Agroecology Futures Regional Forum

CONSERVATION OF THE FLOATING RICE BASED AGROECOLOGICAL FARMING SYSTEMS IN THE MEKONG DELTA

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Dr. Van Kien Nguyen is the contributing author and the editor for the upcoming book entitles "Conservation of the floating rice based agro ecological farming systems in the Mekong Delta".

What is floating rice?

Floating rice/deep water rice is well suited to growing in river flood prone deltas. As the floodwater rises the stem can elongate at rates of 20 to 25 centimetres a day and the top of the plant floats on the surface, hence its name: 'floating rice' (Kende et al., 1998). Its yield is relatively low (average 2.0 tons/ha), it is largely grown without the addition of agricultural chemicals (Nguyen and Huynh, 2015, Nguyen et al., 2015), and it has high nutritional values (high protein: 11.3-11.5%, higher than normal short-term white rice, Vitamin E: 56.5-69.9 mg/kh, five times higher than short-term white rice, Vitamin B1, and Anthocyanin) (Ho and Tran, 2015). Abundant fish, other aquatic an animals and biodiversity which are protein sources of Mekong people are found in the floating rice paddies (Nguyen and Huynh, 2015).

Floating rice elongates during floods and at ripen time

Floating rice elongates during the flood peak, October 2013 at Mr's Hao rice fields, Vinh Phuoc Commune, Tri Ton District, An Giang province

@ Van Kien Nguyen, 2013

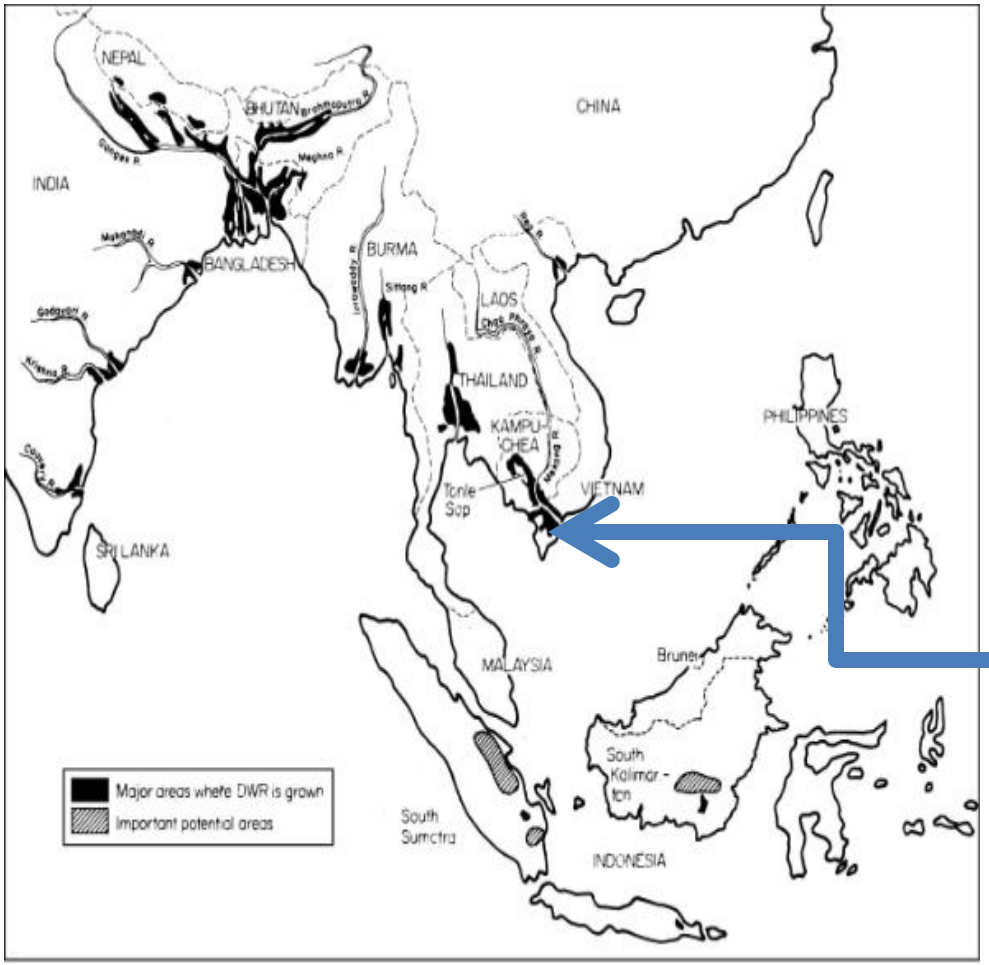
Floating rice is ripen, ready to harvest

