

# Breaching dykes in the Mekong Delta

Agriculture in the Mekong Delta is poised on the brink of a revolution. In order to cope with salinization and climate change, dykes are going to have to be broken down and farming and freshwater fisheries replaced by shrimp farming. This transition is based on a Dutch Delta Plan.

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After 1975, Vietnam became the world's second biggest exporter of rice. Shrimp farming grew up a few decades later, in response to salinization.

On the top floor of the education building at Can Tho University, 10 small groups of provincial civil servants and students are bent over a map with stickers. Players throw a dice and confer eagerly about how best to develop shrimp farming. I am a guest at the first trial of a new game called Good Shrimp Farming. The aim of the game is to raise players' awareness of the options and the dilemmas involved in developing the delta. Shrimp farming here in the south of Vietnam has grown rapidly in recent decades, but is now coming up against environmental limits. The purpose of the game, developed by Can Tho University and Wageningen University & Research, is to help provincial governments and farmers develop new policy.

### ALWAYS FLOODED

The Mekong Delta is just as big and just as flat as the Netherlands, and its population is about the same. But the 4900 kilometre-long Mekong, which rises on the Tibetan plateau, brings a lot more water down with it than the Rhine does to the Netherlands. In the rainy season, the upper reaches of the delta, near the border

with Cambodia, are always flooded. Just like the Netherlands, the Mekong Delta has seen a spectacular development of its agriculture. From 1975, after the Vietnam War, the region was developed with help from Wageningen (see inset). Soil improvement and irrigation meant farmers could go from one harvest a year to three. Vietnam also started importing improved high-yield rice varieties. This enabled farmers to earn more, put an end to famine and made Vietnam the biggest rice exporter after Thailand, explains Dang Kieu Nhan, director of the Mekong Delta Development Research Institute in Can Tho. A Wageningen PhD holder, he is joining in the shrimp-farming game today. By 2000, Vietnam enjoyed food security but two problems were looming, explains Nhan. Export prices for rice were low, so farmers were not earning much in spite of farming more and more intensively. And salt water was infiltrating the coastal region of the Mekong. This salinization was affecting the rice crop, so the Vietnam government opted for diversification. Shrimp farming was established along the coast, while farmers further inland started combining rice farming with freshwater

aquaculture, mostly farming tilapia. Thanks to this development, which WUR researcher Roel Bosma assisted with, Vietnam has grown into a significant exporter of shrimps and tilapia. Bosma helped develop the Good Shrimp Farming game, and he too is present at its trial run in Can Tho.

### ENVIRONMENTAL LIMITS

There is every reason to play this game, says Nhan, as the agricultural sector in Vietnam faces another transition. Intensive export agriculture is coming up against environmental limits such as pollution with pesticides, and falling biodiversity and soil fertility. It has got to give way to a more environmentally friendly way of farming that keeps an eye on food quality and consumer demand while addressing the issue of climate change.

The blueprint for this transition is outlined in the Mekong Delta Plan, drawn up at the end of 2013 by a Dutch consortium of WUR, Deltares and consultancy firm RoyalHaskoning DHV. One of the main authors in this consortium, which was led by ex-minister Cees Veerman, was WUR researcher Gerardo van Halsema.



## ‘The high dykes block the deposition of sediment on the rice fields’

Remarkably, this commission from the land of polders and dykes is not recommending raising the dykes. Instead, the proposal is that Vietnam should adapt its use of land and water so that delta residents can cope flexibly with the impact of climate change. This means that Vietnam should flood polders in the upper reaches of the Mekong to create more space for the overflowing river. The country should also adapt to the salinization in the coastal region by substituting shrimp farming and mangrove forests for agriculture and freshwater fish farming. The mangroves will help absorb the expected rise in seawater levels.

### RAIN CAPES

During my travels through the humid Mekong Delta, temperatures reached 32 degrees Celsius every day. Actually it is supposed to be dry in December, as the rainy season is from June to November, but the innumerable scooter riders on the streets kept having to put on their rain capes. Climate change is already under way. The rainy season is shifting and it is raining more heavily, says Chau Nguyen Xuan Quang, director of the climate centre in Saigon. On the other hand, it rains less

these days during the dry season in the spring. This means the delta is facing both flooding and water shortages, explains Quang.

