

# **The International Society for Ecological Economics ISEE 2016**

## **Rice intensive cropping and balanced cropping in the Mekong Delta, Vietnam – economic and ecological considerations**

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# Introduction

Agriculture on the floodplains of less developed countries has been intensified to meet population growth and economic development needs.

While agricultural intensification has benefitted farmers economically, it has also raised concerns about the sustainability and cost effectiveness of an increased reliance on external inputs, especially agrochemicals. In addition, intensification often requires the building or upgrading of large-scale irrigation infrastructure which, along with moves toward intensification, requires cautious assessment for several reasons. For instance, irrigation systems that facilitate intensification can fragment floodplains and disrupt natural flows of water, sediments, nutrients, and aquatic life. This affects the ecology and the environment and this, in turn, can have feedback effects on agriculture and fishing.

# A case study in Vietnam

This research focuses on the most recent phase of rice intensification in the Mekong wherein current targets for floodplain agriculture is the production of three rice crops per year using high dikes to completely prevent floods. Hence, two-rice crop systems, which were enabled with the use of low dikes to delay floods, are now being converted to three-rice crop systems with dike heightening.

One important notice: with three-rice crop systems within high dikes, rice fields are no longer be over-flooded during the flood season.

# From government's perspective:

Two rice crops  
within low dikes

First crop

Second  
crop

Three rice crops  
within high dikes

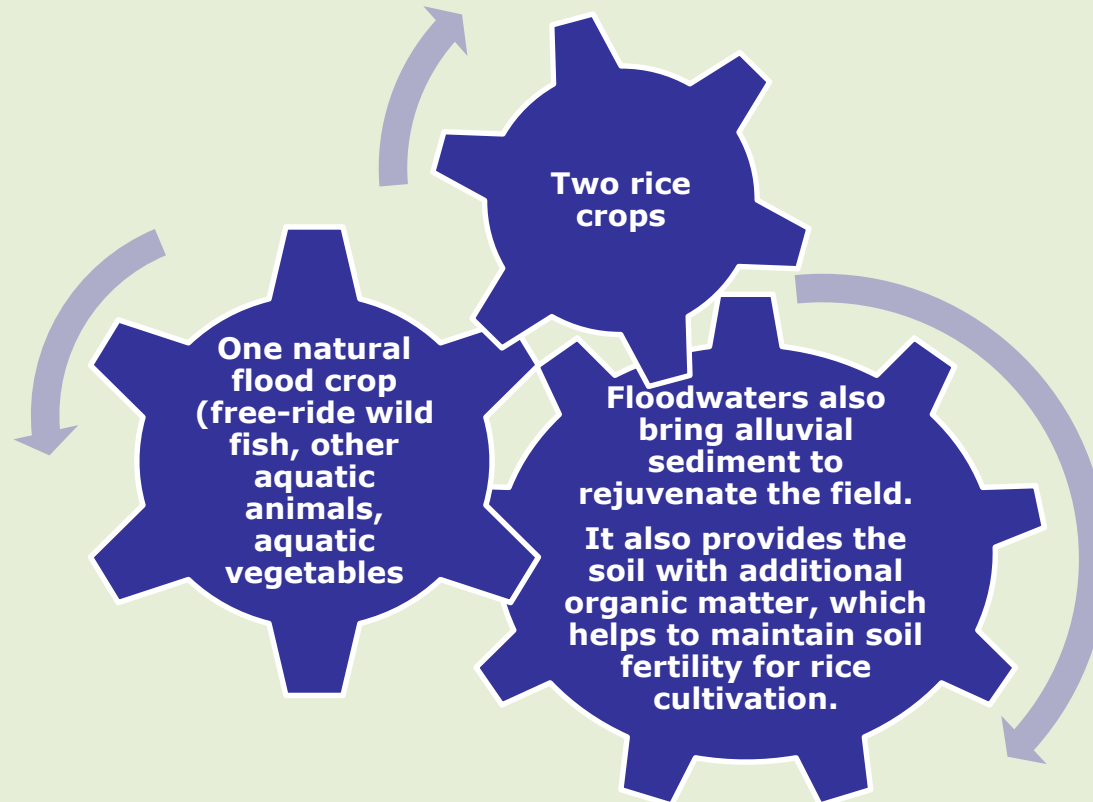
First crop

Second  
crop

Third crop



# With ecological considerations, we now have different picture: two rice crops on the floodplain is not simply a “two rice crops”!