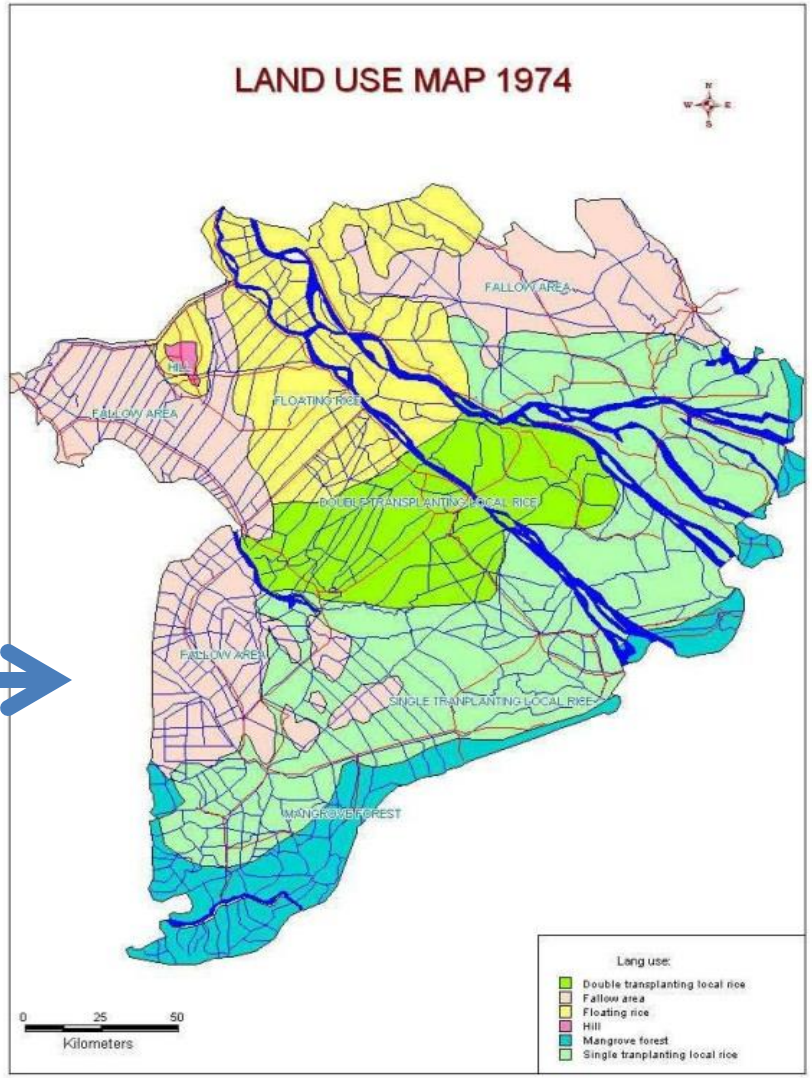
@ Huynh Ngoc Duc, 2012

Cultivated areas and yields of deep water rice in 1980s

Country	Areas (ha)	Yield (tons/ha)
Bangladesh – India (Gange Basin)	5.00 million	1.5-3.0
Myanmar -Irrawaddy Delta	1.28 million	1.0-2.0
Thailand - Chao Phraya Delta	0.76 million	1.8-2.2
Vietnam Mekong Delta	0.57 million	1.4-1.7 in acid sulphate soil (3.0 in alluvial soil)
Mekong Delta-Cambodia	0.41 million	1.4-1.7 (0.5-1.0 in acid sulphate soil)
West Africa	0.16 million	<1.0-1.5

Floating rice in the Mekong Delta, Vietnam before 1975

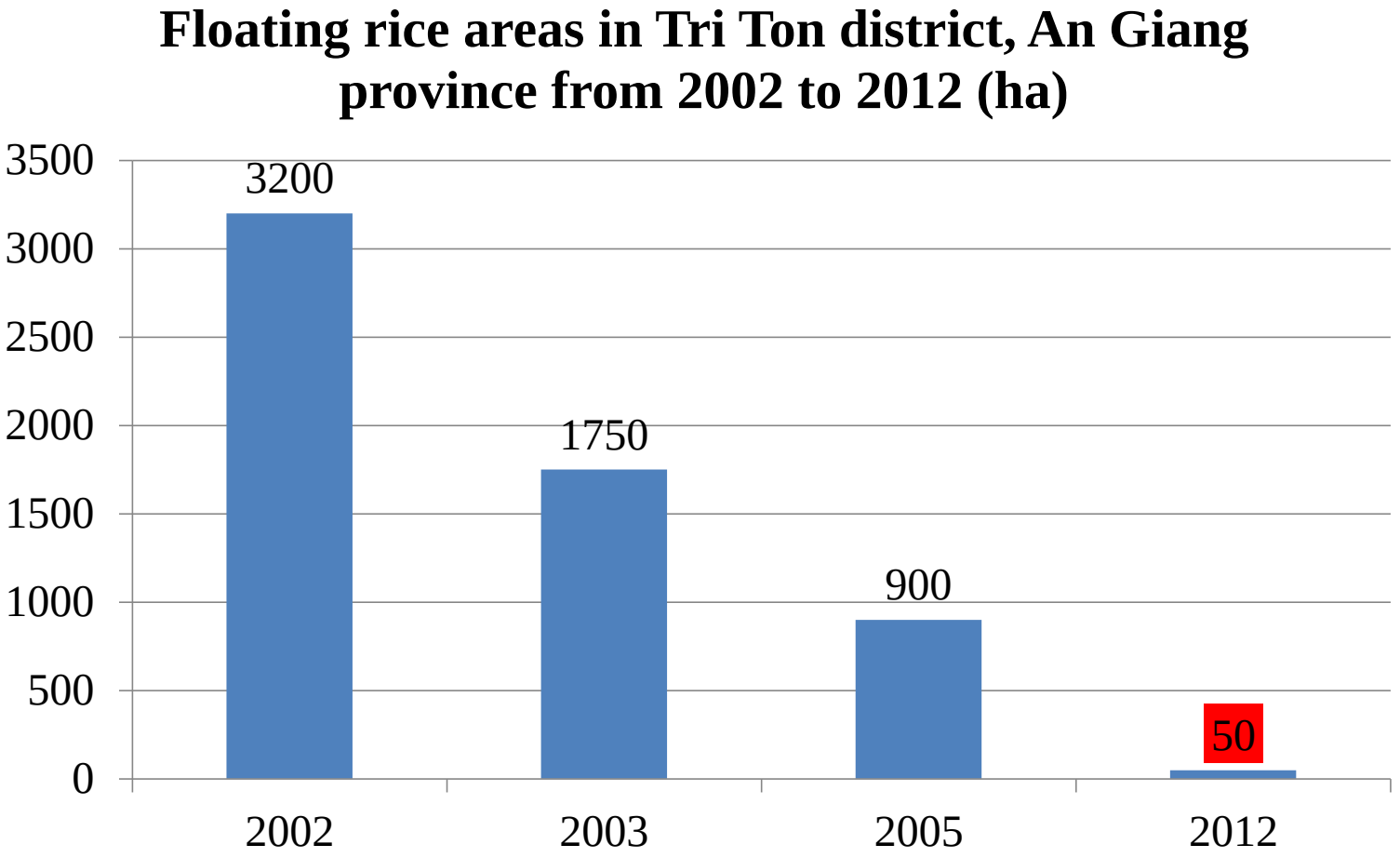




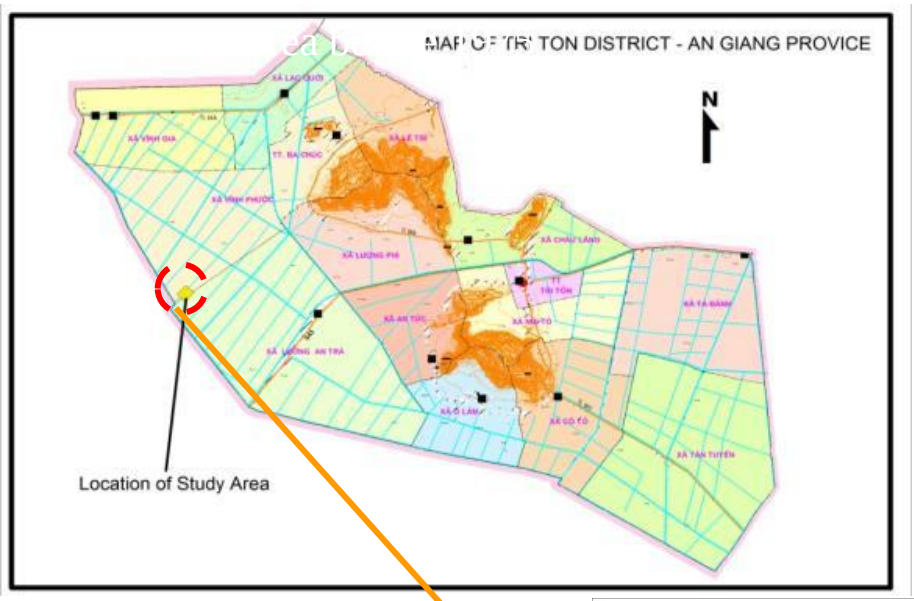
Adapted from: Catling (1992)

