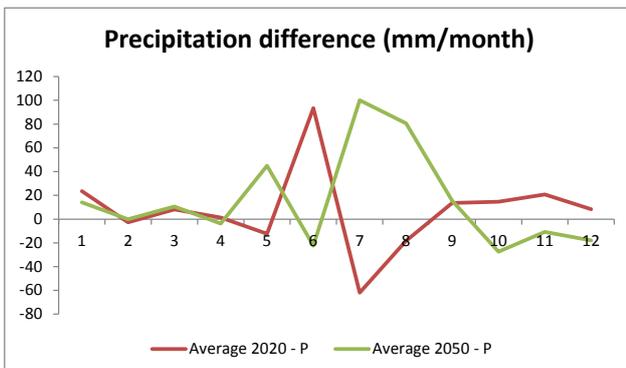
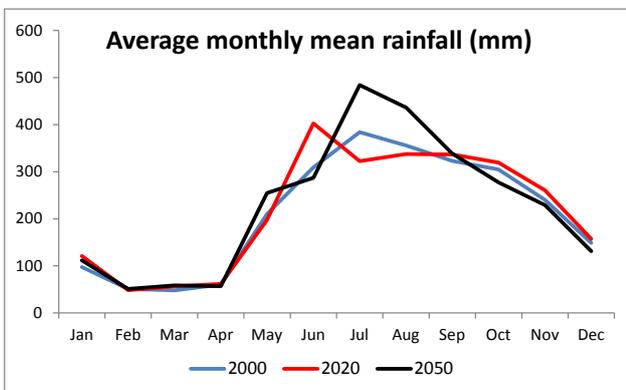


Figure 2. Predicted variations in mean monthly rainfall on the ponds and watershed 2020 & 2050.



Policy measures

Make the Provincial Disaster Risk Reduction Management Council the overall coordinator

Climate change and impacts cuts across national, provincial and sectoral boundaries. Being an island country, the Philippines is one of most vulnerable countries to climate change in the region. Climate predictions and impact assessment are currently done by different departments. At the provincial level, the various sectors such as aquaculture act independently, with some exceptions. In fact, aquaculture is not eligible for benefits under many ongoing climate adaptation programs. The government should try to integrate the needs of various sectors while planning and implementing the climate adaptation programs in the future.

PDRRM is a multi-sectoral council with a legal mandate headed by the Governor of the province as the chairperson. Hence it has the necessary legal and political mandate for integrating and implementation of the programs at the provincial and barangay level. In case of Philippines, there will be no need for creating a new body for implementing the climate adaptation measures at the provincial level. PDRRM should be strengthened with technical support from various departments to carry out the implementation of adaptation measures. Climate change impacts on aquaculture should be strengthened within this initiative. Such a single body with an overall coordinating role will result in more effective use of funds from different development and adaptation programs and avoid duplication of efforts by different government departments. PDRRM also gets funding from the Internal Revenue Allotment IRA.

The BFAR initiative for Disaster Risk Reduction Management Training and the BFAR Disaster Task Force should be strengthened and more closely coordinated with the PDRRM.

Strengthen coastal system against storm surge and sea level rise

Strengthening the coast can be done through several measures including storm surge hazard mapping, mangrove rehabilitation and transplanting coral reefs.

Storm surge hazard mapping should be done by the National Mapping and Resource Information Authority (NAMRIA) covering the whole island to identify the coastlines that are most vulnerable and at high risk. Aquaculture should not be permitted in such highly vulnerable areas. Local government units from six municipalities have already asked to prepare a comprehensive coastal management plan. This should be extended to other local government units.

Mangrove rehabilitation can be integrated in the management plan. Mangroves have a significant potential to act as a protective barriers against storm surge. The benefits of mangrove belts have already been seen in areas where they have established. A Joint Administrative Order Series 1, 2008 prepared by the Department of Interior and Local Government, Department of Environment and Natural Resources and BFAR is already in place for the cancellation of fishpond leases that were abandoned and to be reverted into mangrove areas.

Coral reefs can protect against tidal surges. Following experiences from initiatives in other municipalities wherein transplanting of corals has been taken up to repopulate barren areas, coral plantation should be taken up wherever possible. However, there is a need to build capacity of the local agencies on how to do it and where to place them to prevent the misuse and mishandling of corals. The policy should also address the protection of other vital ecosystems such as mangroves and seagrasses. The Philippines Fisheries Code (Republic Act 8550) specifies policies on protection and proper management of these systems.

