

WATER ENVIRONMENTAL CONSERVATION FOR IMPROVED LIVELIHOOD IN THE MEKONG DELTA, VIETNAM

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Abstract

Livelihoods of major population in the Mekong Delta (MD) highly depend on water resources of the Mekong river, especially in Southern Vietnam, lowest part of the Mekong River Basin. While most of Vietnamese farmers in MD use water from the rivers and canals for their daily drinking, irrigation, domestic use, etc., effects of water environment to human life is more crucial. Vice versa, impacts of human activities to water environment are also considered to ensure the sustainable development of the MD.

A case study on water environmental conservation was done in Long An province, Vietnam. Long An, part of the Plain of Reeds where is remarkable vulnerable area with flooding and saline intrusion, has been suffering all water related problems including extra water, shortage of drinking water, saline water, acid water, water pollution by upstream as well as on-stream users. The most water related problems concerned by farmers in this area was access to get clean water.

Water environment conservation is one of the most urgent actions to be done by increasing awareness for local people. Integrated water resources management was considered. "Living with flood" has been trend in the area. Sharing information between provinces is needed to get synthetic data of water resources to adapt flood and orient it become "nice flood" from which local people can utilize its benefit such as alluvia, natural fishes, soil improvement, ...

Key words: *livelihood, Mekong Delta, water environmental conservation, water-related problems.*

1. Introduction

The Mekong River Delta (section of the delta in Vietnam), with its four million hectares of lands for nearly 18 million of Vietnam inhabitants, is great potential for agricultural production. The Delta supplied more than 50 percent of staple food and 60 percent of fish production of Vietnam (Minh, 2000). However, the MD population, especial in the remote areas, is facing to water problems from day to day. Long An province (part of the Plain of Reeds as figure 1 and figure 2) suffer complexity of water related problems including not only flood in the wet season but acid sulfate water, saline intrusion, lack of clean water in the dry season. Water environmental conservation is an urgent action. Better access to water and sanitation will improve the health and productivity of poor rural people and contribute to a sustainable reduction of poverty in the target communities.

This case study aim to understand the most water related problems which link to livelihood of grass root level in the area. The interview and group discussion with officers and farmers at four levels are to comment participatory water environmental conservation for research areas which help to improve living condition of the poor in the MD.

2. Area Description

Long An is located among the nine provinces of the Mekong Delta in the South Vietnam and faces Ho Chi Minh City in the East. The area is 4,492 sq. km, lived with population of 1,392,300 habitants (2003) and Capital Tan An Town. It has 12 districts and as a part of Plain of Reeds. The below map shows the position of Long An in the Mekong Delta.

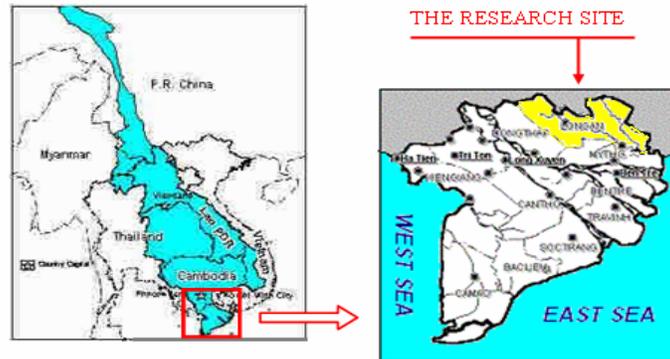


Figure 1: Research site map in the Mekong River Delta

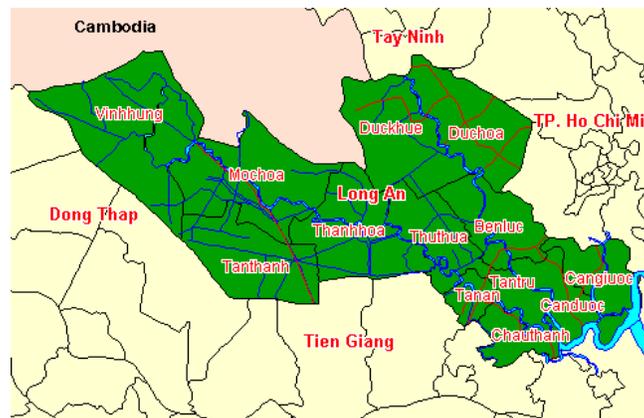


Figure 2: Long An map

3. Method

The survey was carried out at 4 levels including province, district, commune leaders and local farmers. The method based on Participatory Rapid Appraisal (PRA) and Rural Rapid Appraisal (RRA). At the province, district and commune levels, key informants from Provincial Department of Agriculture and Rural Development (DARD), Department of Natural Resources and Environment (DONRE), Women's Union, Youth's Union were invited for interviewing. At the grass root level, two groups of 15-20 farmers took parts in group discussion. To reach the objectives of the study, mapping, semi-structure checklists, problems ranking were applied.