Life is becoming more dangerous for delta dwellers too. The Mekong Delta suffered extensive flooding in 2000 and 2011, but the damage in 2011 was much greater and more residents had to be evacuated, says Andrew Wyatt. He is delta manager of the International Union for Conservation of Nature, an international NGO which invests in nature management. That damage, Wyatt says, was a direct consequence of the construction of large dykes upstream over the past 15 years.

He shows me two satellite images. On the older image, the upper Mekong Delta plain is totally inundated at the end of the rainy season because the floodwaters have washed over all the one-metre dykes around the rice fields. On the newer satellite image, half of the plain is dry, protected by three-metre-high dykes. Because of those polders, there is no more room for the floodwaters and the mass of water moves faster towards the coastal delta, resulting in floods and much damage.

Wyatt, an American who has been living in

Vietnam for 18 years and monitors water policy there closely, is very positive about the Dutch Delta Plan. ‘This is a turning point. Before this plan, the Vietnamese government was not working on sustainability at all.’ The serious flooding of 2011 helped bring about a change of heart. The dykes broke, over 100,000 homes were flooded and 49 people died. Wyatt: ‘Then came the Delta Plan and now we are seeing environmental initiatives. The Vietnamese government adopted a resolution in 2017: we are going to adapt to the changing environmental conditions and flooding.’ Adaptation is the key word in the new policy.

### BREACHING DYKES

The first steps are now being taken in the upper reaches of the Mekong Delta, says Wyatt. Proposals are being drafted to breach the high dykes. ‘Those high dykes enable farmers to get three rice harvests instead of two, but that third rice harvest brings down prices, doesn’t make the farmers much money, and has several downsides. The dykes block the deposition of sediment on the rice fields, causing soil fertility to drop. They also hamper the >

## FROM POOR AREA TO RICE BOWL

Thirty years ago, Wageningen made a big contribution to the development of the Mekong Delta by tackling the problem of acid sulphate soils in which very little grows. In the mid-1970s, the Wageningen soil scientist Nico van Breemen brought to light the complex soil-chemistry process that causes the formation of acid sulphate soils. That knowledge led to new approaches to combatting soil acidification in polders and delta regions. The Wageningen soil scientist Tini van Mensvoort went to Vietnam, where he ran acid sulphate soil projects between 1980 and 1992. In the Mekong Delta, the ground was also becoming acidic because bacteria convert sulphate in seawater into sulphide, which in dry soil oxidizes into sulphuric acid. Working with Vietnamese researchers, he tested different treatment plans. His remedy: rinse the sulphides out of the soil with fresh water. This intervention changed the Mekong Delta from an impoverished region to the rice bowl of Vietnam.

Van Mensvoort has retired and is now a city guide in Düsseldorf. He puts his work in perspective: 'The Vietnamese did it themselves; Wageningen's main contribution was in transferring knowledge and boosting the confidence of the researchers in Can Tho.'

**'Vietnamese agriculture is enormously dynamic'**

development of aquaculture and cause flooding elsewhere. If you go back to lower dykes, you can manage the water better, without much loss of income.'

The Vietnamese researchers I talk to do not share Wyatt's optimism, however. 'My biggest concern is how to involve farmers in the plans,' says director Quang, of the Saigon climate centre. 'You might think we don't need those high dykes anymore, but a lot of farmers won't agree with you. Their houses and land will be under water. And as long as food prices go on fluctuating wildly, it is hard for them to invest in alternatives. In the policy, we must draw on their knowledge and experience, but I don't know how yet.'

### GAMING WITH FARMERS

The Good Shrimp Farming game might offer a solution. The meeting with the provincial civil servants on the campus of Can Tho University was a success, says game designer Tran Thi Phang Ha afterwards. The civil servants were enthusiastic and they are thinking of playing the game with farmers as a way of formulating their policy. She explains how the game works. 'There

is a map on the table, with farm plots on it. A player throws the dice, lands on a particular plot and then has to deal with the situation described on that plot. The shrimp farmer learns about farming options, ecological constraints and market developments. This opens up several perspectives on ways of improving your local environment. You might want to produce more fish, for example, but you could also combine aquaculture with vegetable growing and with tourism.' Ha thinks this game has something to offer rice and tilapia farmers, too, by shedding light on their business strategy.