Adapted from: Võ Tòng Xuân and Matsui (1998)

Floating rice area in An Giang, Mekong Delta reduced significantly from 2002 to 2012

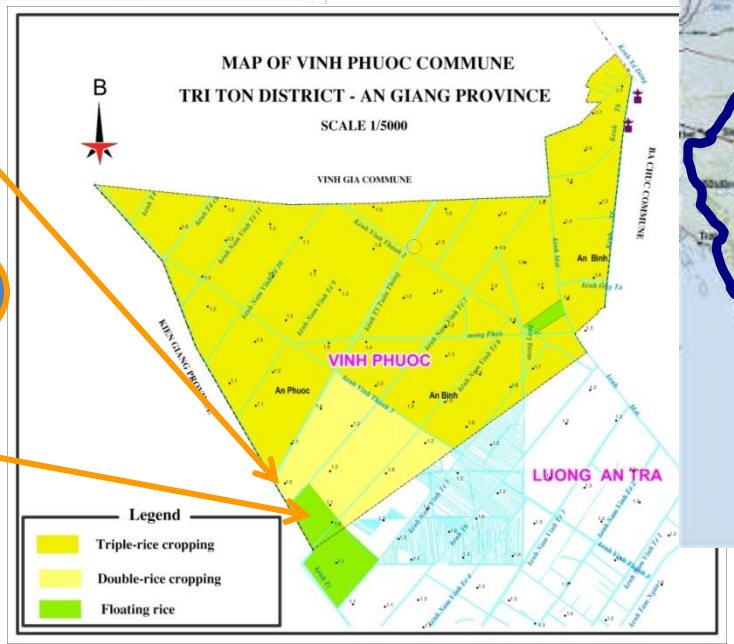


Current floating rice area in the Mekong Delta in 2013



Source: Phạm Duy Tiễn (2013)

50 ha remaining:
Project site

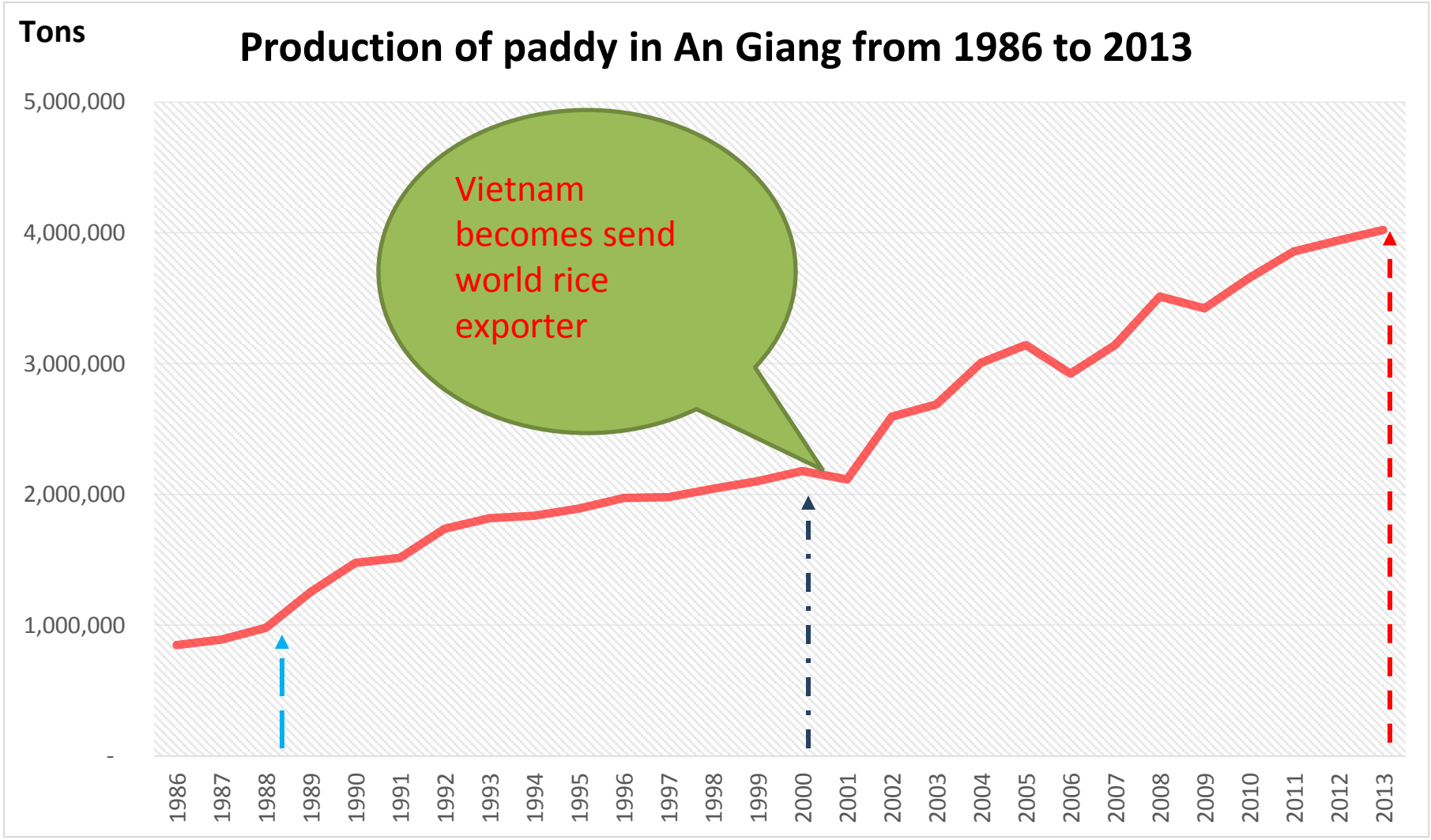


Why floating rice area in the Mekong Delta becomes smaller?

