

# Vulnerability and adaptation to climate change for catfish farmers in the Mekong Delta: Adaptation measures for small-scale farmers

Technical brief





**IMPROVE WATER EXCHANGE AND WATER QUALITY MANAGEMENT IN CATFISH PONDS:** Good water quality is an important factor for fish growth and management of pond water is essential to maintain water quality within suitable parameters for effective catfish growth. Changes in water exchange practice will help improve the growth rate of fish and mitigate negative impacts of climate change.

**IMPROVE SEDIMENT MANAGEMENT:** Effective management of sediment can reduce water turbidity in catfish ponds and improve water quality stability. Establishing a strategy for sediment management through use of a sedimentation pond can improve catfish growth and reduce environmental impacts by retaining the sludge on site, where it may be collected for use as agricultural fertiliser.

**SELECT GOOD QUALITY SEED:** Seed quality is an important factor leading to successful farming and selection good quality of seed will be increasingly important as climate change impacts place catfish under additional environmental stress. Selection of quality seed needs to be conducted by both farmers and local authorities have a role to play in seed quality control.

**USE GOOD QUALITY FEED AND FEED MANAGEMENT PRACTICES:** Feed quality and feeding management are the two key factors in aquaculture, especially in the catfish farming industry. Farmers need to ensure they select high quality feed and carefully control their feeding practices to ensure good growth and health of catfish. Provincial managers and scientists also have a role to play in helping farmers to optimise their feeding practices.

**STRENGTHENING POND DYKE:** Strengthening pond dykes can help to prevent fish escape during floods and typhoons and can reduce damage to infrastructure by such events.



*Discussing perceptions of climate change impacts with catfish farmers.*

# Catfish farming and climate change

Viet Nam is one of world's top five most vulnerable countries to sea level rise and the area most vulnerable to climate change impacts is the Mekong Delta. Mapping impacts and vulnerability, devising adaptation strategies at the national and local levels and strengthening the capacity of rural farming communities to manage the impacts of climate change are now a matter of urgency. This is more relevant for vulnerable sectors such as aquaculture that provide employment to a large number of small scale farmers and poor households.

## Significance of Catfish farming

A major part of Viet Nam's aquaculture production, both for domestic and export markets is the striped catfish known locally as "ca tra". In 2011 total production reached 1.35 million tonnes from a production area of 5,430 ha. Approximately 660,000 tonnes of catfish were exported, generating foreign exchange of US\$ 1.427 billion (VASEP, 2011, D-Fish, 2012).

Catfish farming involves a diversity of stakeholders including farm owners, caretakers, processing plants (where women are > 70% of the work force), traders, seed and feed sellers and middlemen. An Giang is the most important catfish farming province in the Mekong delta with about 5,000 households involved, followed by Dong Thap and other delta provinces.

It is estimated that about 30-40,000 poor landless people are directly working in catfish farming at various levels, in addition to people involved indirectly. On an average, each hired labourer working on fish cages and ponds earns about VND 550,000-650,000 per month. Catfish also contributes as a source of protein to the local communities. Given this dependency, it is important to improve the adaptive capacity of the people involved in the sector.

## Impact of climate change on catfish farming

Farmers have already observed a number of climate related changes:

- Increasingly variable weather patterns.
- Higher river and canal water levels and more frequent floods.
- Rainy season starting earlier.
- Increasing salt water intrusion.
- Increase in the number of hot days and longer hot seasons.

- Increase in the number of cold days.
- Increasing incidence of sudden heavy rain.
- Increasing incidence of storms and typhoons.

## Rainfall in the Mekong river catchment and river flow

The predicted monthly precipitation in the Mekong River catchment area is predicted to be fairly similar between the present and 2020.

However, peak rainfall is predicted to be 10% higher in the month of August meaning that at peak river flow, 10% additional water may be passing down the river. This together with the increasing sea level will increase the risk of floods. However, the Mekong is already heavily dammed, with many more dams planned and under construction.

Peak river flow may therefore be controlled by 2050 resulting in less flooding than predicted but with slight increase in the case study provinces.