The result of survey was reported again to get feedback from four levels. The information correctly reflected the situation and was the basis for water conservation. In additional, there were 5-6 private interviews of farmers to confirm and deeply understand farmer 's problems and aspiration on water conservation for their livelihood improvement.

4. Result and discussion

4.1 Water related problems with livelihood

4.1.1 Flood

The MD has 1.2 to 1.9 million hectares (ha) of land affected by annual flooding. In the year of 2000, Vietnam experienced one of largest and most damaged flood in 70 years (Minh, 2000). Long An is affected flood from the Mekong river, it runoffs through Cambodia border, flows down the Tien river and surmerges all main canals in the Plain of Reeds. This province is also affected by flood from Vam Co Tay river. About 24,963 ha of paddy rice, 913 ha of aquaculture, other crops as well as infrastructure were damaged by the flood in the year 2000. The flood killed 78 persons including 39 children and lead 21,600 households to starveling (Report of Long An DARD, 2000). Hamlet number 6, Tan Lap commune lost a lot by flood before the year of 2000 because poor, homeless people lived in the field with unstable, small houses. Children have to leave school in flooding season. Flood occurs in Long An from August to October. In the year 2004, the curve of flood was very strange, it quickly increased to the peak and drained. The officers explain that the flood was depend on rain in the upstream areas. Deforestation for land use change has been listed as a root cause of increased magnitude of flooding (Sitanon, 2004). Damages caused by flooding gradually decreases. Table 1 shows damages caused by flood from 2000 to 2004.

Table 1: Flood damages in Long An

Damaged Items	Unit	2000	2001	2002	2004
Rice (lost)	ha	24 693	539	84	0
Cash crop	ha	1 827	664	25	0
Aquaculture	ha	913	381	-	-
Infrastructure (collapsed bridges)	unit	301	14	-	5
Death	person	78	39	29	7

(Source: Long An DARD, 2005)

However, flood also brings benefit to people. Farmer need flood because it transfers alluvium to the rice field, brings natural fishes, brings plankton which is food for fishes in cases and pools, improves water and soil quality. Flooding flushes toxicity released from acid sulfate soil. An extremely large amount of water is needed to dilute the leachate in order to prevent negative impacts to the environment (Minh, 1998). Every people agreed that “Living with flood” is the best way for the Mekong Delta sustainable development. Sharing information among communes, districts and provinces aim to get synchrony water database and orient flood to become “nice flood” which brings benefit to people.

4.1.2 Acid sulfate soil

Acid sulfate soil (ASS) occupies a large area of Long An. That is an serious problem in the dry season for agriculture and aquaculture. Acid sulfate soil forms when soil containing iron sulfite are exposed to oxygen (Minh et al, 1996). Disturbance of acid sulfate soil will increase the acidity discharging into the water body.

To cultivate crop in the acid sulfate soil, there is necessary to reduce acid sulfate content by a large amount of fresh water for flushing. Lime application is also a way for reduce acidity in the soil but it will increase the production costs to the farmers. The leachate will ultimately discharge into the river which may cause water pollution and kill aquatic life.

4.1.3 Saline intrusion

Saline intrusion affects to Long An through Vam Co Dong and Vam Co Tay Rivers. Vam Co Dong river springs from Cambodia, meets the sea at Xoai Rap estuary, is affected by saline intrusion up to the Cambodia border, including the Plain of Reeds. The most saline intrusion was in 1977 up to Go Dau Ha. In year 1974, saline intrusion reach to Tan Thanh through Vam Co Tay river (Thuan, 2004). The years with high saline intrusion were of years 1992, 1993, 1996, 1997, 1998. Peak of saline intrusion is in March yearly. In year 1996, the concentration of salinity was over 3 mg/L.

Saline intrusion causes low yield of rice crop and damages the boat generators in the rivers and canals. According to an officer in district level, it is very complex to control saline intrusion. The dike system for prevention of saline intrusion will increase the harm of acid sulfate soil to aquaculture and agriculture in the Plain of Reeds. Saline intrusion is one of the principal limiting factors in agricultural production.

Most of the area is under mono-crop rice cultivation, where most of the poor provinces with a high ratio of poor farmers are located. Shortage of drinking water is another constrain for local people. In order to prevent further salinity intrusion, it is necessary to keep flows from dropping too low (WB-ADB, 1996).

