



COMPARING THE COSTS AND BENEFITS OF FLOATING RICE-BASED AND INTENSIVE RICE-BASED FARMING SYSTEMS IN THE MEKONG DELTA

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Abstract

This paper compares financial costs and benefits of floating rice-based and intensive rice farming systems using data from focus group discussions and household survey in four locations in the Mekong Delta. We argue that the net financial benefit per 1000m² of integrated floating rice-based farming systems is greater than the net financial benefit of intensive rice farming system. The total net benefit of floating rice-leeks shows the highest net benefit (VND 24.8 mil./1000 m²), followed by floating rice-sweet corn- two baby corn crops and cattle systems (VND 18.5 mil./1000m²), and floating rice-chili (VND 16.7-17.7 mil./1000m²). If farmers cultivate monoculture of rice either two or three crops, the net benefits are ranging from VND 2.2-4.8 mil./1000m² respectively. Alternatively, farmers integrate vegetables; the net benefit was ranging from VND 5.6 to 11.7 mil./1000m². The net benefit of the two rice crops is lowest (VND 1.3-2.3 mil./1000m²). Surprisingly, if farmers convert from two intensive rice crops to two maize crops, the net benefit can reach to VND 21 million/1000m². The results support the argument that the floating rice based systems allows farmers diversified into profitable upland crops, which can help farmers to improve their total income.

Keywords: Financial cost, floating rice-based, Mekong Delta

1. INTRODUCTION

As recently as the 1990s, nine million hectares of floating rice were cultivated in the river lower basins of the Ganges-Brahmaputra of India and Bangladesh, the Irrawaddy of Myanmar, the Mekong of Vietnam and Cambodia, and the Chao Phraya of Thailand (Catling, 1992). At that time it was a key source of nutrition for more than 100 million people in Asia, also West Africa (Kende et al., 1998). It was grown in areas which flooded to depths of 50 cm for a month or longer each year (Catling, 1992). It has extreme elongation capacity which can grow at rates of 20 to 25 cm/d when partially submerged and can reach the lengths of up to 7 m in water depths up to 4 m (Kende et al., 1998). Its yield was relatively low (average 2.0 tons/ha), it was grown largely without the addition of chemicals, but it had high nutritional value.

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During the pre-colonial period, in the Nguyen Dynasty (18th century) floating rice was grown in the Vietnamese Mekong delta (Quadrangle and Plains of Reeds). Floating rice varieties were a source of high quality dietary nutrition for people living in the Mekong Delta. During colonial period (1858-1954), people harvested floating rice, fished and hunted wild animals for their home consumption (Biggs, 2003). Prior to 1975, the total area of cultivated floating rice in the Mekong Delta was estimated at over 0.5 million ha, of which 50% (0.25 million ha) was grown An Giang province (Nguyễn, 1994; Võ and Matsui, 1998; Biggs *et al.*, 2009) (figure 1). Between 1975 and 1994 cultivated floating rice areas have reduced significantly (up to 80%) due to the Vietnamese *Doi Moi* policy, an export-oriented policy involving irrigation improvement based on rapid canal excavation to efficiently supply water in support of short term high yield rice intensification (Karonen, 2008).

Nowadays much of these areas are given over to modern varieties which are grown inside dike compartments protected from flood water by high walls and required water, energy and irrigation systems. In An Giang province only, around 67 ha of floating rice was grown in Vinh Phuoc and Luong An Tra communes of Tri Ton district in 2012, where short term high yield rice variety are not suitable because of the presence of strongly acid soils (Nguyen *et al.*, 2013). The reason for the rapid reduction in floating rice area was low yields and long growth period which encourage its replacement by short term high yield rice. Recently, dikes were built for intensification of rice in the Mekong delta to narrow channels for natural flood retention and reducing areas for floating rice (Nguyen, 2014).