In addition there should be mapping and an inventory of the Fishpond Lease Agreements along the coast with identification of those that are most vulnerable to coastal erosion and storm surge.

Improve early warning and weather forecasting systems

This will help to increase farmers' preparedness, reduce losses and optimise investments by farmers. Although weather forecasting is already in place, there is a need to improve the system.

Improved forecasting by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and other scientific agencies and dissemination of this information to farmers at local government unit level is required. Investment in forecasting equipment is necessary for better predictions (temperature, precipitation, storms and typhoons) and interpretation of this data for the different aquaculture sectors especially milkfish pond production should be improved. Capacity building in these issues is required for the PAGASA, the government agency mandated to provide weather, flood, climate and astronomical products and services.

Collaboration between PAGASA and local government units on information dissemination should be improved. In this way, dissemination of information and preparedness will be faster, using methods such as radio stations, texting and other means. This is an on-going initiative and should be in place within three years.

Currently, in Iloilo Province, the Agromet station located at the Climate Field School gives daily, three-day, and five-day forecasting to the Office of the Mayor,

Municipal Agricultural Office and Disaster Risk Reduction Management (DRRM) in Dumangas. This information is then sent to the barangay captains and the results should be posted in the barangay hall where the farmers can visit and see.

Train the trainers and farmers/care takers/ operators at the Climate Field School

At the national level, the Philippine Network on Climate Change (PNCC) was established to enhance the capacity of civil society organisations and local communities, particularly the marginalized sectors, by mainstreaming and integrating climate change into the development process geared towards alleviating poverty, the fulfillment of climate justice, and attaining sustainable development. So far the network has not involved much in the milkfish sector or aquaculture. It can contribute to improving adaptive capacity of milkfish farmers.

Training has been mentioned by many farmers and stakeholders as a measure that should be supported by policy and regular funding. It may not need much funding, but if properly planned and implemented can make a significant difference in improving farmer's adaptive capacity.

Training of technicians/trainers on climate change adaptation strategies is required through a week/two week day training modules that should include climate scenario interpretation, impact assessment methods, developing future scenarios and adaptation plans. Funding support should be sought from the Department of Agriculture.

At the next level, training of caretakers and operators on climate change adaptation strategies, through short and long term courses on preparedness against extreme events, new farming systems and climate smart aquaculture practices targeted towards milkfish farmers should be conducted. This can improve farmer's adaptive capacity with new knowledge on adaptation measures.

The local government in Iloilo sees the need to strengthen the infrastructure/ capacity of the Climate Field School and train more people to be able to replicate these initiatives.

Follow an ecosystem management approach and secure funds for "climate smart aquaculture"

This policy will help in integrating the ongoing measures that are scattered and address the climate change impacts through an ecosystem approach. This approach should be developed, adapted and/or simplified for the various aquaculture sectors.

The first step will be to link the ongoing Integrated Coastal Resources Management Plan ("Ridge to Reef") with climate adaptation efforts. Needed funding can be

accessed from the Department of Science and Technology and Department of Agriculture.

At the next level, local government units should facilitate the inclusion of flood reduction measures during the planning of watershed and marine waters, develop ordinances regarding the clearing of rivers and estuary waterways and strengthen river banks and facilitate upland reforestation to reduce the run-off into the river system.

The National Mapping and Resource Information Authority and the Department of Public Works and Highways should undertake a study identifying flooding risks, using vulnerable sectors and predicted future climate change as a basis.

Secure calamity funding and crop insurance and/or soft loans for farmers

Aquaculture is prone to various risks due to production, weather, technological and market uncertainties. Losses arising out of these risks have to be mostly borne by farmers. The majority of milkfish farmers operate on a small scale and often find it difficult to adjust to uncertainties, especially the risks from extreme weather events and variability in climate, in the absence of calamity funds and insurance to cover damage. In recent years, weather based crop insurance for agricultural crops is becoming popular in many countries to protect farmers against climate risks and losses in crop yields resulting from adverse weather events. Farmers' willingness and interest in crop insurance can be seen as risk adjusted management input in aquaculture production.

Funds can be made available through the Department of Budget and Management and the National Disaster Risk Reduction and Management Council; through the Philippine Crop Insurance Corporation and local government units. The Department of Agriculture, in conjunction with the Development Bank of the Philippines and Land Bank of the Philippines can provide soft loans to small-scale farmers. This will provide the small-scale farmers disposable funds to invest on risk aversion measures and protect from the impacts of climate change.