As a impact, the more drought leads the more saline intrusion. Saline intrusion period is about 3 months, from March to May yearly. At this period, almost no vegetables, kitchen-gardens and other crops can stand. Many farmers, including women and their children have to move to other places to earn their life. They become stpendiary. Some women do small trading, hired labour. Farmers make use the time to repair their house, canal. In 1996, serious saline intrusion went up to Hung Thanh, Duc Hoa districts. At that time, Vinh Hung, Moc Hoa districts were in highest shortage of irrigation water. Some of Northern districts had to sow rice and pea nuts twice. Depending on the water supply capacity and land use pattern, there are two major rice cropping systems in the Long An as figure 3:

- (i) the single rice crop as *Mua* crop (rainfed rice); and
- (ii) double rice crop as *Dong Xuan* crop (Winter-Spring) and *He Thu* crop (Summer - Autumn) or *He Thu* crop and *Mua* crop.

The different in the rice yields in the wet and the dry seasons and the seasonal effects to the livelihood is presented in table 2.

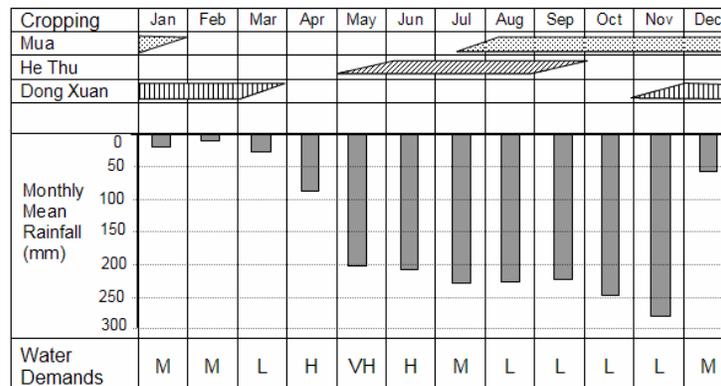


Figure 3: Cropping calendar, monthly rainfall and water demands in Long An
 Note: VH: very high; H: High; M: Medium; L: Low

Table 2: Seasonal effects to the rice production and livelihood in Long An

Year	Spring rice yield (ton/ha)	Summer rice yield (ton/ha)	Effect of water regime to paddy field and livelihood
1996	4.80	3.02	<ul style="list-style-type: none"> • Early and long stayed saline intrusion (4 g/L) • Lack of irrigation water • Lost 10,497 ha of summer paddy rice • Rural women and youth moved to the city
1997	4.70	3.32	<ul style="list-style-type: none"> • Still suffered effects of the harsh condition of 1996
1998	4.39	2.62	<ul style="list-style-type: none"> • Complicated climate, long dry season • 11,000ha paddy rice of Moc Hoa, Tan Thanh districts was lost by salinity and ASS
1999	4.18	2.97	<ul style="list-style-type: none"> • The 3rd rice crop was affected by ASS
2000	4.20	2.82	<ul style="list-style-type: none"> • Big flood • 24,693 ha of rice lost • 78 person were died by flood
2001	4.40	2.73	<ul style="list-style-type: none"> • Slowly drainage of flood • Spring rice crop was later 1 month • 10,675 ha of rice lost
2002	4.50	2.80	<ul style="list-style-type: none"> • Better climate for rice cultivation
2003	5.02	2.99	<ul style="list-style-type: none"> • Applying Integrated Pesticides Management (IPM) • Improving varieties • 80% of population have stable life
2004	5.08	3.25	<ul style="list-style-type: none"> • Excavating canals • irrigated area increased to 40,000 ha • Developed semi-dyke system to prevent early flood • Improving water resources system management and decentralizing management to district and commune

(Source: Long An DARD, 2005)

4.1.5 Water quality

Pollution of water resources caused by pesticides, herbicides and fertilizers in the past ten years (An, 2000). Water quality issue impacts the people widely. Recent years, development of agriculture adding the expanding population force Long An province to confront water environmental problems. The beginning of the rainy season is the problematic period.

The main concern in the village level was the water quality, especially, the water supply for domestic usage. For the interviewed villagers, water quality cause more worries than the flood. The main cause of surface water pollution is acid sulfate soil, followed by agro-chemicals and awareness of local people. According to directly interviewed local farmers, some people have had bad habits: dropping dead animals, domestic solid wastes and chemical containers to the water bodies. "Overhung toilets" or "Fish pond toilets" which contributed micro-organism pollution to surface water, is still popular in hamlet No.6

The poor water quality leads to the water supply problems. Immediately need of hamlet No.6, Tan Lap commune is water supply system. They can not use ground water because of very high iron content. Many local people in Hamlet No. 6 and No.4 of Tan lap commune, Moc Hoa district, use rain water in a haft of year, in the rest time they have to buy water from Tan

Thanh district with the cost of 2,000 VND /3 liters of water for drinking. For other purposes of domestic usage such as washing, bathing, ... they take polluted water from canals and rivers. Expenditure for high cost drinking water partly affects to their livelihood that may become one of busy and hard loads for women and children in taking care their daily life.

