

Session IV – Reducing the Mekong Delta’s Climate Change Vulnerability Through Regional Cooperation and Local Adaptations
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Potential Effects of Dams, Dikes and Sea Level Rise on Agriculture and Aquaculture and Local Adaptations to Hydrological Changes in the Lower Mekong River Delta

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Abstract

This paper is threefold. Firstly, it reviews dam development in the Lower Mekong River Delta and its potential impacts on water flow in downstream river systems and agriculture and aquaculture development in the region. Secondly, recent dike and weir construction in the Mekong River Delta of Vietnam, which alters hydrologic conditions and creates new risks to new areas without previous flooding, is presented. In addition, potential flooding arising from sea level rise would affect a total of three-rice cropping areas of the delta. Finally, the paper will provide local adaptations to the change in local flood regime in the MRD. Using several flood-based aquaculture and agriculture activities, local farmers can adapt well to floods by exploiting the benefits of floods. The presentation’s key message will be that potential consequences of dam development in the LMRB and in the MRD itself, in linkage with potential sea level rise, creates a need for understanding those pressures on agriculture and aquaculture development in the region. These altered regimes at least will have implications for productivity. A call for adaptations to the hydrological changes is essential to reduce the possible welfare losses arising from those pressures but also exploit the opportunity that the floods bring to us. Life in the delta is greatly affected by the floods, rising and falling tides, and saline water intrusion from the sea and potential consequences of dam development in the Lower Mekong Delta Basin (LMRB) as well as the dike development in the Vietnamese’s MRD. Water has always had two-sided effects in the delta. On one hand, the Mekong alluvium-rich waters bring many benefits to the area, such as soil fertility and agricultural and aquaculture productivity. On the other hand, the delta has been exposed to permanent threat of water disasters in the form of increased frequency of high floods in the wet season and water scarcity and saline intrusion in the dry season as a result of potential rising in sea level arising from climate change.

The Vietnamese’s Mekong River Delta (MRD) is the major agriculture and aquaculture production zone in Vietnam. Rice is the main agricultural crop in the region which amounts to 18.1 million tones of paddy, accounting for 50 percent of total paddy production in Vietnam (GSOV 2006). Besides rice, aquaculture is the second most

important product in the Delta. Statistics shows that approximately 2 million tons of aquaculture products were produced in 2006 (GSOV 2006), of which, shrimp production was estimated about 287.1 thousand tones in 2006 (GSOV 2006) and pangasius farming is an emerging industry in the region.

It is known that floods wash away polluted acid water and bring alluvium-rich fresh water and fertile sediment to replenish the soil for agriculture and aquaculture development in the delta. The delta comprises 4 million ha, of those 41% (1.6 million ha) are acid sulphate soil, so floodwater plays an important function for cleaning acid in soil. However, recent development of dams in LMRB, in linkage with the dike and weir development in the Vietnamese's MRD itself and sea level rise, has potentially altered the hydrological conditions and brings new risks to existing agriculture and aquaculture production zones in the region. A large number of engineering structures primarily dykes and weirs have been built in the delta in recent years and are still being built, mainly to control floods and saltwater intrusion. Hoa et al. (2006) suggests that the engineering structures in the delta increase the flow velocities in the rivers and canals, increasing bank erosion, and cause the water to be deeper in the rivers and canals. Nha et al. (2006) found that rice productivity has declined in the *ad hoc* high dike areas without floodwaters for 6 years in An Giang province due to soil degradation.

Local adaptations to hydrological change

Due to the change in local flood regime, local people have adapted several flood-based farming practices that exploited the natural benefits from floods but also adjusted to the local flood regime. Since 2001, several flood-based farming practices have been introduced by local farmers and governments in An Giang province. Those farming practices contribute significantly to rural households' income. Rice farmers, for example, cannot only grow two rice crops per year but can grow flood-based vegetables (water-caltrops, neptunia), mushroom, culture snake head fish, eels in plastic bags in the front yards and fresh water prawn in net fences on rice fields using local knowledge. Prawn farmers could gain a net benefit from 22 to 44 VND million per ha which was as much as three times higher than that of one rice crop. Small scale snake head fish and eel farmers gained a highly positive net benefit. The net benefit of lotus and water caltrops were ranged from 10 to 12 VND million per ha which were twice higher than that of a rice crop. Mushroom producing also provided a net return of 560,000 VND/100 m². In addition to economic benefits, those flood-based farming and services have been providing jobs for local people during the six months of flooding. There were 406,937 jobs created during the flood 2005, of which 47,000 jobs are based on flood-based services in An Giang province. Floods have brought many social benefits as well as its economic one.

Future threats

The rising sea level arising from climate change could add a new risk of water disaster in the region. As predicted by the Intergovernmental Panel on Climate Change, sea level could rise to 100 cm in this century, so the MRD will be negatively affected. In particular, the predicted impacts of climate change and sea level rise would negatively

affect the productivity of the three rice cropping pattern of the delta. As Wassaman et al. (2004) predicted, if sea level rises to 20 cm the average increment in water levels in the Delta would be 14.1 cm at the onset of the flood season in August. Therefore, all three cultivated rice croppings in the delta will be negatively affected. The change in water flow due to dams and water quality due to dikes and sea level rise would potentially affect pangasisus farmers as well as the agricultural system in the region.

Needs for adaptations

- Agriculture
 - Crop adaptation
 - New varieties/new farming systems
 - Economical use of water
 - More adaptive water management
 - Education: Raising awareness for local people toward adaptations to climate change

- Aquaculture
 - Enhancing local capacities to predict and adapt the possible consequences of climate change, dams on aquaculture system