

Evolution of rice production and fertilization practices in the Mekong Delta

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INTRODUCTION



Rice growing – basic
profession of the
Vietnamese people since
4,000-6,000 BC.

Drawings of man and
woman pounding rice on
Ngoc Lu brass drums -



Topics covered

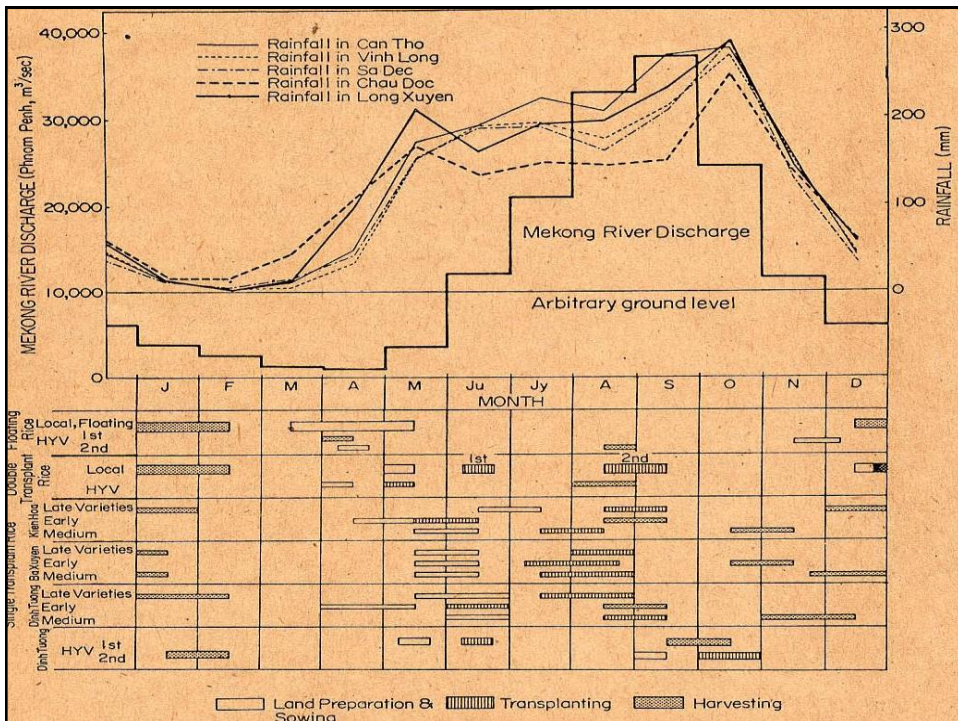
- Brief history of rice production in the Vietnamese Mekong Delta.
 - Pre-historic time – nomadic, subsistent
 - Feudal period –
 - Colonized period more irrigation and drainage
 - Independent period P fertilizer trad rice, HYV in 1968 with NPK
 - Unification period too many fert maerials

