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# The Dyke Dilemma – A Cost-benefit Analysis from Vietnam

EEPSEA POLICY BRIEF • No. 2007-PB1

Wetlands provide rich environments for wildlife as well as agriculture. This frequently results in a conflict between wetland conservation and agricultural development. This, in turn, means that research into the interplay between development decision making, agricultural productivity and ecological sustainability in wetlands is crucial. A new EEPSEA ➔

A summary of EEPSEA research report 2007-RR1, 'Impacts Of Dykes On Wetland Values In Vietnam's Mekong Delta: A Case Study In The Plain Of Reeds' by Thang Nam Do, Graduate Studies in Environmental Management and Development, Crawford School of Economics and Government, Australian National University, Canberra ACT 0200, Australia. Tel: 61 2 6125 1300 Email: [thang.do@anu.edu.au](mailto:thang.do@anu.edu.au)

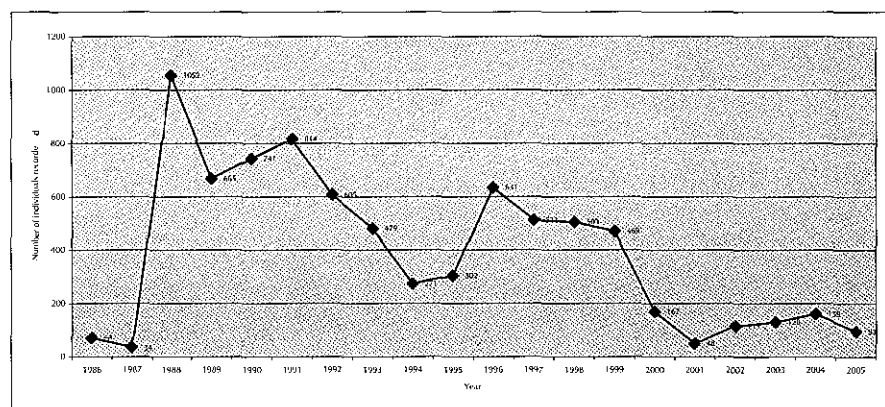
# "The plans represent a

➡ study from Vietnam has looked into just such a situation. It investigates the impact of proposed changes to the dyke system of the country's Mekong Delta. These changes are designed to benefit the area's wildlife, especially birds, but they will also affect farmers' rice crops.

The study was conducted by Thang Nam Do from 2006 to 2007. The study does not find a trade-off between conservation and development. To the contrary: the changes could produce improvement to the Delta's ecology and economic benefit. This suggests that the plans represent a win-win for nature and for people. Given that society as a whole will benefit, money should be made available to compensate individual farmers for any losses. The research findings suggest a level of compensation and highlight areas for further research.

## The Plain of Reeds

Like many wetland areas in Southeast Asia, Vietnam's Mekong River Delta (MRD) has been the location of widespread ad-hoc dyke construction. This has led to significant wetland degradation. The development of dykes began in the early 1980s and proceeded rapidly in the late 1990s. Dykes have been developed in seven MRD provinces and now enclose a total area of 1,099,314 ha (about 27% of the MRD area). On this



Number of Sarus Cranes Visiting Tram Chim (1986 – 2005)

scale, the dykes are responsible for a large-scale impact on the MRD's hydrological conditions. They therefore have a negative effect on the ecological sustainability of wetlands in the region.

Because of this, ecologists have suggested that some of the dykes in the Delta be lowered to bring water levels back to a more ecologically beneficial level. Others disagree. Because of this, policymakers have not been able to make informed decisions about dyke management strategies. To fill this information gap, Tram Chim National Park and its adjacent areas in the Plain of Reeds were selected as a case study to look at both the costs and benefits of lowering dyke heights. Established as a National Park in 1994, Tram Chim is a 9,000 ha wetland located in Tam Nong District, Dong Thap Province.

## Developments at Tram Chim

Tram Chim supports a large

number of rare species such as Black-necked Storks and, most notably, Sarus Cranes. Due to its biodiversity value, it was the first wetland national park of Vietnam and has been nominated by Vietnam's Government to be a RAMSAR wetland site. Tram Chim is enclosed by 53 km of dykes that were built in 1985 to retain water in the National Park during the dry season. There are two main types of dykes: park dykes surrounding wetland protected areas and farm dykes surrounding villages and paddy fields. From the mid 1990's onwards, the local authorities have raised the levels of dykes. This has affected Tram Chim's ecological systems, threatened the food sources of the Sarus Crane and reduced the biodiversity of the area and the sustainability of the park's fisheries.