4.2 Water environmental conservation

4.2.1 Behavioral changes for polluted water reduction

Public education is an essential component of a successful water conservation program. Difference organizations at all levels combine to one another in communication of environmental protection. To reduce the effect of intensive agriculture to water environment, experiments of using bio-methodology were carried out. IPM and “3 ups and 3 down” (rising up the yield, the effectiveness and the qualify and decreasing down the seed, the fertilizers and the pesticides) programs have been quite successful and welcomed. Method of row sowing is widely applied to reduce using of fertilizers and seeds.

The villagers issued the regulation that throwing dead animal or pesticide containers into the water body is punished.

Another way to provide public information and education on water environmental conservation is to present the demonstration models, for instant the demonstrative toilets. The “overhung toilets” are replaced by hygiene ones. Biogas systems were introduced to farmer with large animal husbandry farms. The sludge of biogas tanks will be a very good fertilizer for agriculture and horticulture. Mass media were widely used to educate public on water environmental conservation such as announcement in the newspapers, pamphlets, local radio and television system. Public school education is also an important means for instilling water conservation awareness (Grisham and Fleming, 1989).

4.2.2 Integrated water resource management

Water is the main component of the environment and essential element for human life (Igor, 2000). Water management is much more than the management of water. In MD, water is basic of life for millions of people to whom water provides directly or indirectly the source of livelihood. The Mekong immense water resources are one of the key factors for social and economic development in the region (Marko, 2004).

**** Identify water resources management***

Provincial authority had official plans on surface water exploitation for each district. Head water resources stations in the provincial level manage lower irrigation systems. In district and commune levels, water management teams are organized. Local people operate and maintain irrigation systems themselves via the control of irrigation teams. Inter-field canals were managed by farmers. In Tan Lap commune, there are also teams spontaneously formed by Youth’s Union which were in charge of canals and semi-dike systems. Each team with 4-5 persons managed a part of canal and the team leader was voted by members. He had right to collaborate with other teams and sign contract of irrigation and canal excavation with farmers. The operation and maintenance cost was contributed by farmers on their irrigated area.

**** Socialization of water resources management***

Socialization of water resources management is implemented according to the motto: “Both the Government and People do together”. At the same time, the Government advocated rallying all popular efforts and encouraging foreign and domestic investment in water resources exploitation and construction of water structure based on democratic participation

and equal benefit (Nghia, 2001). In Moc Hoa district, main canal systems were constructed by province and national 135 program. Lower level canals were invested by district and local people. Almost canal excavation cost was taken from water fee and subsidized from national budget.

4.2.3 Legal documents on water conservation in Vietnam

The Law on Water resources which was approved by the National Congress in 1998 and came into effect in 1999. Beside the Law of Water Resources, Vietnam has other laws related to water conservation as:

- Forest Protection and Development Law (1991).
- Environmental Protection Law (1993).
- Rules and Regulations on water usage, water quality, water contamination issued by Ministry of Science, Technology and Environment (MOSTE).
- Articles related with environmental protection in Civil Code (1995) and Criminal Code (2000).

There were some important national programs supported and concerned water resources management in the MD as listed below:

- Watershed management and reforestation program: The program focus on improvement of environment in general, contributed to improve water resources and flood control in Vietnam.
- Food security and rice export (2000): Cultivation of high-yield rice varieties might cause water pollution by agro-chemicals and fertilizers (Ongley, 1996). So, the policy on balancing agriculture development and environment protection is crucial for sustainable development of the Mekong Delta.

5. Conclusion

Sustainable water management (SWM) should not only control the water resources towards the present needs but also consider water-related problems in the future (Tuan, 2004). The research area suffers all problems connected to water: poor water quality, water scarcity, flood, saline water intrusion, acid sulfate soil, which lead local people to poverty. They are difficult to develop the livelihood structure.

The cropping calendar highly depends on weather and river water regime. Lack of clean water is biggest problems which directly impact to local people's daily life. The remote area is the most difficulty area. Water related issues are very complex in the research area and thus challenging for water conservation. The trend of livelihood in Long An is living with flood. The objective should always be the people. The problem and solution should be formulated by citizens, of course, the local people themselves is the most important actor in the water environmental conservation.

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