In the first scheme, the Department of Agriculture should request the Department of Budget and Management and the National Disaster Risk Reduction and Management Council to include fish farms under the calamity compensation scheme. The calamity funds should cover the relief, rehabilitation, reconstruction and other work or services. There is a need to investigate calamity insurance specific for climate change extreme events. Both strategies may take one to three years to implement.

National Government Payment Scheme: The Philippine Crop Insurance Corporation is a government institution mandated to offer insurance to fish farmers against

losses from unharnessed stocks in fish farms incurred by natural calamities and fortuitous events. The access for the insurance is voluntary; hence all farmers engaged in aquaculture are not automatically covered. Awareness amongst the farmers of the need to have this insurance should be created.

Local Government Payment Scheme: The local government unit can allocate funds that will shoulder the insurance premium payments in behalf of the farmers. Farmers should pay back after the harvest season. In case farmers will not be able to pay due to losses incurred by the natural calamities, the insurance will compensate and cover repayment to local government units. This strategy is already being practiced at agricultural sector in the Iloilo province. It can be adapted and replicated at the aquaculture sector.

The Agricultural Guarantee Fund created under R.A. No. 6390 has been developed with PhP 100,000,000 for aquaculture. This should be expanded.

Mapping and inventory of Fishpond Lease Agreement (FLA)

This will provide a good picture of the situation and farm location and vulnerability. Such mapping will further help improve planning. Although BFAR has the mandate to do the job, local government units can hasten the process. Logistics should be in place so that local government units can execute the work.

Inventory and mapping of Fishpond Lease Agreement- a country-wide inventory was proposed to be done. Although Bureau of Fisheries and Aquatic Resources (BFAR) has the mandate to do the job, the LGU can also help to hasten the process. However, logistics should be in place so that LGUs can execute the work. A policy ensuring the tenure of the staff that will be hired is needed, as not all LGUs have enough manpower to do the job.

Enhance women's participation in future adaptation measures

Although their participation is already seen, it is recommended that their role should be increased, especially in areas of climate change adaptation. Some of the initiatives that were undertaken by the Provincial Government is the implementation of "Great Women", program, wherein it is required that in all trainings undertaken by the different departments, participation of women should be highlighted. Training courses should be developed specifically for women to improve skills in processing and developing alternative livelihoods.

Another area where women's involvement could be encouraged is in mangrove rehabilitation. The Zoological Society of London, an NGO working in Iloilo is involving women to monitor and plant mangroves.

Summary of recommendations for key stakeholders

Stakeholder group	Recommendations
Bureau of Fisheries and Aquatic Resources	<ul style="list-style-type: none"> To be the lead agency that will be responsible in identifying abandoned Fishpond Lease Agreements (FLAs). Conversion of these abandoned FLAs into mangrove areas should be done in collaboration with the Department of Environment and Natural Resources, with assistance from an NGO. It will take 3 to 5 years to start up the process. On-going enforcement of a buffer zone among FLA areas that are designated for mangrove replanting; review the existing policy on 50m buffer zone designated as mangrove areas. To be responsible for providing the incentives.
Department of Environment and Natural Resources	<ul style="list-style-type: none"> To plan and coordinate mangrove replanting schemes (2-5 years) together with relevant agencies. Lead agency from the Department of Environment and Natural Resources should be the Coastal and Marine Management Office. To continue the on-going initiatives on monitoring the status of mangroves using satellite imagery and GIS in collaboration with the National Mapping and Resource Information Authority (NAMRIA). To draft and issue a legislation on the establishment of a mangrove belt within 5 years. To encourage local government units to prepare a forest land use plan. To be responsible for securing funding support.
Local government units	<ul style="list-style-type: none"> Local government units in conjunction with local NAMRIA should be responsible for monitoring the mangrove replanting activities and send feedback to central government.
NGOs and women's groups	<ul style="list-style-type: none"> Implementation of coastal management plans/mangroves/coral plantations/ training programmes.
Banks and insurance companies	<ul style="list-style-type: none"> To implement crop insurance policies.
Provincial Disaster Risk Reduction Management Council	<ul style="list-style-type: none"> Provincial Disaster Risk Reduction Management Council to be responsible for overall implementation of climate adaptation measures.