Rice in the old days

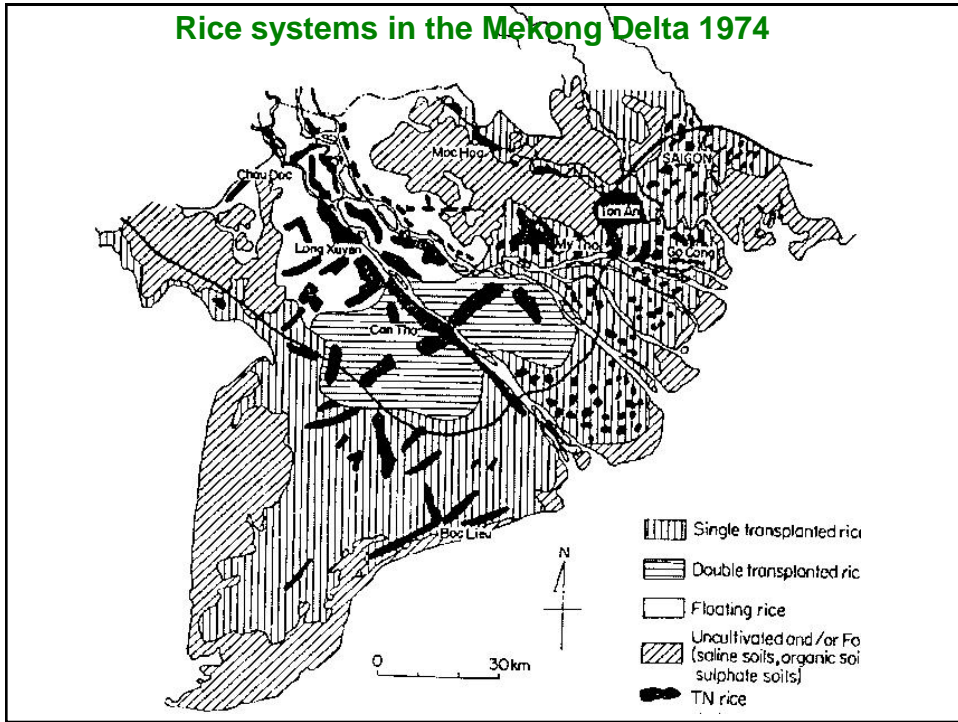
- Rice in the pre-historic era
 - Nomadic live, slash and burn, natural soil fertility exploited
- Rice in the feudal period
 - Expansion southward, clearing swamps in lowland.
 - Excavation of canals them Thoai Ngoc Hau
 - Traditional rice: single transplanted, double transplanted, and floating rice.
 - practice of growing one or two crops of leguminous species (mungbean and red bean) before rice.
 - Continuation of slash and burn agriculture

Colonized period

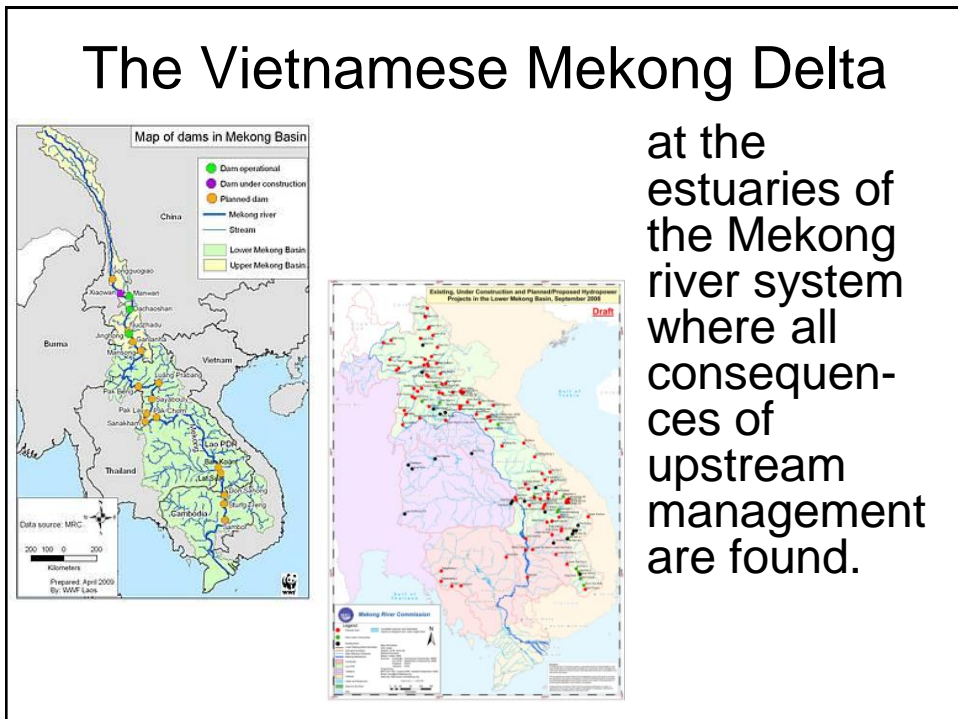
- French governors continued to mobilize farmers to excavate more canals in the MKD – for drainage and transport navigation. The Rach Gia – Ha Tien canal
- Rice areas expanded as canals went.
- Traditional rice with organic replenishment:
 - Leguminous crop bf rice
 - Sweet potato bf rice
 - Sesbania sesban bf rice