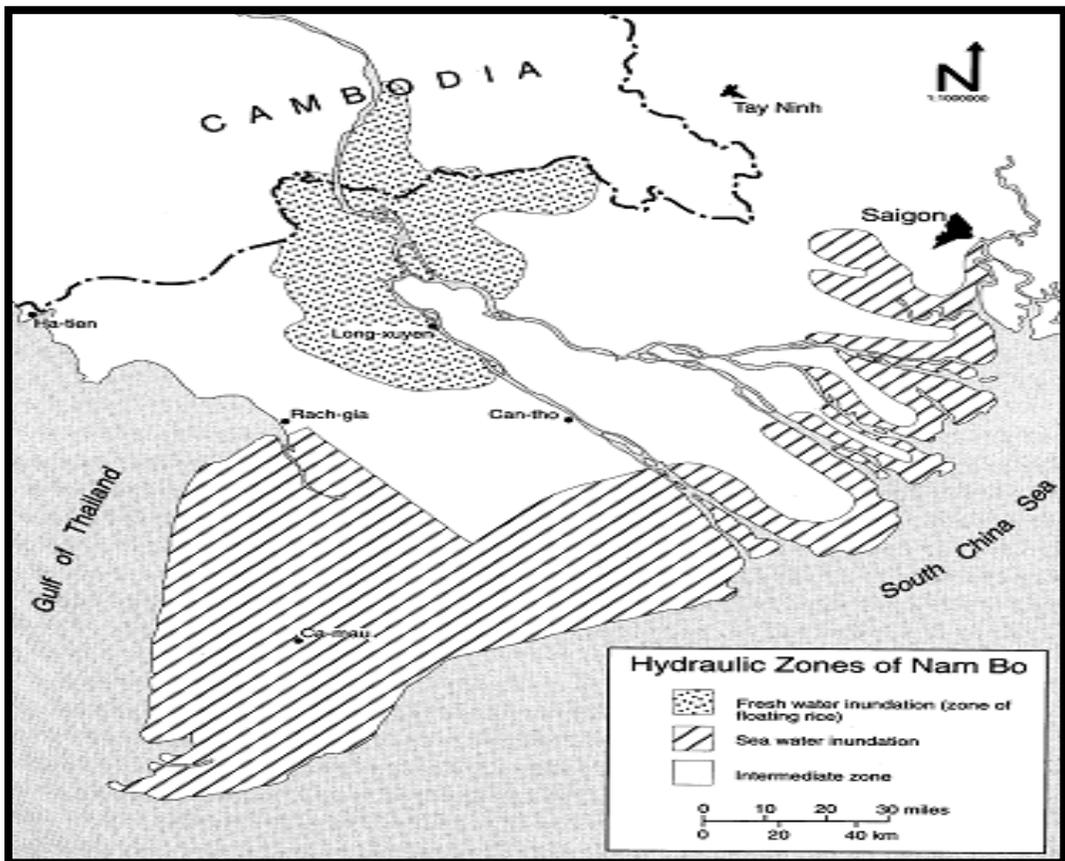


Figure 1: Planted areas of floating rice in 1960s

Adapted from: Brocheux, (1995)

The growth of rice initially depends on rainwater, providing moisture until flooding occurs in mid-August. The flood water level usually rises gradually, and the rice plants follow the rising water through stem elongation. When the water level recedes in November (lunar calendar), the rice plants lay flat on the ground and the flower during May to December following lunar cycles *in lunar calendar*. According to a group of floating rice growers, each rice plant can produce around four tillers each with two or three panicles (personal communication with farmers in Vinh Phuoc commune, Jan 2013). After harvesting floating rice in early January, farmers rotate one or two crops of upland crops such as cassava, chili, pumpkin, eggplant, leek, cucumber, maize or taro. Some farmers rotate only one cassava crop, but other can grow one chili crop and egg plant.

In contrast, the growth of short term high yield rice is about 100 or 110 days. Farmers can grow up to three crops of rice a year. Mono rice farming can be seen more than 30 years in some regions of the Mekong Delta. In An Giang province, the period of rapid conversion from one crop floating rice to two crops of high yield rice occurred during 1990s, three crops of rice from 2000 up to present. In 1990, the land area for paddy was 325,000 ha but this area was 641,000 ha in 2013 because farmers shifted from one traditional rice crop to three crops of intensive rice a year. However, the mono intensive rice crops provide less profitability and diversity of income sources from small scale farmers. This paper will compare financial costs and benefits of some floating rice based farming systems in the Mekong Delta to argue for recovery of the floating rice-based farming systems will provide better income for farmers.

2. DESCRIPTION OF RESEARCH SITES

2.1. Vinh Phuoc and Luong an Tra communes – Tri Ton district of an Giang province

Vinh Phuoc commune has 5,437 ha of natural land in 2013. Of which 4,669 ha (85.8%) are used for agriculture. The commune is located in the strongest acid soil areas of Long Xuyen-ha Tien Quadrangle of the Mekong Delta (Figure 2).

Although the agricultural land is relatively larger than the average land size of the other communes in An Giang province, most of the lands (66.9%) are occupied by people in other communes [xâm canh]. The total cultivated rice land per year was 11,200 ha because some farmers cultivate up to 2 to 3 crops of rice using intensive high dikes, making up a total rice² production of 57,000 tons a year. Before 2000, floating rice was the crop mostly cultivated in this commune. However, it was replaced by short term high yield rice crops rapidly. In 2012, there were only 31.10 ha of floating rice with 10 farmers cultivating it. The average land size of this farmer group is 3.01 ha. Some farmers grew more than 01 ha of the floating rice while the other farmers cultivated up to 05 ha of floating rice. The floating rice is grown from June to December [during the flood season] each year in this village. After harvesting the floating rice, farmers rotate cassava, leeks, pumpkins, or chili on the same land from January to May, then the floating rice is rotated on the same land in this village.

Similarly, there were 07 farmers growing floating rice in neighboring commune, Luong An Tra. The average land size is 4.5 ha. Some farmers own up to 10 ha, while the smallest farm size is 3.0 ha. These farmers grew floating rice and rotated by cassava in all of their lands.

2.2. My an commune – Cho Moi district of an Giang province

Agricultural activities are very diversified in My An commune. The commune has 1,286 ha of natural land which is located in the Cho Moi district, between the Bassac and Hau Rivers (Figure 2). There are 954 ha of agricultural land, but only 317 ha are used for rice cultivation, mainly three intensive rice crops a year using high dikes which were built in 2002. The commune is much

² This information refers to short term high yield rice which does not include production of floating rice

diversified in agricultural activities by integrating cattle, and baby corn crops. In 2014, the commune has 3,778 cattle and nearly half of the areas are under upland crop cultivation.

The My Loi is one of six hamlets of the my an commune which has 702 households, but less than one third (202/702 households) own agricultural lands. Over 200 households are landless whose livelihoods are relying on non-farm hired labor, handicrafts in the village and migration to Binh Duong city for work as laborers.

The hamlet has 46.18 ha of upland crops and 69.81 ha of artificial bushes. Some 46.18 ha of the agricultural lands in My Loi commune are used for cultivating floating rice integrated with sweet corn, two baby corn crops and rearing cattle. It means that the natural flood events continue in this hamlet because the village does not built high dikes. The largest land size is one ha for the households; most of them (202 households) own less than one ha of agricultural lands.

Farmers have diversified into cattle rearing in recent years. The number of cattle in the hamlet has increased significantly since 2003 by integrating with baby corn production. At the present, there are 400 cattle rearing in the hamlet.