Green Revolution: Introduction of High Yield Variety (HYV) Rice, intensification of rice replaced floating rice areas

@ Dr. Kien, HYV rice fields (three crops/year) in Chau Phu district, An Giang province, 2017

Rice paddy production in the Mekong Delta increased four times from 1985-2013



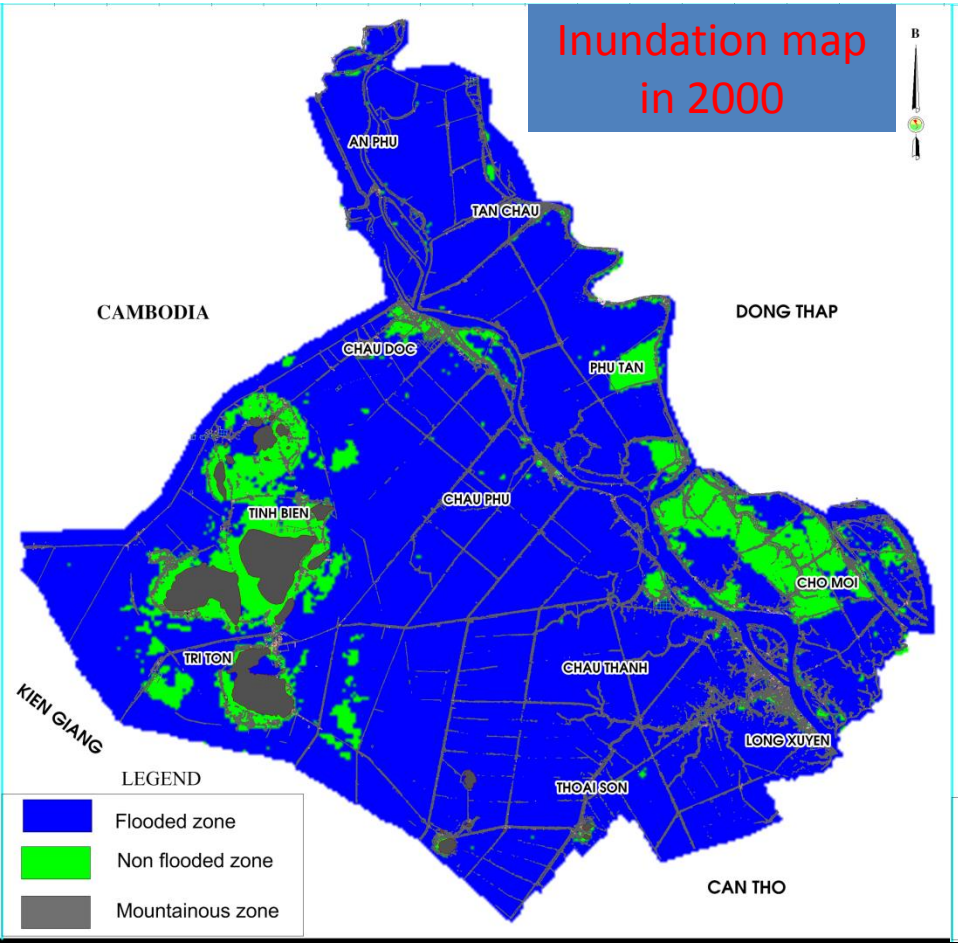
Source: GSO (1986 - 2013)

HYV rice intensification requires modification of delta, irrigation, using of pesticides and fertilizer

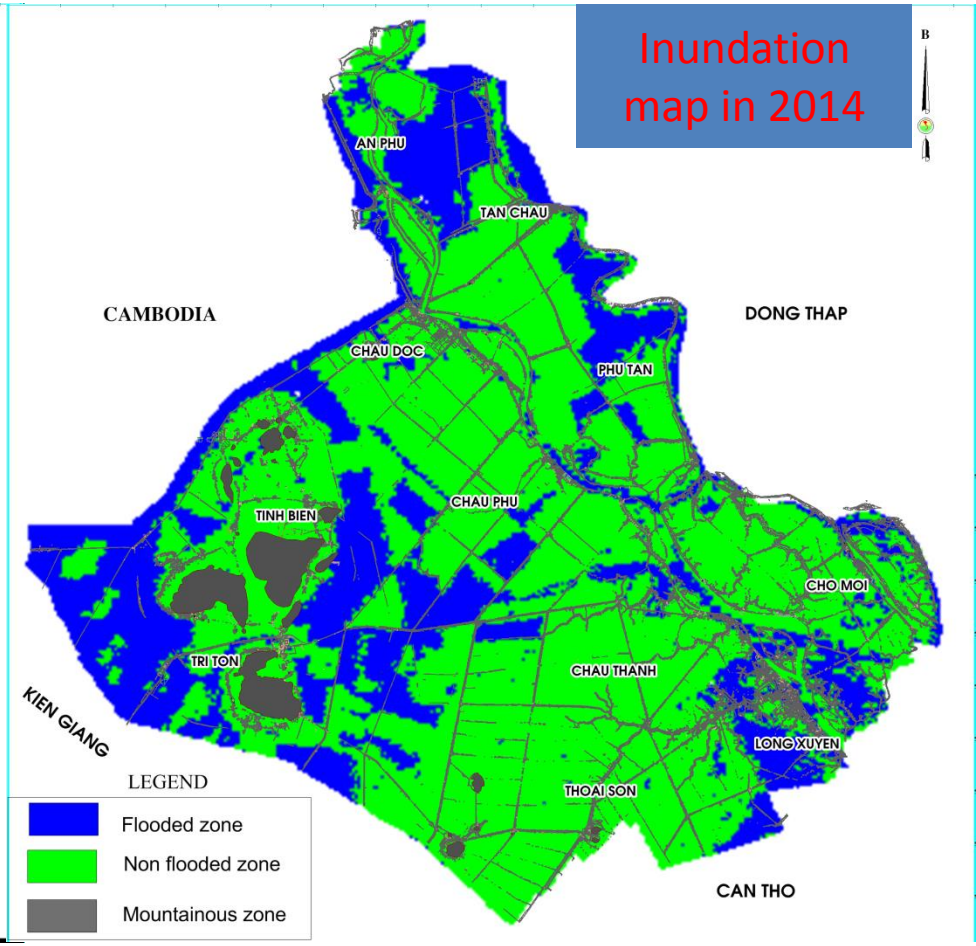
Dikes have been a key approach to control flooding and rice intensification in the Mekong Delta over the last three decades.

@ Van Kien Nguyen, 2013

More than 2/3 of An Giang province's total agricultural land area is covered by dikes



Source: Pham Duy Tien (2015)



Source: Pham Duy Tien (2015)

However: HYV rice intensification remains problems: Trade-off?