## Temperature

The average monthly maximum temperature is predicted to rise with time. It is predicted that average monthly maximum temperatures will increase by 0.7°C by 2020 and 1.32°C by 2050 and that present maximum monthly temperatures will be the same temperature or more for 2.5 months (March to May).

The peak maximum temperatures are predicted to increase in April. It is predicted that average monthly maximum temperatures will increase by 0.83°C by 2020 and 1.33°C by 2050. The peak monthly temperatures will be 1°C higher (35°C) in 2020 and 2°C higher (36°C) in 2050.

This could cause thermal stress for catfish at peak maximum temperatures as well as low water oxygen levels and possible impact to pond productivity.

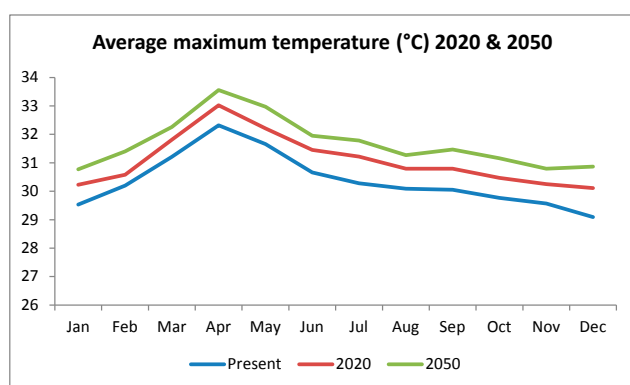
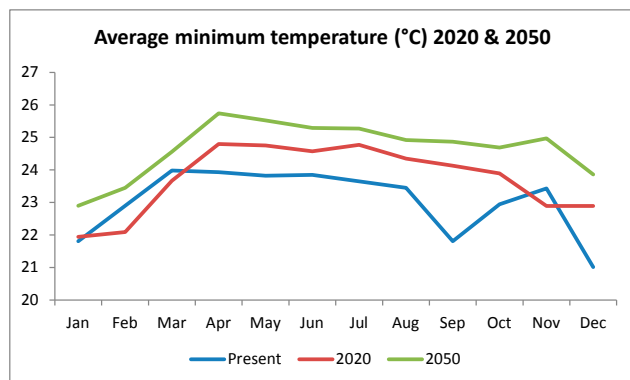
The average monthly minimum temperature is also predicted to rise. Catfish may benefit from warmer temperatures between June and January leading to improved growth rate, improved pond productivity and reduced white spot disease outbreaks.

## Rainfall in case study areas

The rainfall at the case study provinces is predicted to be very similar to present levels in 2020 and 2050. Although



no significant change is expected in terms of total rainfall and seasonality of rainfall, the IPCC (2007) predicted that when rainfall occurs it will be heavier i.e. there will be stronger downpours of rain.



## Sea level rise

Sea level is predicted to rise with time. If the observed sea level rise continues at the present rate then sea level could be 2cm higher in 2020 and 10 cm higher in 2050.

This in conjunction with increased storms will mean stronger and more frequent storm surges and seawater flooding of farms close to the coast and in low lying areas.

Increasing sea level rise will also result in increased saltwater intrusion into the Mekong river delta area with increasing salinity December to March and increasing salinity deeper into the delta, reducing the availability of suitable areas for catfish farming.

**The Aquaculture 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 Viet Nam, the Philippines, India and Sri Lanka. This brief provides a summary of the project's work with catfish farmers in the Mekong Delta. 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 is 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, the Department of Aquaculture, Can Tho University and Research Institute for Aquaculture No. 2, Ho Chi Minh City, Viet Nam.

## Catfish farm adaptation measures

### Improve water exchange and water quality management in catfish ponds

Good water quality is an important factor for fish growth rate and pond production and effective water quality management is essential to maintain environmental parameters within a range suitable for good growth and health of fish. Improving water exchange and water quality management practices will help improve the growth rate of fish and mitigate the negative impacts of climate change.