2.3. Tan long commune – Thanh Binh district of Dong Thap province

Tan Long commune is located on the fertile soils nearby the Bassac River, in Thanh Binh district of Dong Thap province (Figure 2). In 2014, the commune had 4,107 households and 535 ha of rice lands, which were cultivated in three crops of winter-spring, summer-autumn and autumn-winter using high dikes. There are 362 ha of upland crops which are grown in winter –spring and summer-autumn seasons. Some 45 ha of agricultural lands are cultivated for maize, chili and mung bean on the floating rice-based lands. In 2014, 33.57 ha of floating rice (involving 52 households) were cultivated, while some of them did not grow it during the flood season ([Tan Long People's Committee, 2014](#)).

The average land size of the floating rice farmers is 0.6 ha per household (min 0.2, max 1.56 ha). Floating rice farmers have continuously grown this crop for several decades.

2.4. My Phu and Thanh My Tay communes – Chau Phu district of an Giang province

My Phu and Thanh My Tay communes are located in Chau Phu district of An Giang province (Figure 2). Before 1990, more than 25,000 ha of floating rice were cultivated in this district. During 1990s, the intensification of rice program has been introduced to replace by short term high yield rice. The district has 45,100 ha of natural land, comprising 39,774 ha of agricultural land. Of which, 37,900 ha of land are used for intensive rice farming. The district has 12 communes and one town. Thanh My Tay has 3,565 ha, of which 3,165 ha are using for rice intensification. Similarly, My Phu commune has 3,646 ha of natural lands, but almost 3,027 ha of lands are using for rice intensification. More than 60% of the total rice lands are used for cultivating three crops of rice using high dikes, while the remaining land areas are growing two crops of rice a year with low dikes. Since after 1990, rice has almost been a mono crop in this district.

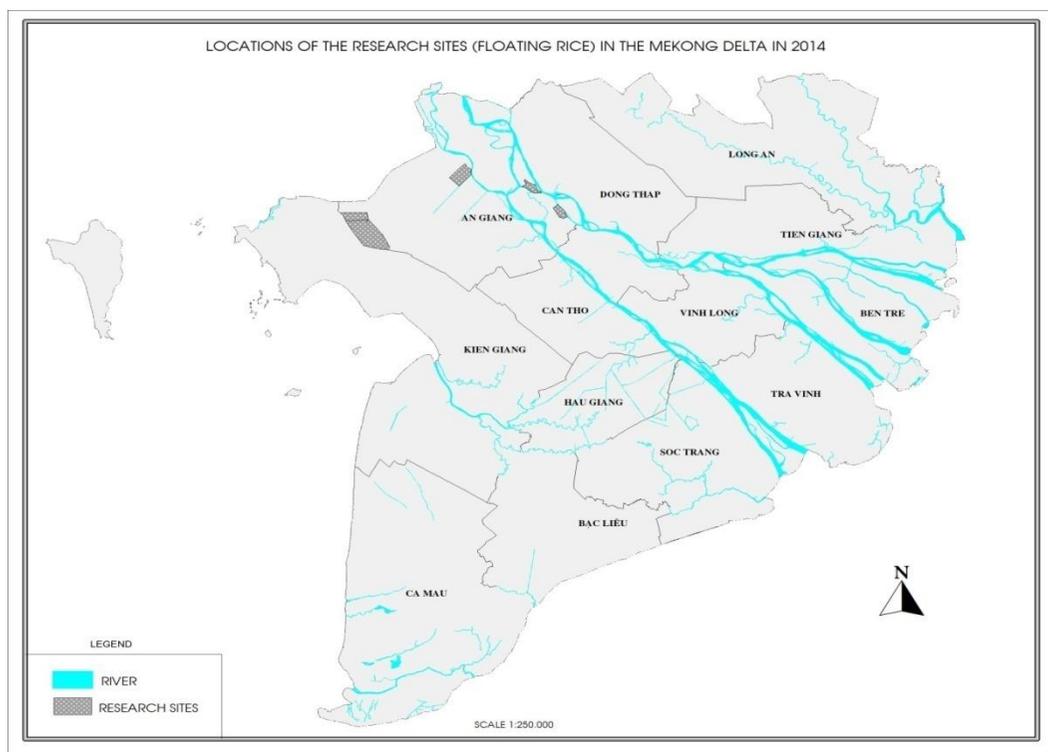


Figure 2: Research sites [floating rice areas] in the Mekong River Delta

Source: [Pham \(2015\)](#)

3. RESEARCH METHODS

Focus group discussion, in-depth interviews, household survey and field observations are the key techniques for this research. In each commune, we carried out from two to three focus groups discussions which includes from six to eight participants. All detailed financial costs and benefits of each farming activity were identified by group discussions. The production costs and benefits were quantified by local prices of the materials and outputs. For the net benefits, we used the farm gate to quantify the total benefit. In Vinh Phuoc and Luong An Tra communes, we carried out three focus group discussions with floating rice farmers, who grow cassava, chili and leeks separately. In My An commune, we carried out three focus groups discussions with the intensive short term high yield farmer group, and with the floating rice farmers who grow sweet corn, baby corns, and with the cattle rearing group. In Tan Long commune, we carried out two focus group discussions with floating rice farmer group who grow chili and rearing cattle. In Thanh My Tay and My Phu commune, we conducted three focus group discussions with farmers who grow two rice crops a year, those who integrate maize, mung bean, and those who rear cattle. Each focus group discussion included about eight participants. Also we carried a household survey with intensive rice farming (two crops a year) in both My Phu (16 samples) and Thanh My Tay (22 samples) communes of Chau Phu district. Also we carried out in-depth interviews with key informants (five people) in each research site, who are knowledgeable about farming system, and the history of farming in the village, and who are used to cultivating floating rice in the past and current cultivating floating rice and intensive rice crops.