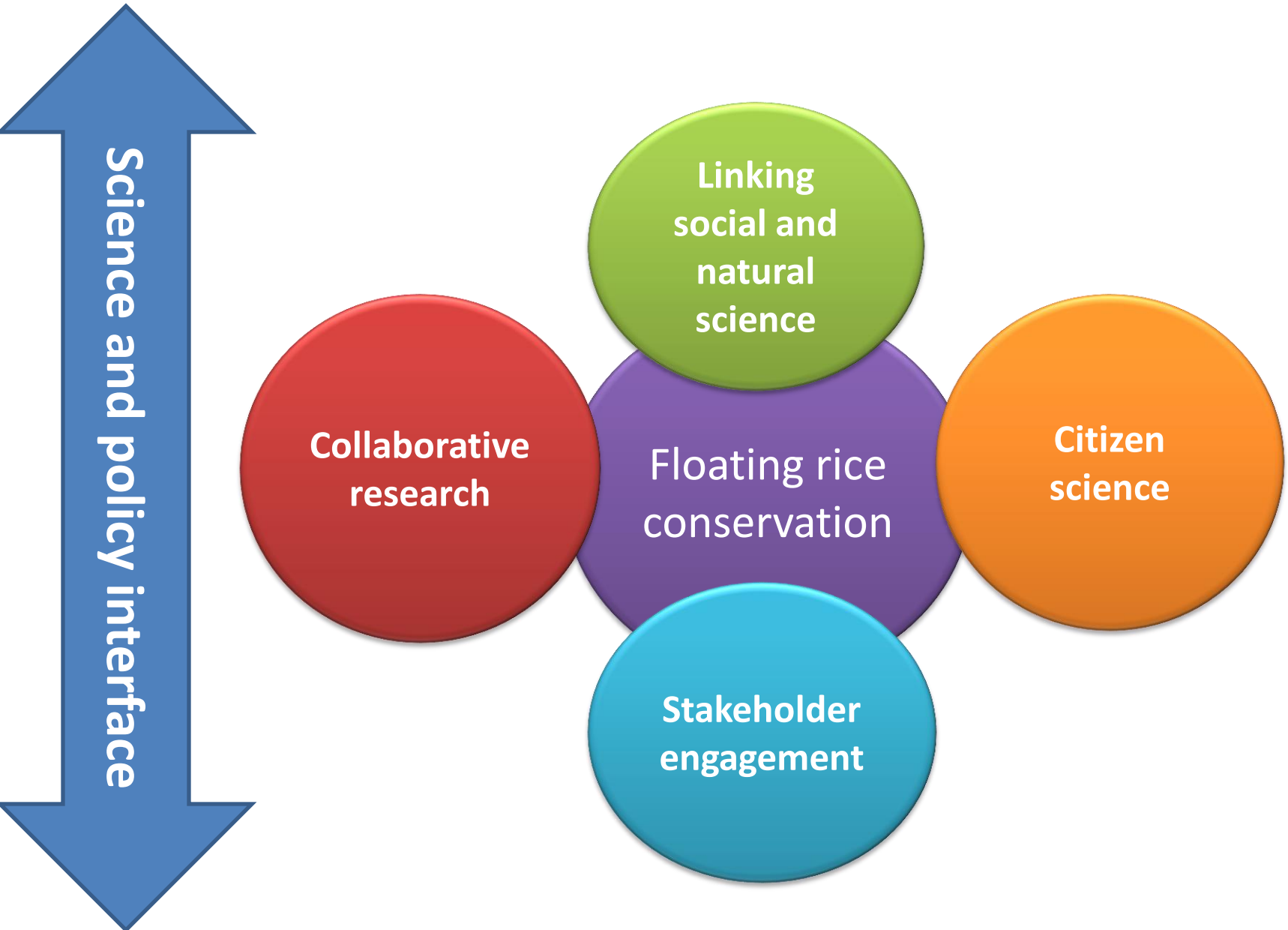
Soil degradation
Less wild fish
Less bio-diversity in rice fields

Flood risk – breach of dike compartment

Coping with floods – waste resources

Dike Failures

How to identify the problems and develop real solution?



In 2012, it is the starting point for developing the recovery floating rice project

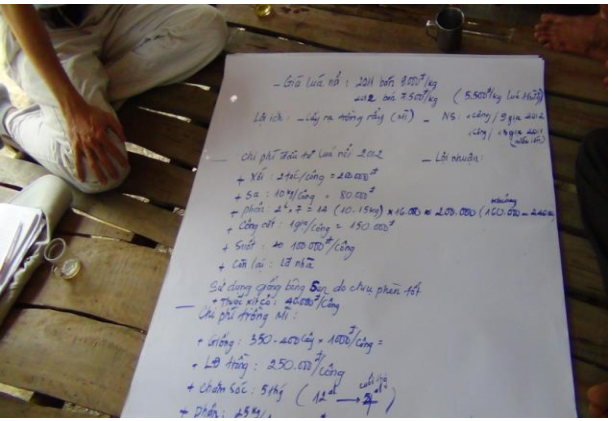
Initial meetings with farmers, leaders and local scientists:

Issues were identified

Why farmers still grow floating rice?
Why others converted to HYV Rice?

Economic, environmental, ecological values	Social values	Cultural values

Identify problems and opportunities



Formulation of the preservation project

A three year (2013-2016) co-design research project with community was developed

RCRD and Vinh Phuoc Commune's People Committee signed MoU and co-design a 3 year research program (2013-2016) on 12 June 2013 at Vinh Phuoc commune of Tri Ton district of An Giang province, Vietnam. This provided legal framework for action.

Why conservation of floating rice in the Mekong Region?

Recovering and maintaining floating rice-based agro-ecological farming systems is one option for **Conservation of Natural Resources for Food Security, Maintaining Flood-based Ecosystem Services & biodiversity and achieving a Sustainable Economy in the Mekong Delta and Mekong Region**

See references

Pittock J, Nguyen KV (2017). Rice: The role of traditional floating rice systems. ACIAR.

Nguyen, V. K., & Pittock, J. (2016). Floating rice in Vietnam, Cambodia and Myanmar: The Australian National University and An Giang University.