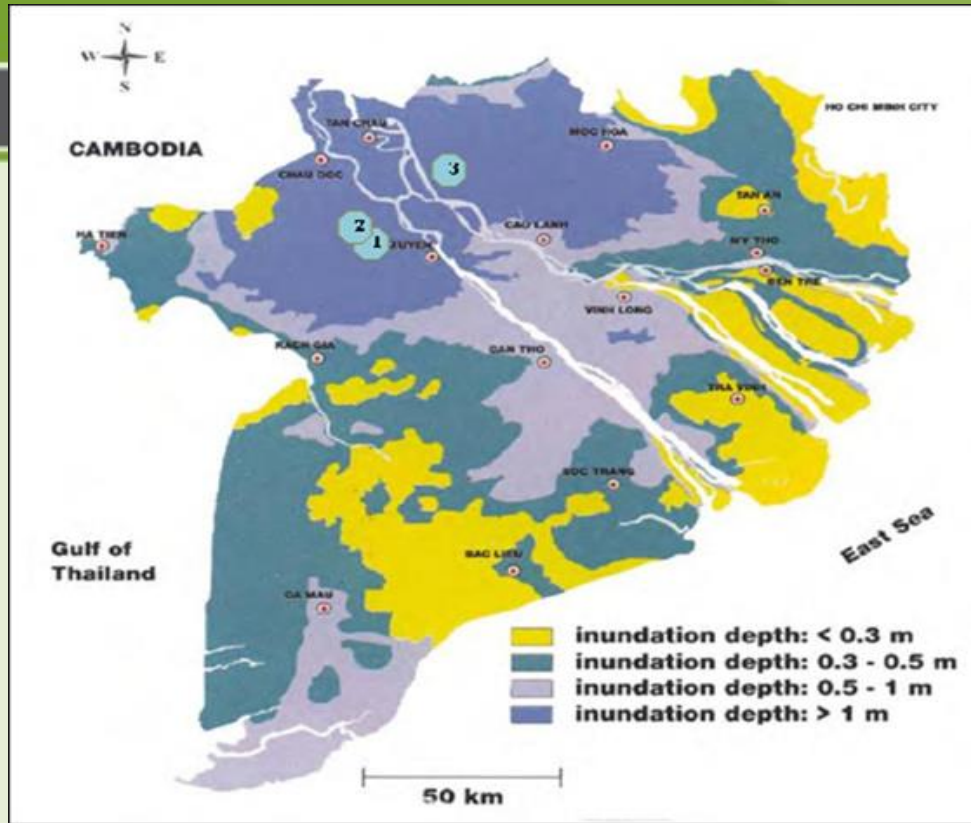
## Research question:

**Is intensive cropping a sustainable alternative to balanced cropping from economic or an ecological point of view?**

On the floodplain, two rice crops can be described as "balanced cropping since it has a long fallow period, which conforms to good agricultural practices. It also takes advantage of the flood's benefits.

Two two-crop system within low dikes hence is more balanced than the alternative intensive three-crop system within high dikes.

# Field survey:



Source of base map: Vo and Matsui (1998)

Notes: (1) Intensive cropping site (An Giang province); (2) Contiguous balanced cropping site ( An Giang province); (3) Non-contiguous balanced cropping site (Dong Thap province).

# **Results: switching to intensive cropping is not simply adding a third crop. It changes the character of the whole system.**

These changes, in turn, imply different required input combinations to be able to achieve similar yield between the two systems.

For example: With three continuously crops, “bridges” exist which transmit insects and diseases across the year. Switching to rice varieties with higher levels of resistance to diseases and insects is then likely to solution of intensive croppers in dealing with such unfavorable conditions.



# Results: Characteristics of rice varieties of the first two crops in intensive cropping and balanced cropping

Category	An Giang		Dong Thap
	Intensive cropping	Contiguous balanced cropping	Non-contiguous balanced cropping
Main varieties (name)	IR 50404 OM 6976	Jasmine 85 OM 4218	VD20
Farmers using (%)	74-77	80-94	82-91
Features of main varieties	average to high resistance on the main insects and diseases	infected to heavy infected by the main insects and diseases	infected to heavy infected by the main insects and diseases
Seed price (thousand VND/kg)			
Mean	9.53 <sup>a</sup>	13.01	12.81
SD	4.29	1.67	3.13
Output price (thousand VND/ton)			
Mean	4,406 <sup>a</sup>	5,319 <sup>b</sup>	5,834 <sup>c</sup>
SD	526.88	557,99	443,64

Note: Superscripted letters denote significant difference among cropping systems. Means that do not share the same letter are significantly different (P<0.05).

# Results: intensive cropping imposes spill-overs on adjacent areas

For example:

Lower amount of insecticides per crop applied by intensive croppers rather than in contiguous balanced cropping sites. As mentioned, intensive cropping farmers have switched to rice varieties with high resistance to insects. As a result, contiguous balanced cropping with more vulnerable rice varieties serves as an extra feed source for insects originating from intensive cropping site, thereby requiring extra insecticides

# Results: intensive cropping cannot be a sustainable alternative to balanced cropping from both economic and ecological viewpoints

Intensive cropping provides lower net income per crop because switching to rice varieties with higher resistance to diseases and insects implies a lower valued rice output.

The value of adding one additional crop hence does not compensate enough for the lost net income of the first two crops in using intensive cropping. As a result, the annual net income from intensive cropping with one additional crop is not significantly different from that balanced cropping even ignoring extra imputed labor costs and the value of foregone fish outputs

## Implications:

Fishers, balanced croppers are negatively affected. Intensive farmers do not improve their net income by switching to intensive cropping. They are, instead, constrained to work harder but less effectively and cannot revert to the balanced cropping which is now impossible by the irreversible investment in high dikes.

In contrast to intensive cropping, balanced cropping are designed to deliver a variety of interlinked ecosystem service such as rice, fish, pest control, and nutrient recycling. Future farming systems therefore should maintain and enhance value of balanced cropping as such.

## Implications:

Instead of focusing on increasing rice output to achieve rapid economic development based on exports, the government should incorporate a greater appreciation of the Mekong Delta as an environmental system which provides multiple highly-valued ecosystem services. In this regard, the use of low dikes are preferable to reliance on full-flood protection high dikes.

In addition, the main aim of high dikes is to enable intensive cropping. If converting from balanced cropping to intensive cropping does not make economic sense, this conclusion makes this a strong case to question the economic viability of the dike heightening from social perspective.

**THANK YOU FOR LISTENING!**