4. RESULTS AND DISCUSSIONS

4.1. Seasonal calendar for farming systems in four study sites in the Mekong Delta

Traditionally, several upland crops have been cultivated in the same paddy fields after harvesting the floating rice crop. From 1986 to 1988 the Cuu Long Rice Research institute had an intensive research program for faming systems in Chau Phu district of An Giang province, Hon Dat district of Kien Giang province, and Co Do district of Hau Giang province in the Mekong Delta. Farmers grew several crops including sesame, soybean, mung bean, cucumbers, and pumpkin, etc., as part of the rice farming system (Nguyen and Dang, 1987). In the existing floating rice based farming systems, farmers rotate sticky corn, baby corn, chili, or cassava on the same land after harvesting the floating rice in December. Some farmers then grow three crops of corn. Others cultivate one chili crop and one short term leaf vegetables, or one cassava crop. Comparing to high yield intensive rice crops, floating rice farmers are more diversified in their farming activities involving upland crops. Also each family can rear up to 4 or 5 cattle using by-product from baby corn. The seasonal calendar of these crops can be seen in Table 1.

Table 1: Seasonal calendar of floating rice-based farming systems

Locations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Dry months					Flood months						
Vinh Phuoc [Tri Ton district]	Leeks	Chili	Cassava	Cassava	Cassava							
Tan Long [Thanh Binh district]	Chili	Chili	Chili	Chili	Chili							
My An [Cho Moi district]	Sticky corn	Baby corns	Baby corns	Baby corns	Baby corns							
Thanh My Tay and My Phu communes- Chau Phu district	Rice					FLOOD						

4.2. Cost-benefit analysis of floating rice-based farming systems

This section presents the comparison of costs and benefits of several typical farming systems with the traditional floating rice based farming systems in the Mekong Delta.

4.3. Cost-benefit analysis of cultivating a floating rice crop in three locations

Although the yield of floating rice is quite low in Vinh Phuoc commune (200-250 kg/1000 m²), the net benefit of the floating rice crop is VND³ 1.2 -2.0 million/1000 m². However the production cost is relatively low (VND 630,000 /1000 m²) which requires less capital investment compared to the system of two or three short term intensive rice crops produced in Vietnam Mekong Delta.

³ One USD is equivalent to VND 21,500 in January 2015

In My An and Tan Long communes⁴, the soil is more fertile due to annual deposited sediment, where floating rice farmers can earn a net benefit of VND 3.0 million/1000 m² at the farm gate price of VND 10,000 /kg because the yield is much better than in acid soil areas (300 kg/1000 m²) (Table 2). The total production cost of the floating rice crop is estimated at VND 625,000 /1000 m². Here farmers tended to sell floating rice to local consumers in better-off social groups, who prefer to eat safe rice (no pesticide is applied to floating rice). The benefit cost ratio of the floating rice in My An is highest (3.93) because the yield is better than in Tan Long and Vinh Phuoc communes. The yield of floating rice is lowest in Vinh Phuoc due to the strongest acid sulphate soil and rat damage in the 2013 crop.

Table 2: Cost-benefit analysis for floating rice crop in My An, Tan Long and Vinh Phuoc communes

Indicators	My An	Tan Long	Vinh Phuoc
	Commune Cho Moi district	Commune Thanh Binh district	Commune Tri Ton district
Total costs (VND 1000 /1000 m ²)	670	596	630
Yields (kg/1000 m ²)	300	240	187
Farm gate price (VND 1000/kg)	10	10	10
By-products sold (VND1000/1000 m ²)	300	154	00
Total Benefits (VND 1000 /1000 m ²)	3,300	2,554	1,875
Net benefit (VND 1000/1000 m ²)	2,630	1,957	1,245
BCR	3.93	3.28	1.98

Source: Focus group discussions (FGDs) with farmers in Tan Long and my an communes in December 2014 and with farmers in Vinh Phuoc commune in March 2014. Eight participants attended each FGD

4.4. Economic analysis of upland crops on the floating rice-based lands

Several upland crops are also grown in the dry season in the same land unit such as cassava, leeks, egg plants, pumpkin and chilies, baby corn, sweet corn and crop production is integrated with cattle rearing in the study sites. Cassava production in Vinh Phuoc commune is the most important cultivated upland crop in the dry season because this system requires less financial investment and is suitable for acid sulphate soil. The net financial benefit of cassava is VND 3.8 million/1000 m², according to the price at the farm gate in July 2013 (Table 3). Leek is a crop with high benefit, but it requires high investment (VND 13.4 million/1000 m²) and specialist knowledge, so few farmers grow leeks. The net benefit for leek is VND 24.3 million/1,000 m². Chili is highly suitable for this soil in Vinh Phuoc commune, after floating rice has been harvested, as it brings a net benefit of VND 16,500,000/1,000 m² (Nguyen *et al.*, 2013). Chili shows the highest BCR (2.75) because the investment cost is lower than leek. The net benefit for pumpkin is VND 4,850,000/1000m², according to the farm gate price in March 2013.