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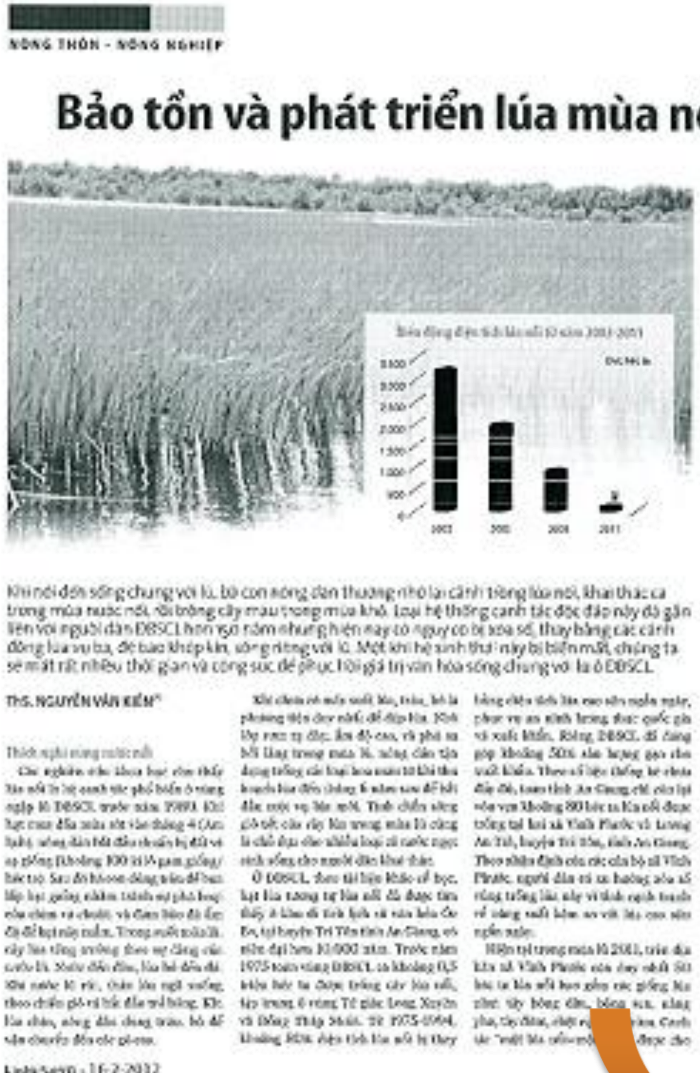
Nguyen, K. V., V. O. Vo and D. N. Huynh (2015). "Comparing the costs and benefits of floating rice-based and intensive rice-based farming systems in the Mekong Delta." Asian Journal of Agriculture and Rural Development **5**(9): 202-217.

How to communicate the problems?

Who are the target?

Raised the issues in National Newspapers entitled "Benefits of conservation of floating rice" by leading scientist



NÔNG THÔN - NÔNG NGHIỆP

Bảo tồn và phát triển lúa mùa nổi

Khi nói đến sống chung với lũ, bà con nông dân thường nhớ lại cảnh trồng lúa nổi, khai thác cá trong mùa nước nổi, rồi trồng cây màu trong mùa khô. Loại hệ thống canh tác độc đáo này đã gắn liền với người dân ĐBSCL hơn 150 năm nhưng hiện nay có nguy cơ bị xóa sổ, thay bằng các cánh đồng lúa vụ ba, đê bao khép kín, sống riêng với lũ. Một khi hệ sinh thái này bị biến mất, chúng ta sẽ mất rất nhiều thời gian và công sức để phục hồi giá trị văn hóa sống chung với lũ ở ĐBSCL.

THS. NGUYỄN VĂN KIÊN*

Thích nghi vùng nước nổi

N.V.Kien, Saigon Times, 2012

Nguyen Van Kien, No 8, dated 16-2-2012

AG people's committee issued the document N0 69/VPUBND-KT dated 06 March 2013 >>> support preservation of floating rice in An Giang province

Using Participatory Action Research identifies opportunities and challenges for conservation, to co-design the conservation action plan

Consultation with different stakeholders

Implemented action research with farmers and community (community-based variety selection & farming system)

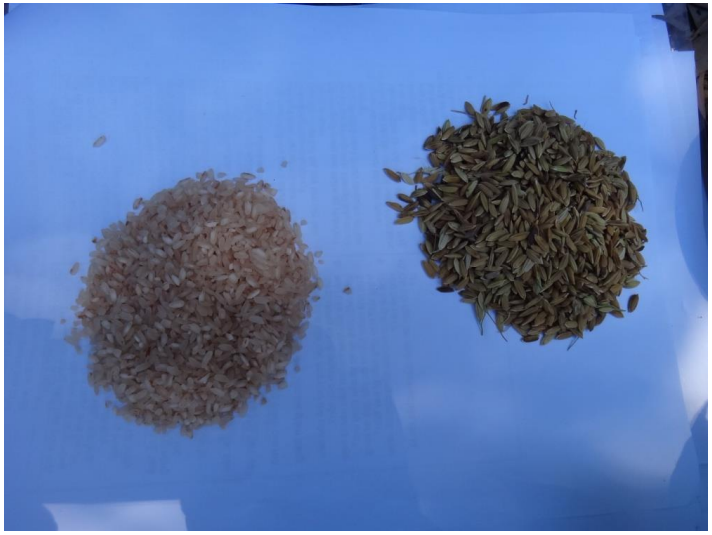
Apr		May			Sep			Nov-Dec		Jan	Feb	Mar

Sowing time

Adapting to floods

Harvesting time

Undertook filed experiments, social-cultural, value chain research, nutritional studies and trainings to farmers



Promoting niche market for floating rice to improve income and livelihood for farmers to conserve floating rice

Linking floating rice farmers to market via FLOATING RICE FESTIVAL, on 11 Jan 2014 (first festival in the Mekong Delta). The festival is repeated each year.

Note: The festival is now becoming the annual event in the Mekong Delta

Price of floating rice (paddies) increased by 3 times after the project operated in one year (in 2014)

Farmers sold floating rice “paddies” at VND 14,000/kg. Previously, farmers sold VND5,000/kg. in 2017, Cooking Studio Company bought paddies, milled, packed and sold floating rice in HCM city at VND 79,000/kg supported by RCRD/AGU research projects. Evidence is collected by RCRD team, Dr. Van Kien Nguyen.

What are the values of floating rice – based agro-ecological farming system?

How were the values communicated?

To whom?

Economic analysis of the floating rice based – intensive rice farming systems – talking to farmers and other stakeholders/decision makers

Locations	Farming Systems	Net return (VND/1000m^2)	Benefit/Cost Ratio
Chau Phu district	3 rice crops/year(*)	4,827,200	0.71
Thanh My Tay commune	2 rice crops/year	2,484,363	0.62
	2 rice crops + one cattle/year	13,959,780	0.56
	Chili + one cattle/year	15,685,217	0.54
	Chili + one Sesbania sesban crop	7,858,700	0.62
	2 rice crops + one Sesbania sesban crop	6,133,263	0.71
My Phu Commune	2 rice crops	2,620,881	0.57
	2 rice crops + one cattle/year	11,960,101	0.50
	Maize – Mung bean	11,047,000	1.07
	Mung bean-pumpkin-rice	4,496,826	0.40
	Maize- maize	21,014,000	1.75
Tri Ton district	Floating rice - cassava	4,425,000	1.81
	Floating rice - leeks	24,895,000	1.68
	Floating rice - chili	17,745,000	2.68
Thanh Binh district – Dong Thap	Floating rice - chili	16,763,314	1.12
Cho Moi district	Floating rice – sticky corn- baby corn- baby corn- cattle (**)	18,557,500	0.48
	Floating rice – sticky corn- baby corn- baby corn	11,025,000	1.24

Source: Nguyen KV, Vo VO, Huynh DN (2015) Comparing the costs and benefits of floating rice-based and intensive rice-based farming systems in the Mekong Delta Asian Journal of Agriculture and Rural Development 5:202-217.