Rice systems in the Mekong Delta 1974



The Vietnamese Mekong Delta



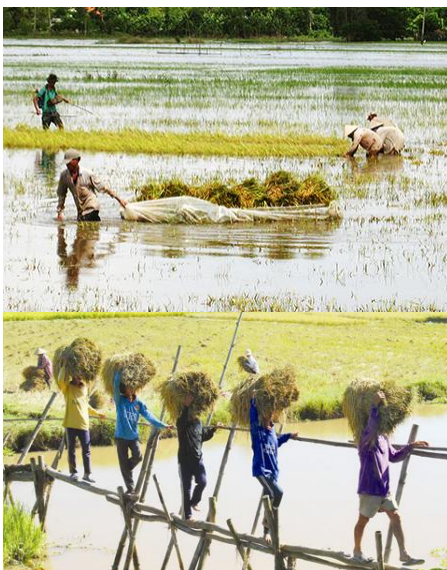
at the estuaries of the Mekong river system where all consequences of upstream management are found.

The land of the Mekong Delta



- 4 mil ha with alluvial along river, acid sulfate soils in backswamps, and saline affected along the coast.
- Highly impermeable and moderately flat physiography impounds the huge quantity of monsoon rains and overflows of the Mekong system.
- This results in annual flooding of the delta in the rainy season, while in the dry season, drought is becoming more and more severe.

Rice growing, the oldest profession



- Depending on the elevation of each area, generations after generations, farmers adapted to the natural conditions by selecting suitable growing methods to produce enough rice for subsistence.

Rice production prior to 1966



- Because of the annual abrupt inundation of the land, in the old days prior to 1966 farmers only relied on transplanting of rice using long duration, photosensitive rice varieties.

FERTILIZATION ONLY BY RICE STRAW LEFT OVER BY PREVIOUS RICE CROP AND RESIDUES FROM LEGUMINOUS CROPS (MUNGBEAN, RED BEAN) BEFORE TRANSPLANTING RICE.

Floating rice



Floating rice

In areas where water level reached 1-3 meters, farmers grew **floating rice**, which possess an elongating gene, by direct broadcast rice seeds, then let nature takes care after 7 months to harvest.

FERTILIZATION ONLY BY RICE STRAW LEFT OVER BY PREVIOUS FLOATING RICE CROP AND RESIDUES FROM LEGUMINOUS CROPS

Double transplanting rice



In moderately flooded areas, farmers practice **double transplanting method**, using medium to late duration traditional rice.

FERTILIZATION BY LIME AND PHOSPHATIC MATERIAL, PLUS RICE STRAW LEFT OVER BY PREVIOUS RICE CROP PLUS CHOPPED WEEDS AND RESIDUES FROM LEGUMINOUS CROPS (MUNGBEAN, RED BEAN, SESBANIA) OR SWEET POTATO CROP BEFORE TRANSPLANTING RICE. COW AND BUFFALO DUNGS WERE USED, TOO.

Organic fertilizers for traditional rice



Thoroughly incorporate residues from soybean (A), mungbean (B), *Sesbania sesban* (C), sweet potato (D) into the soils before transplanting rice.