Table 3: Cost-benefit of the floating rice-based farming systems in Vinh Phuoc commune of Tri Ton district

Indicators	Floating rice	Cassava	Leeks	Chili
Total cost (VND1000/1000m ²)	630	1,820	14,157	6,000
Total benefit (VND1000/1000m ²)	1,875	5,000	37,807	22,500
Net benefit (VND1000/1000m ²)	1,245	3,180	23,650	16,500
BCR	1.98	1.74	1.67	2.75

Source: Focus group discussions with three floating rice based farmer groups in Vinh Phuoc commune in January 2013

In Thanh Binh district, after harvesting floating rice in November (earlier than in Tri Ton), farmers rotate a profitable chili crop and leaf vegetables. Some farmers use by-products of young corns for

⁴ The findings of this calculation is based on Focus Group discussion with 10 floating rice farmers in Cho Moi and 9 floating farmers in Thanh Binh district in December 2014

cattle rearing. The chili crop in Tan Long is perceived the most profitable (Table 4). The total production cost of the chilly crop is at VND 14.4 million, while the total benefit is ranging from VND 8.5 to 28.8 million which is fluctuated by the yields of 1.8 to 4.0 tons/1000 m². The net benefit ranges from VND 6.0 million to 31.0 million, at farm gate price of VND 15,000/kg. The common net benefit is VND 14.4 million/1000m². Yield also varies from 1.3 to 3.0 tons/1000m². If farmers rear an additional cow, they would earn a net of 17.5-40.2 VND million/1000 m².

Table 4: Cost-benefit of the floating rice-based, chilli farming systems in Tan Long commune of Thanh Binh district

Indicators	Floating rice	Chili
Total cost (VND1000/1000m ²)	598	14,407
Total benefit (VND1000/1000m ²)	2,924	28,845
Net benefit (VND1000/1000m ²)	2,326	14,437
BCR	3.89	1.00

Source: FGD in Tan Long commune, 8 farmers participated in this FGD in December 2014. The lowest net benefit is VND 6.0 million, while the highest net benefit is VND 31.5 million

On the other hand, farmers in Cho Moi district rotate one sweet corn crop followed by two baby corn crops and rearing cattle. The net benefit for the sweet corn is estimated at VND 4.0 – 5.0 million/1000 m² depending the fluctuation of the market (Table 5). With two baby corn crops, floating rice farmers can earn a net benefit of VND 3.2 to 4.0 million/1000 m² depending on the yield/1000m². The total net benefit for production systems of floating rice-sweet corn, and two baby corn crops ranges from 10.2 to VND 12.0 million/1000 m². If farmers rear cattle for selling meat using the by-product from baby corn (leaf, stems and bark), a net benefit per head of cattle aged 10-12 months is estimated at VND 6.0 – 10.0 million/10-12 months. As a result, the total net benefit of the system can reach to VND 16.2-22.0 /million/1000 m²/year. Cattle show the lowest BCR because the investment cost is relatively high. The floating rice shows highest BCR because the cost of production is very low comparing its benefit.

Table 5: Cost-benefit of the floating rice-based farming systems in My An commune of Cho Moi district

Indicators	Floating rice	Sweet corn	Baby corn ⁵	Cattle*
Total cost (VND1000/1000m ²)	670	2,275	2,965	22,467
Total benefit (VND1000/1000m ²)	3,300	7,500	4,550	30,000
Net benefit (VND1000/1000m ²)	2,630	5,225	1,585	7,532
BCR	3.93	2.30	0.53	0.25

*cost and benefit analysis is made for one cattle. Most household rears at least 3 cattle

4.5. The economic analysis of intensive rice farming systems- comparing with the floating rice crop

In contrast, the net benefit for the winter-spring and summer-autumn high yielding rice crop in Vinh Phuoc commune (acid soil) is 0.9 VND and 0.0 million/1,000 m² respectively (Nguyen *et al.*, 2013). When growing two crops of rice per year, the total costs for the summer-autumn high yielding rice crop are relatively high, so less profit is made by farmers. Floating rice-based farming systems in Vinh Phuoc commune has a relatively high benefit in comparison with intensively growing two short term crops of rice because the production costs are high and the benefit is low due to low price and yields.

In Chau Phu district, for the first winter-spring high yielding rice crop, the total costs are estimated at VND 2.2 million/1000m² (Table 6). With the average yield of 800 kg/1000 m², and the farm gate price at VND 4,600 /kg in March 2014, the total benefit is estimated at VND 3.6 million/1000 m².

⁵ Farmers can grow two baby corn crops continuously. Each crop lasts for totally 55 days

After subtracting the costs, the net benefit is VND 1.4 million/1000 m² for the winter-spring crop [short term high yield crop] which is less than the net benefit of the floating rice crop in Vinh Phuoc commune of Tri Ton district, My An commune of Choi Moi and Tan Long commune of Thanh Binh districts (VND 1.4 million/1000 m² compared to VND 1.5-3.0 million/1000 m²). For the second summer-autumn rice crop, the total cost is VND 2.5 million/1000 m², while the total benefit is 2.5 VND million/1000 m² due to low yield in the summer-autumn crop (600 kg/1000 m²), and lower farm gate price (VND 4,200 /kg of rice).

Table 6: Costs-benefits of a two short term high yield rice crop systems in Chau Phu district of An Giang province, 2014

Indicators	My Phu – Chau Phu		Thanh My Tay – Chau Phu	
	Winter-spring	Summer-Autumn	Winter-spring	Summer-Autumn
Total costs (VND 1000/1000 m ²)	2,245	2,573	1,716	1,732
Yields (kg/1000 m ²)	800	600	1,000	577
Farm gate price (VND/kg)	4,600	4,200	3,500	3,800
Total return (VND 1000 /1000 m ²)	3,680	2,520	3,500	2,192
Net return (VND 1000 /1000 m ²)	1,435	- 53	1,783	460
BCR	0.64	- 0.02	1.04	0.27

Source: Household survey conducted in My Phu (22 samples) and Thanh My Tay (16 samples) communes, December 2014

Table 7 shows if farmers shift from one short term rice crop in Chau Phu district to maize and mung bean or double maize crops a year, the net benefits range from VND 11.0 to 21.0 million/1000 m², with the BCR of 1.07 to 1.75. However, the number of farmers cultivating these crops is very small, just under five farmers in the two communes for each crop because the market is not attractive.