Environmental BENEFITS: Wild fish return to floating rice fields – LESS fish was found in high dike areas with HYV rice paddies

HYV Rice fields inside high dike compartments- no fish
@ Van Kien Nguyen, 2015

Poor farmers harvest fish – self subsistence for 3-4 months. They cooked, made fish sauce, and fermented fish for using year round (Group interview, 2013)

Environmental benefits –Improve floating rice field biodiversity

Aquatic plants at floating rice fields during floods

Source: Nguyen Van Kien, et al. (2016). Long-term biophysical and socio-economic monitoring of floating rice-based and intensive rice farming systems in Mekong Delta United Kingdom, Rufford Foundation: 6.
http://www.rufford.org/projects/van_kien_nguyen

Biodiversity values in the floating rice were improved

Indicators	Vinh Phuoc Commune		My An commune	
	Floating rice fields	Triple rice crop fields (HYV)	Floating rice fields	Triple rice crop fields (HYV)
Fresh water fish	-8 families -20 species	Non	-4 families -5 species	Non
flora	-37 families -68 species	No monitoring	- 25 families - 56 species	-20 families - 30 species
Birds	- 34 species		- 12 species	
Reptiles	- 13 species		- 12 species	

Source: Nguyen Van Kien et al. (2016) Long-term biophysical and socio-economic monitoring of floating rice-based and intensive rice farming systems in Mekong Delta Rufford Foundation, United Kingdom
http://www.rufford.org/projects/van_kien_nguyen

What are the BENEFITS of recovering floating rice based agro-ecological faming system for food security?

Nutritional Values of Floating Rice in An Giang province were tested in 2014

•Floating rice has high protein: 11.3-11.5%, higher than normal short-term white rice, Vitamin E: 56.5-69.9 mg/kh, five times higher than short-term white rice

• Protein content in floating rice is more than by 3% compared with data from USDA (USDA, 2014).

• The rice contains high in anthocyanin, particularly for 0% milled rice (43.6±3.12mg/kg).

• Vitamin E content is also high (56.5-68.90mg/kg) as compared with normal rice (12mg/kg).

• Amylose content ranges from 18.83±0.61% (0% milled rice) to 27.96±0.61% (16% milled rice).

This could be referred to as high amylose rice and medium GI rice.

Sources:

Ho, B. T., & Tran, K. N. (2015). *Quality characteristics of floating rice (Oryza sativa L.) in the Mekong Delta of Vietnam: a preliminary study. Paper presented at the Tropical Agriculture Conference 2015, Brisbane, Australia.*

Zambrano AD, Bhandari B, Binh Ho, Prakash S (2016) Retrogradation – digestibility relationship of selected glutinous and non-glutinous fresh and stale cooked rice. International Journal of Food Properties 19:2608–2622

Recovery of floating rice is adapting to climate change?

Thick rice straw can be efficient mulches for keeping soil moisture in dry vegetable crops

Floating rice fields with mulches

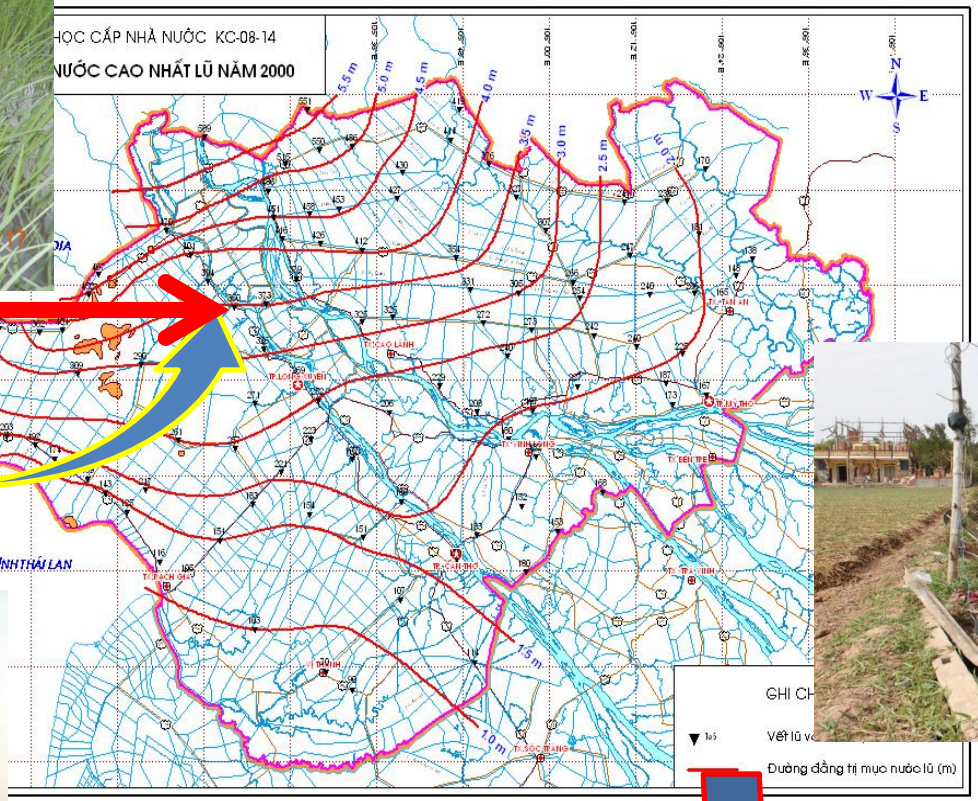
Dike areas (HYV Rice) without mulches

Environmental benefits –Created Rooms for Flood Retention

Dikes– risk of breach

Floating rice areas create “open space” for flood retention

Potential for ground water recharges in downstream communities



Trade-off between DIKES or Floods?