### RAKING

Around Can Tho, at the heart of the delta, thousands of canals connect the three main estuaries of the Mekong. Travelling through the area, you still see countless rice fields, in which the farmers are raking the wet soil after the last harvest, or ploughing it using a tractor or a buffalo. It is difficult to imagine that this region faces water shortages and even salinization in the spring. But that salinization is already coming close to Can Tho, which is 60 kilometres away from the sea.

At first, Vietnam tried to keep the salt water out. Fifteen years ago, with World Bank funding, the government constructed large dykes in the coastal zone to protect rice and tilapia farms. But in spite of these efforts, the water became brackish and rice harvests declined. Fish farmers switched from freshwater tilapia to saltwater shrimps and asked for the dykes to be holed. And that happened.

In the new policy, prompted by the Dutch Delta Plan, Vietnam accepts the salinization. Freshwater farming has to disappear from the coastal zone, partly in order to stop the fall in groundwater levels and secure the supply of drinking water. Vietnam also needs to keep hold of more of the fresh river water and arm itself by natural means against rising sea levels by reintroducing mangroves along the coast. Mangrove forests, which have been cut down for decades to make way for shrimp farming, provide natural coastal defences. A Wageningen-Vietnam project has researched how you can combine mangroves with shrimps.

The margins for change are not very big. Game designer Ha points out that many of the small farmers in the Mekong Delta are



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Sustainable shrimp farming in a mangrove forest that protects the coast.

still poor. They have less than one hectare of land for rice and fish farming, and they earn no more than 15 million Vietnamese dong (600 euros) a year. That is barely enough to support a family, says Tran, especially with the rising price of fertilizer and pesticides in recent years, and low prices on the export market.

For this reason, the Delta Plan includes a chapter on agriculture. Farmers should focus less on bulk crops and more on quality food for the growing Vietnamese middle class. Various interesting options are emerging in this area. Vietnam National University in Saigon is doing research on floating rice: rice plants that float on water and can therefore move with the changing height of the river. One problem is that this variety of rice is not yet very profitable. The university in Can Tho is doing research on farming traditional local fish species for the Vietnamese market. There is also a new demand among well-off Vietnamese for more expensive, organic food.

Most producers are not benefitting from this new market yet. Small farmers sell their wares at traditional markets in the Mekong, such as the floating market on

the Cai Rang River, which I reach from Can Tho in half an hour by boat. Hundreds of boats come and go with food products which are traded on the water. Nice for tourists but not the way for farmers to reach wealthy urbanites. Part of Vietnam's delta management challenge is to find new ways of linking farmers to consumers.

### HANOI IS FAR AWAY

The big question will be: how will the Vietnamese government organize the transition to sustainability? The formerly communist government implemented economic reforms in 1986 in a shift towards a market economy, but is used to a top-down approach to policy. Now the ministries of infrastructure (the dam-builders), agriculture and environment need to work together. But the capital, Hanoi, is far away, say the people I talked to in the Mekong Delta. It is at the regional level that the various different interests need to be balanced in an integral plan. And that is not an area in which Vietnam has much experience.

The World Bank wants to implement the Dutch Delta Plan for the Mekong and

has allocated 300 million dollars to investments. Forty million of this is earmarked for getting rid of the polders. WUR researcher Gerardo van Halsema, one of the authors of the Delta Plan, is advising the World Bank on this. 'The first step has been taken at the political level,' he says. 'Now regional and local government must be brought into the decision-making process to work out the plan. That is time-consuming and for the Vietnamese it takes some getting used to.' Van Halsema is not afraid that the delta farmers will get a poor deal. 'Vietnamese agriculture is enormously dynamic. We have done research on land use in the delta, and that showed that there are changes in how 14 per cent of the land is used every year. That shows that the farmers are constantly adapting to the circumstances. The World Bank finances projects in the field of sustainable shrimp cultivation, but I am also seeing new environmentally friendly farming systems that we hadn't thought of. The great thing is: there is new scope for the farmers to innovate.' ■

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