Table 7: Costs – benefits of upland crops (maize, mung bean, and pumpkin) in Chau Phu, An Giang, 2014

Indicators	Maize	Mung bean	Pumpkin
Total costs (VND 1000/1000 m ²)	5,993	4,360	4,560
Total Benefits (VND 1000/1000 m ²)	16,500	4,900	7,700
Net Benefit (VND 1000/1000 m ²)	10,507	540	3,140
B/C	1.75	0.12	0.69

Source: Focus group discussions with farmers in My Phu and Thanh My Tay communes in December 2014. Eight farmers involved in each FGD

4.6. Cost-benefit analysis of intensive short-term rice farming systems [three crops of rice a year]

Data from a focus group discussion with 8 key farmers in My An commune of Cho Moi district where high dikes were completely installed in 2004 for rice intensification, shows that the total cost of the first winter-spring [Dong Xuan] crop is estimated at VND 2.3 million/1000 m², while the benefit is only 3.2 VND million/1000 m², at the farm gate price of VND 5,300 /kg and the yield of 612 kg/1000 m². The net benefit is only VND 931,100 /1000 m², with a BCR of 0.39 (Table 9).

The net benefit of the summer autumn crop [He Thu] is negative (VND-508,800 /1000 m²) because the yield is low (441 kg/1000 m²), and the low farm gate price of (VND 4,700 /kg). The total cost of the summer-autumn crop is relatively higher than the winter-spring crop (VND 2.5 million/1000 m²) (Table 9). The reason for the higher cost is additional use of chemical fertilizers and pesticides and the lowest yield for the second crop.

The autumn-winter crop [Thu–Dong] is grown during the flood season from August to November each year). The third crop was introduced after the high dikes were installed in 2004. The net return of the third crop is reported as positive, but the figure is relative small (VND 218,500 /1000 m²), as the yield is low (500kg/1000 m²), and the farm gate price is much better than the summer-autumn crop (VND 5,300 /kg) while the total cost is a less than that of the winter-spring's crop (VND 2.4 million /1000 m²) (Table 8).

Table 8: Cost and benefit analysis of intensive rice farming systems in Cho Moi district

Indicators	Winter-spring crop ⁶	Summer-autumn crop ⁷	Autumn-winter crop ⁸
Yields (kg/1000 m ²)	612	441	500
Farm gate price (VND/kg)	5,300	4,700	5,300
Total cost (VND 1000/1000 m ²)	2,312	2,581	2,431
Total benefits (VND 1000/1000 m ²)	3,243	2,072	2,650
Net benefit (VND 1000 /1000 m ²)	931	-508	218
BCR	0.39	-0.19	0.08

Source: FGDs with 8 farmers in Cho Moi district, My An commune

4.7. Cost-benefit comparison of floating rice-based and intensive rice farming systems

If the comparison between floating rice-based farming systems is made with the intensive three crops of rice per year, it the data show that the net benefit from three crops per year is relatively lower.

If farmers grow three crops of rice in Chau Phu district, the net benefit is VND 4.8 million/1000m²/year, while the BCR is 0.71 (Table 9). If farmers cultivate only two short term rice crops a year, the net return is VND 2.2 million/1000 m²/year.

However, if farmers grow two rice crops and one sesbania sesban [bông điên điển] crop or one chili crop in Chau Phu district, the total net return are VND 5.6 and 6.7 million/1000 m² respectively, with the BCR 0.8 and 0.5. However, if farmers grow only two rice crops a year, the net returns are the lowest (from VND 1.3 to 2.2 million/1000 m², with the lowest BCR of 0.29 and 0.56 respectively) (Table 9).

If farmers grow two short term rice crops and rear additional cattle, the BCR of the farming system reduces as the BCR for cattle is very low (Table 9).

Table 9: Net benefit and BCR for intensive rice farming in Chau Phu district

Locations	Systems	Net Benefit (VND1000/1000 m ²)	B/C
Chau Phu district-An Giang ⁹	Winter-Spring rice	4,827	0.71
	Summer – Autumn rice		
	Autumn -Winter rice		
	Winter –Spring rice	2,243	0.65
	Summer-Autumn rice		
	Winter-Spring rice	10,701	0.35
	Summer –autumn rice – one cattle*		

⁶ This is called the first crop

⁷ This is called the second crop

⁸ This is called the third crop

⁹ Secondary data analysis was collected from Chau Phu Sub Department of Agriculture and Rural Development in 2013 crops

*cost-benefit analysis was carried out at the unit of one cattle

Thanh My Tay-Chau Phu district	Chili – 1 cattle*	11,761	0.31
	Chili – Sesbania sesban	6,716	0.50
	Winter –Spring rice		
	Summer-Autumn rice Sesbania sesban	5,656	0.81
My Phu-Chau Phu district	Winter –Spring rice	1,382	0.29
	Summer-Autumn rice		
	Winter –Spring rice		
	Summer-Autumn rice 1 cattle*	8,015	0.28
	Maize – mung bean	11,047	1.07
	Mung bean – pumpkin – Autumn-Winter rice	3,627	0.32
	Maize – Maize	21,014	1.75

Note: Synthesis from partial analysis

More interestingly, if farmers grow floating rice plus cassava or leeks in Vinh Phuoc commune or chili or sweet corn and baby corn crops in My An commune, the BCR is improved greatly (Table 11). The system of floating rice rotated by leeks in Vinh Phuoc commune shows the greatest net benefit (VND 24.8 million/1000m², the BCR of 1.68, followed by floating rice rotated by chili (net benefits of VND 16.7 to 17.7 million/1000m², with the BCR of 1.1 to 2.6). The system of floating rice – cassava in Vinh Phuoc commune shows the second highest the BCR (1.81), but the net return is VND 4.4 million/1000 m², due to smaller investments and smaller benefits. The system of floating rice-sweet corn - baby corn - baby corn shows a relatively high the BCR of 1.2 and high net benefit of 11.0 VND million/1000 m².