Although most catfish farms are located in the lower Mekong River where water is abundant and generally of good quality, climate change impacts such as prolonged hot, sudden rain, fluctuations in temperature and water quality can affect catfish health, growth rate and flesh quality. Improving water exchange practices and effective water quality management is a key means that farmers can use to mitigate negative impacts of climate change.

### Improve sediment management

Set up practical management of sediment is a technical item that reduces water turbidity in catfish ponds and more water quality stability.

The current status of water in the low Mekong River is high turbidity which are natural stream and other impacts by several activities of sectors. In addition, climate change impacts consisting of heavy and irregular rain, run off and strong wind lead to higher turbidity in water inlet and poorer water quality in catfish ponds. Therefore, setting up a strategy for sediment management through a sedimentation pond in catfish farm shall be useful for not only catfish growth, but also valuable for surrounding environment by storage sludge from catfish ponds. This could be done by farmers in short term to cope with climate change.

### Selecting good quality seed

Seed quality is an important factor leading to successful farming and selection good quality of seed becomes to more important under climate change impacts.

At present, production and availability of Pangsius seed are abundant and enough meeting the requirement for farming in the Mekong Delta. However, the requirement of seed quality is higher and higher, especially stronger

tolerance in environmental and climate changes. Prolonger hot, sudden and heavy rain, irregular weather pattern, etc impact directly and indirectly on fish behavior and health such as stress, stop feeding, diseases and low yield. This leads to impact on farmer livelihood unsustainable production for export. Thus, better seed quality selection need to be done by farmers as well as seed quality control by local authority for longer term development of the catfish industry in the Mekong Delta and adaptation climate changes condition.

### Good quality feed and feeding management

Feed quality and feeding management are the two key factors in aquaculture, especially catfish culture industry.

Intensive catfish culture in the Mekong Delta has been well known due to supper high stocking density and yield in the world. The quality of feed (nutrients) can support fish grow faster, more healthy and avoid stresses

by environmental changes, particularly climate changes such as irregular weather changes, water temperature fluctuation, water quality variation, etc. which affect fish feeding behavior and health such as stop feeding, stress, disease, higher mortality, low yield and less income. Thus, better feed quality and feeding management practice need to be implemented by farmers and also controlled by provincial managers as well as advised by scientist in order to adapt with current climate change impacts and improve catfish production.

### Strengthen pond dykes

Catfish farming in the lower Mekong River has been affected by floods and typhoon which leads to lost production and income. Fish can escape from ponds if the dykes are of poor construction, particularly in areas vulnerable to flooding such as An Giang and Dong Thap. Increasing the height and strength of dykes can reduce the risk of damage and stock loss during these events.

## Summary of recommendations for key stakeholders

Stakeholder group	Recommendations
Farmers	<ul style="list-style-type: none"> <li>• Improve water exchange and water quality management practices.</li> <li>• Improve sediment management.</li> <li>• Select good quality seed.</li> <li>• Use good quality feed and feed management practices.</li> </ul>
Department of Agriculture and Rural Development	<ul style="list-style-type: none"> <li>• Improve aquaculture planning and zoning, particularly for catfish aquaculture.</li> </ul>
Department of Irrigation	<ul style="list-style-type: none"> <li>• Improve the irrigation canal system to improve the freshwater supply to farms.</li> </ul>
Department of Natural Resources and Environment	<ul style="list-style-type: none"> <li>• Establish forecast and monitoring system for river level rise and floods, including early warning broadcast system by TV stations.</li> </ul>
Department of Natural Resources and Environment  Department of Agriculture and Rural Development  Provincial Institutes of Irrigation	<ul style="list-style-type: none"> <li>• Maintain and strengthen the main river and canal dykes need to be maintained and strengthened.</li> </ul>
Universities and and research institutions	<ul style="list-style-type: none"> <li>• There needs to be research to select salt and higher environmental change tolerance catfish strain needs to be implemented by University and Research Institutes.</li> <li>• Scientist and technology research institutions should research and develop fry and fingerling free of disease seed, disease diagnosis and treatment, vaccines against the major diseases, as well as improving quality of fingerlings.</li> </ul>

Surveying catfish farm management practices in the Mekong Delta