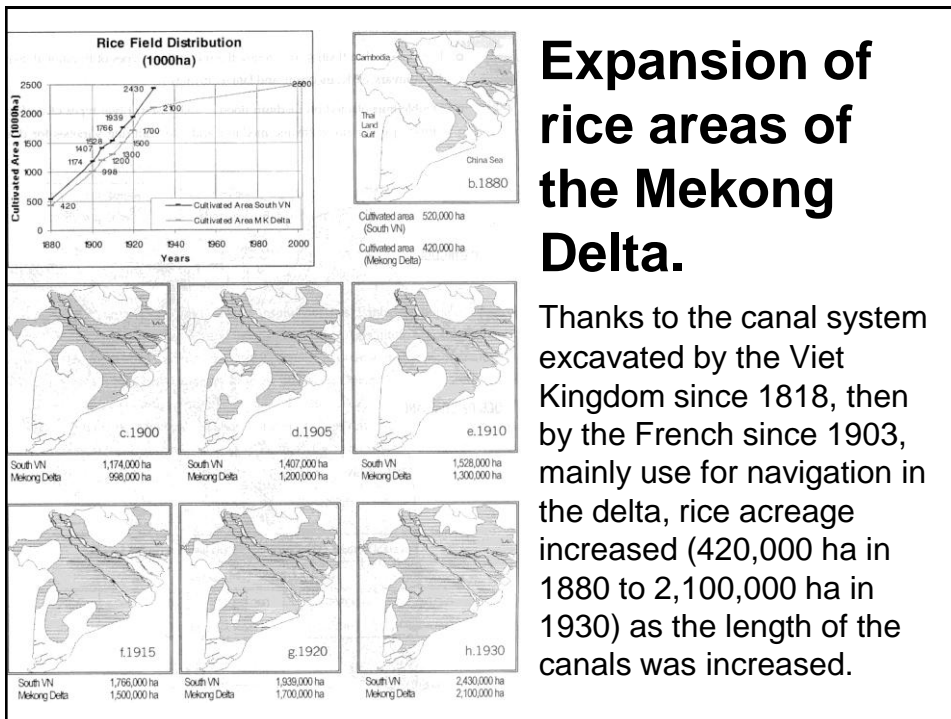
Single transplanted rice



and they also plant the non-photosensitive short duration rice varieties (two crops per year, often as a crop after the main rice season).

In the backswamp areas, they transplanted photosensitive rice with medium, or long growth duration (one crop per year)

**FERTILIZATION
SIMILAR TO DOUBLE
TRANSPLANTING
RICE**



Introduction of high yield, short duration rice from IRRI



Starting 1966, new rice varieties (HYV) IR8, IR5 from the International Rice Research Institute were introduced with the whole package of practices (**inorganic fertilizers**, pesticides, and irrigation water).

But the short duration is not short enough to for rice to mature before the onset of flood water. We had to select newer varieties that can be harvested within 100 days. This enabled farmers to double crop widely.

The infestation of brown planthopper.



- 1971: HYV spread to 400,000 ha.
- The brown planthopper or BPH (*Nilaparvata lugens*) infested the delta, prompted a change in the genetic make-up of HYV. New

BPH-resistant HYVs were introduced to minimize the damage by BPH.



FERTILIZATION BY INCORPORATED RICE STRAW AND RESIDUES FROM LEGUMINOUS CROPS, PLUS INORGANIC DAP/16-16-8 FERTILIZER RATE 50-40-0 (40)

Rice production in peace time



After the end of the war in 1975, the new government led an all-out campaign to increase rice production. Everybody in the country had to participate.

FERTILIZATION BY INCORPORATED RICE STRAW PLUS INORGANIC RATE 80-60-40 + various foliar

- More irrigation canals were excavated
- Newer HYVs were introduced and bred locally.



Infestation of BPH-2

As the floating rice area diminished, and the long duration traditional rice of the main season was contracted, double cropping of BPH-resistant HYV rices expanded rapidly. Technology: **high seeding rate (>200 kg/ha) and high urea rate (>100 kg N/ha) unbalanced fertilization** stimulated BPH and rice blast and sheathblight.

The new outbreak of the BPH, this time the biotype 2 BPH, inflicted great losses.

Severe infestation of BPH-2



In 1977, hundreds of thousand farmers were impoverished, had to eat finely shredded banana stems instead of rice. Several biotype-2 BPH resistant rice varieties were developed while farmers were taught new technique in multiplication of new seeds, and by the end of 1979 production was back to normal.

Mining the soils



Under pressure of the government, farmers continued to increase their rice production: double crop, triple crop, even in many areas they grew 7 rice crops in two years without letting the soil to rest.

FERTILIZATION BY INCORPORATED RICE STRAW AND GREATLY UNBALANCE INORGANIC FERTILIZERS: EXCESSIVE NITROGEN WHILE DEFICIENT P AND K. AS SUCH, N RATES KEEP INCREASING CROP AFTER CROP – PRESENTLY AT ABOUT 150 KG N/HA.

Resuming rice export



The acreage under HYV rapidly increased to more than 2.5 million ha in 1988, milestone of ***doi moi*** policy in Vietnam, brought Vietnam back to the rank of rice exporting countries since 1989, which Vietnam enjoyed in the old days until 1968.