Table 10: Net benefit and BCR for intensive rice farming in Tri Ton, Cho Moi and Thanh Binh districts

Locations	Systems	Net Benefit (VND1000/1000 m ²)	B/C
Vinh Phuoc- Tri Ton district	One floating rice – cassava	4,425	1.81
	One floating rice – leeks	24,895	1.68
	One floating rice - chili	17,745	2.68
Tan Long- Thanh Binh district	One floating rice - chili	16,763	1.12
My An-Cho Moi district	Floating rice – green sticky corn – bay corn – baby corn – 1 cattle*	18,557	0.48
	Floating rice – green sticky corn – bay corn – baby corn	11,025	1.24

Source: Focus group discussions (FGD) with farmers Vinh Phuoc commune of Tri Ton district, My An commune of Cho Moi district, and Tan Long commune of Thanh Binh district in December 2014. Eight participants involved in each FGD

5. CONCLUSIONS

Floating rice based farming systems declined after the introduction of high yielding rice varieties and use of high dike systems in the Mekong Delta. Floating rice produces low yields, but provides good opportunities for diversifying into profitable upland crops when used in combination with rearing cattle. Financial benefits of several combinations of floating rice-based farming systems can provide greater financial benefits than other intensive high yielding rice crops in the Mekong Delta because intensive rice crops involve high production costs, but provide less income for farmers. Farmers can even diversify their cropping systems in the same floating rice-based land area for

many crops and cattle year round. In particular, there are opportunities for expanding the floating rice based systems in deeply flooded areas where construction of dikes is not feasible. Secondly, the floating rice is very suitable for acid soils so this system is potential for strongest flooded acid soils in the Plains of Reeds and Long Xuyen Quadrangle. In the islands between the branches of the Mekong River, it is possible to develop this farming system to adapt to floods, while maximizing the benefits from rice straw for feeding animals and additional upland crops. There is a sign that farmers in Luong An Tra commune of Tri Ton district, My Phu commune of Chau Phu district and Hong Ngu town of Dong Thap province, are likely to return to floating rice-based farming systems in 2014 in the Mekong Delta. It is important to maintain and expand this area for sustainable agriculture. Finally, a further advantage of this floating rice-based farming system is that it presents an alternative option that obviates the need to build dikes in the Mekong Delta.

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Appendixes

1: Cost-benefit analysis of floating rice crop in my an commune of Cho Moi district

Indicators	Unit	Quantity	Price	Total costs
land preparation	VND/1000 m ²	1	180,000	180,000
Seeds	kg/1000 m ²	10	10,000	100,000
Weeding	VND/1000 m ²	1	40,000	40,000
Harvesting (sickle)	VND/1000 m ²	1	200,000	200,000
Fertilizer	VND/1000 m ²	5	1,000	5,000
Threshing	VND/1000 m ²	1	100,000	100,000
Total costs				625,000
Yield 1		300	10,000	3,000,000
Yield 2		320	10,000	3,200,000
Yield 3		340	10,000	3,400,000
Net benefit 1				2,375,000
Net benefit 2				2,575,000
Net benefit 3				2,775,000

Note: FGDs with 8 farmers in my an commune of Cho Moi district, in January 2015

2: Cost-benefit analysis for one baby corn crop in my an commune of Cho Moi district

Indicators	Unit	Quantity	Price (VND/1000m ²)	Total cost (VND/1000m ²)
land preparation	time	1	180,000	180,000
Seeds	kg	2	150,000	300,000
Fertilizer	bag (50kg)	1	420,000	420,000
DAP	kg	5		-
Ure	kg	20		-
NPK	kg	25		-
Irrigation	days of labor	10	100,000	1,000,000
Harvesting	days of labor	10	100,000	1,000,000
Pesticides	bottle	1	25,000	25,000
Total costs				2,925,000
Yield 1	(kg/1000m ²)	270.00	15,000	4,050,000
Yield 2		280.00	15,000	4,200,000
Yield 3		290.00	15,000	4,350,000
Yield 4		300.00	15,000	4,500,000
by-product				500,000
Total benefit 1				4,550,000
Total benefit 2				4,700,000
Total benefit 3				4,850,000
Total benefit 4				5,000,000
Net benefit 1				1,625,000
Net benefit 2				1,775,000
Net benefit 3				1,925,000
Net benefit 4				2,075,000

Note: FGDs with 8 farmers in my an commune of Cho Moi district, in January 2015

3: Cost-benefit analysis for sweet corn in my an commune

Indicators	Unit	Quantity	Price (VND)	Total cost (VND/1000m ²)
Land preparation	Days of labor	5		100,000
Rice straw cleaning	home labor			
Rice straw covering	home			
Herbicides	bottle	1		80,000

Seedling	hrs	3		15,000
Ure	VND/bag (50kg)	35	420,000	294,000
DAP	VND/bag (50kg)	5	870,000	87,000
NPK	VND/bag (50kg)	35	670,000	469,000
Electricity	KW	20		1,600
Irrigation	times/crop	7-8		
Hiring labor	days/1000 m2	7	100,000	700,000
Total costs				1,746,600
Yields				

Note: FGDs with 8 farmers in my an commune of Cho Moi district, in January 2015

4: Cost-benefit analysis for three intensive rice crops in my an commune of Cho Moi