The most recent proposals for dealing with the ecological problems facing Tram Chim have

# win-win for nature and for people.”

come from the Park Management Board. The Board have proposed a five-year plan that will reduce water levels in the park by 1m and lead to an increase of 0.2–0.3 m of water level in adjacent farms. In addition, local authorities have proposed that farm dykes should be lowered to improve other remnant wetlands in buffer zones. If they go ahead, these proposals will have considerable impacts on farmers' cropping and livelihoods. This is because, in many cases, the high dykes allow households to grow three crops a year, and they are better protected from flooding than they would be with lower dykes. This, naturally, increases their overall productivity and income. Farmers in high dyke areas are also able to generate more income from livestock.

## Lowering the Dykes – Good or Bad?

To get an estimate of the costs and benefits of the proposed reduction in the heights of the dyke, two main aspects were assessed: first, the costs imposed on local farmers due to lost rice production; and second, the benefits that would result from wetland biodiversity improvements. The impact on rice harvests and farmers' incomes was assessed using a production function model that took into account the way in which a number of key variables interact. These variables included

dyke height, the occurrence of flooding and rice productivity. To get the information needed for this estimate, surveys were conducted on 265 farms.

Estimates of the benefits of the dyke height change on wetland biodiversity were carried out using a “choice modelling” technique. Interviewers asked respondents to state their willingness to pay for various levels of environmental enhancement in the Tram Chin area. Potential levels of environmental improvement were outlined using five key attributes including the number of fish species present and the area under healthy vegetation. In addition to getting the information necessary for a cost/benefit analysis, this work was also designed to test some research techniques, such as the impact of ‘cheap talk’: a form of briefing in the early stages of the interview. To estimate impacts on biodiversity values, 973

personal interviews were performed in three zones: inside the MRD, on the edge of the MRD and outside the MRD. Cao Lanh, Ho Chi Minh City and Ha Noi were the population centres in these zones from which respondents were selected.

## Costs and benefits

It was found that the proposed changes to park dykes would reduce rice yield by 0.03 tonne per ha per year. With 50,000 ha of the MRD affected, this would reduce rice output by 1,500 tonnes per year. This would lead to an overall income loss of about USD 91,875 in five years. This cost, together with compensations for farmers and engineering costs, means that the proposed five-year park dyke program would cost in the region of USD 3.4 million.

As explained, the benefits associated with the proposed lowering of park dyke heights were

Aggregate Willingness To Pay and Net Social Benefit of Park Dyke Conversion

	Adjusted mean WTP (USD)	No. of households (million)	Response rate (%)	Higher bound WTP: extrapolation with adjusted mean WTP (million USD)	Lower bound WTP: zero WTP for non-respondents (million USD)
Zone 1: inside the MRD	0	1	78.6	0	0
Zone 2: on the edge of the MRD	0	3	59.4	0	0
Zone 3: outside the MRD	2.5	3	52.5	5.0	3.94
Total WTP				5.0	3.94
Cost				3.4	3.4
Net social benefit				1.6	0.54

based on the willingness-to-pay (WTP) for those benefits expressed by survey respondents. On average, respondents in Ha Noi were willing to pay USD 2.5 per household for the improvement in Tram Chim wetland, while respondents in Ho Chi Minh City and Cao Lanh were not willing to pay anything. Given an overall population of about seven million split between these three regions, this put the overall WTP at somewhere between USD 3.94 million and USD 5 million. The net benefit of the program would therefore range from USD 0.54 million to USD 1.6 million

A similar scenario was found for the lowering of farm dykes. This would reduce rice yields by 0.24 tonne per ha per year. In addition, it would reduce other incomes from livestock and orchards and impose costs related to infrastructure damage, flooding and a general reduction in the quality of life. Taking only the reductions in rice and livestock incomes into account, the cost of the farm dyke conversion would be

USD 37 million for the whole of the MRD.

There are 95,238 ha of natural wetlands with high biodiversity in the MRD. Extrapolating from the biodiversity value of the 9,000 ha of wetlands in Tram Chim gives a biodiversity value of all wetlands in the MRD of between USD 41.7 million and USD 53 million. This means that the net social benefits of farm dyke conversion would range from about USD 4.7 million and USD 16 million.

### A Way Ahead

The study shows that the benefits of the two schemes under review should outweigh their costs. In both cases, the biodiversity benefits of the changes outweigh the costs of reduced rice production. This means that society as a whole should see a net benefit from the proposed changes; changes which should not only improve wetland management in the Mekong River Delta but also contribute to the sustainable development of the

whole region.

This does not mean that there will be no losers. Individual farmers will suffer a loss of income. Because society as a whole will benefit, it is both fair and feasible that individual farmers should be compensated. Information presented in Thang's research can be used to determine the level of compensations to local farmers. Furthermore, Thang's research contributes to the stock of knowledge about the application of choice modelling in wetland research in Vietnam. It also identifies future research areas that if investigated should ensure that all future wetland developments are enhanced from both a social and environmental point of view.

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