Clandestine diversification



Rice surplus accompanied by low rice price has kept farm income always low. Farmers, without the approval of the government, quietly started diversifying their production by integrating fruit tree,...

Diversification



...fishes, shrimp, and other animal production into their rice land, and kept mostly two rice crops per year only.

The second rice exporting country



- Finally in 2000 the government officially recognized the diversification policy. But most local leaders in Vietnam want rice production continues to increase 1 mil ha per annum. It is easy to increase production but very difficult to increase rice farmers' income.
- **The reason: mainly wrong fertilization (too much N) causing more insects, and diseases that need control. Emission of N_2O .**

Wrong fertilization practice



- Farmers in free access to 16 types of fertilizers which amount to more than 2,000 brands ranging from inorganic to organic and biologic fertilizers.
- Major causes for increasing production cost: overdose of N, off-balance of P-K, add foliar fertilizers, too dense seeding rate, too much pesticides.

Current trend: Biofertilizers combined with inorganic fertilizers



One example: DASVILA

- *Azospirillum sp.*.....109 cfu/ml
- *Pseudomonas sp.*...109 cfu/ml

Can save farmers 40% cost.

There are 21 brands registered with MARD.

Importation of fertilizers



China is becoming the main provider of urea, DAP and potash for Vietnam.

- Despite our urea and phosphate plants, VN continues to import urea, DAP, phosphatic and potash elementary fertilizers for local formulation.
- First 10 months of 2010: USD796 mil imported fertilizers.

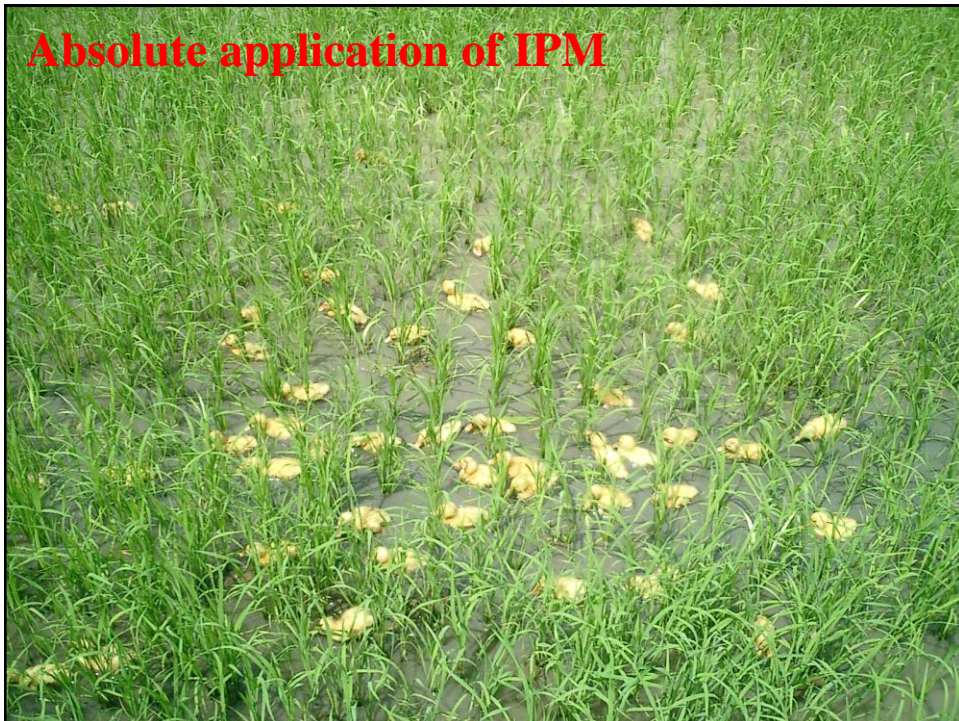
Mitigation of climate change

Need to campaign among farmers to:

- Manage their rice straw to mitigate the emission of NH_3 gas by using biodigester to ferment straw to produce NH_3 for family fuel.
- Practice precise N fertilization to mitigate emission of N_2O by using leaf color chart.



Use of row seeder to assure plant density, reducing pests, easing crop management.



Absolute application of IPM

Use of leaf color chart
to assure correct N dose.