Indicators	Winter-Spring	Summer-Autumn	Autumn-Winter
Land preparation (VND/1000 m2)	260,000	260,000	260,000
Seeds (VND/1000 m2)	132,500	132,500	117,500
Sowing rice (VND/1000 m2)	30,000	30,000	30,000
Re transplanting (VND/1000 m2)	100,000	100,000	100,000
Fertilizer (VND/1000 m2)	600,000	700,000	600,000
Agricultural chemicals (VND/1000 m2)	650,000	750,000	750,000
Fertilizer labouring (VND/1000 m2)	80,000	80,000	80,000
Pesticide spraying (VND/1000 m2)	70,000	84,000	84,000
Harvesting (VND/1000 m2)	170,000	240,000	200,000
Transport (VND/1000 m2)	60,000	45,000	50,000
Irrigation - electric pump (VND/1000 m2)	160,000	160,000	160,000
Total cost (VND/1000 m2)	2,312,500	2,581,500	2,431,500
Yields (kg/1000 m2)	612	441	500
Farm gate price	5,300	4,700	5,300
Total net benefits	3,243,600	2,072,700	2,650,000
Net benefits	931,100	- 508,800	218,500

Note: FGDs with 8 farmers in My An commune of Cho Moi district, in January 2015

5: Cost-benefit analysis of two intensive rice crops a year in Chau Phu district

Indicators	My Phu commune		Thanh My Tay	
	W-S	S-A	W-S	S-A
Cost -benefit analysis of winter-spring crop				
land preparation (VND/1000 m2/crop)	158,955	176,682	113,056	163,188
Seeds (VND/1000m2/crop)	211,636	214,705	224,000	234,219
Seeds used (kg/1000 m2)	20	20	24	24
Hiring labours (VND/1000 m2/crop)	241,118	243,323	231,438	243,500
Total fertilizer and pesticides costs (VND/1000 m2/crop)	1,176,636	1,269,832	1,009,438	1,099,188
Irrigation costs (VND/1000 m2/crop)	193,955	193,955	141,125	136,125
Harvesting costs (VND/1000 m2/crop)	197,273	213,636	202,625	197,563
Transportation costs (VND/1000 m2/crop)	76,259	63,573	4,813	4,813
Total cost (VND/1000 m2/crop)	2,255,832	2,375,705	1,926,494	2,078,594
Yields (kg/1000 m2/crop)	868	679	854	634
Farm gate price (VND/kg)	4,692	4,633	4,356	4,372
Total benefits (VND/1000 m2/crop)	4,059,886	3,150,341	3,710,856	2,778,594
Net benefits (VND/1000 m2/crop)	1,804,055	774,636	1,784,363	700,000

Note: N=16, Thanh My Tay commune- Chau Phu district

Note: N=22, My Phu commune- Chau Phu district

Source: Household survey in My Phu and Thanh My Tay communes of Chau Phu district, in January 2015

6: Cost-benefit of chilli crop in Tan Long commune of Thanh Binh district

Indicators	Unit	Quantity	Price	Total costs (VND/1000m ²)
Land preparation	Time/1000m ²	1	78,802	78,802
Pesticide spray	Bottle/1000m ²	2	78,802	78,802
Ditch arrangement	Time/1000m ²	1	home labour	-
Seeds	Kg/1000m ²			472,813
Seed nursery	VND/1000m ²			189,125
Seedling	VND/1000m ²			425,532
Fertilizer and pesticides	VND/1000m ²			5,516,154
Labour			Home labour	-
Irrigation	VND/1000m ²			118,203
Harvesting	VND/1000m ²			7,880,221
Total cost	VND/1000m ²			14,759,653
Yield 1	Kg/1000m ²			1,389
Yield 2	Kg/1000m ²			1,929
Yield 3	Kg/1000m ²			3,086
Price	VND/1000m ²			15,000
Total benefit 1	VND/1000m ²			20,833,333
Total benefit 2	VND/1000m ²			28,935,185
Total benefit 3	VND/1000m ²			46,296,296
Net benefit 1	VND/1000m ²			6,073,680
Net benefit 2	VND/1000m ²			14,175,532
Net benefit 3	VND/1000m ²			31,536,643

Note: FGDs with eight participants in Tan Long commune in January 2015

7: Cost-benefit of floating rice in Tan Long commune of Cho Moi district

Indicators	(VND/1000m ²)
Land preparation	92,592.59
Seeds	154,320.99
Herbicide	15,432.10
Nutritional chemical	27,006.17
Harvesting	231,481.48
Threshing	77,160.49
Total cost	597,993.83
Yield 1	240.00
Yield 2	312.00
Yield 3	360.00
Farm gate price (VND/kg)	10,000.00
Total cost (VND/1000 m ²)	775,000.00
Rice Leaf sold-by product	100,000.00
Rice straw sold-by product	100,000.00
Total benefits 1	1,825,000.00
Total benefits 2	2,545,000.00
Total benefits 3	3,025,000.00

Note: FGD with 8 participants in Tan Long commune of Thanh Binh district, in January 2015

8: Cost-benefits for rearing one cattle in a 12 month cycle in Thanh My Tay and My Phu communes – Chau Phu district, An Giang province, December 2014

Indicators	My Phu – Chau Phu	Thanh My Tay-Chau Phu
Total costs (VND 1000/1000 m ²)	23,366*	27,542*
Unit of analysis	1	1
Total Benefits (VND 1000/1000 m ²)	30,000	36,000
Net Benefit (VND 1000/1000 m ²)	6,633	8,457
B/C	0.28	0.31

Source: Focus group discussions with farmers in My Phu and Thanh My Tay communes in December 2014. Eight farmers involved in each FGD