Extraction of groundwater downstream

Preservation of social-cultural significance & conservation of floating rice

Social-cultural significance: gender empowerment

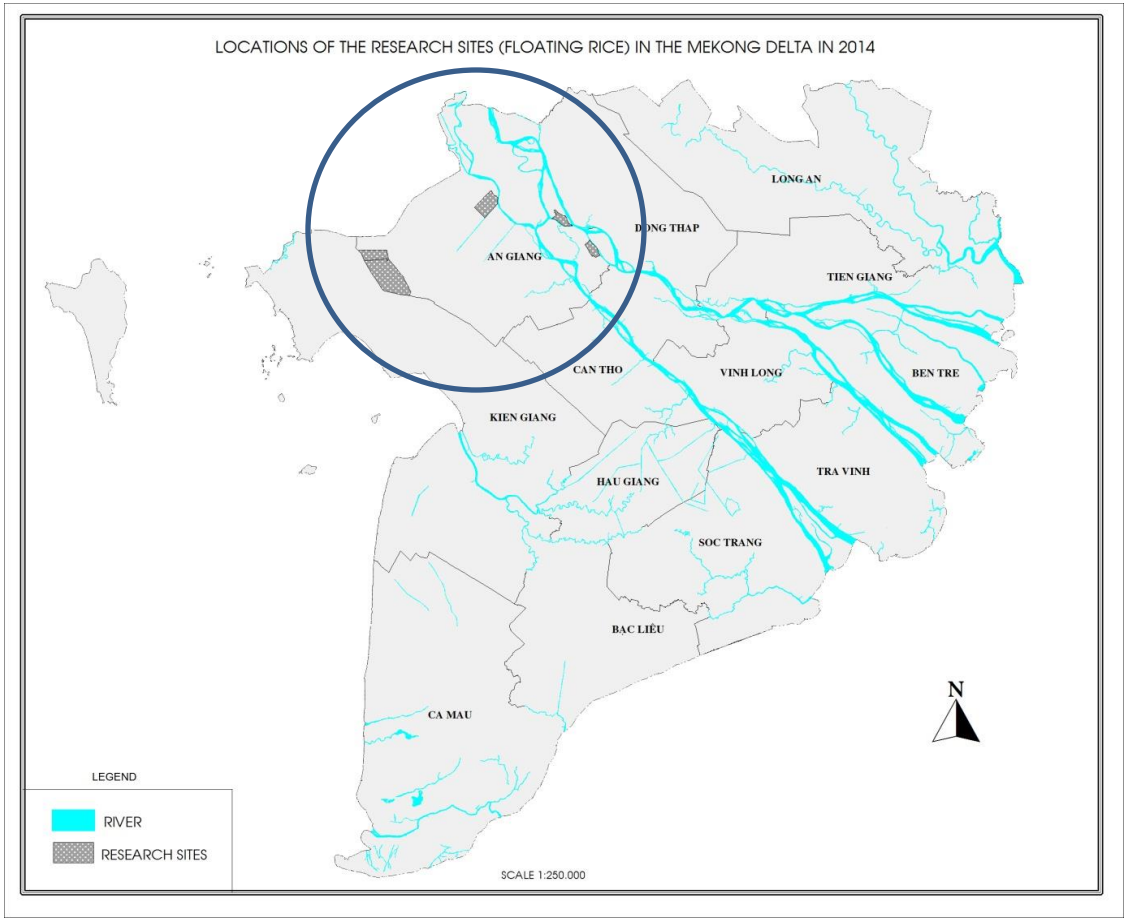
Women are more confident to involve in the projects

Social trust improvement: Researchers + Farmers =1

RCRD staffs provided floating rice seeds for farmers

Project achievement after 3 years (2013-2016)

Four research sites were promoted for 3 years. Over 200 ha were recovered after 3 years

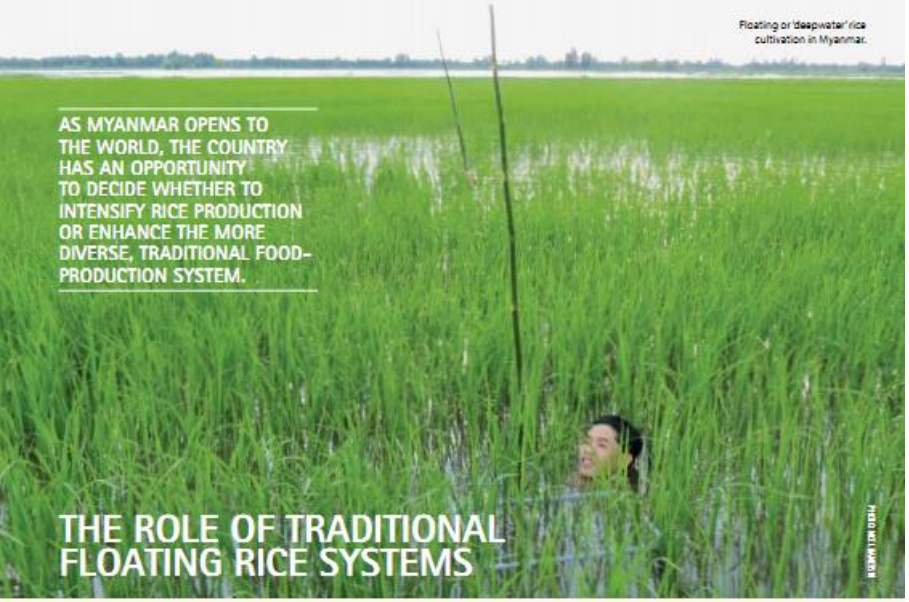


Map of the Mekong Delta's floating rice research sites:
Project sites: Vinh Phuoc-Tri Ton/AG; My An-Cho Moi/AG; Tan Long-Thanh Binh/Dong Thap; and Hong Ngu/Dong Thap
Source: Nguyen, V. K., et al. (2015). "Comparing the costs and benefits of floating rice-based and intensive rice-based farming systems in the Mekong Delta." Asian Journal of Agriculture and Rural Development **5**(9): 202-217.

Scientific values: Publications and presentation at International Conferences, international and regional journals

http://www.mekongcommons.org/conserving-the-benefits-of-floating-rice-in-viet-nam/

International collaboration



Floating or 'deepwater' rice cultivation in Myanmar.

AS MYANMAR OPENS TO THE WORLD, THE COUNTRY HAS AN OPPORTUNITY TO DECIDE WHETHER TO INTENSIFY RICE PRODUCTION OR ENHANCE THE MORE DIVERSE, TRADITIONAL FOOD-PRODUCTION SYSTEM.

PHOTO: MITSUI & CO.

THE ROLE OF TRADITIONAL FLOATING RICE SYSTEMS

BY **ASSOCIATE PROFESSOR JAMIE PITTOCK** AND **DR KIEN VAN NGUYEN**
Australian National University

Governments across South-East Asia have programs to intensify rice production but researchers from the Australian National University (ANU), the Research Association for Development, Cooperative University (Myanmar) and An Giang University (Vietnam) are arguing for the conservation of the traditional, once-per-year crop of floating (or deep-water) rice in Myanmar.

When wet-season floods inundate the plains the floating rice plants grow very fast, up to 4 metres high in the water column, and form good habitat for fish. When the floods recede the rice is harvested, leaving the land with a thick mulch of rice straw suitable for supporting vegetable production, such as black gram beans.

This project is assessing the benefits and costs of conserving floating rice in Vietnam, where little remains, and extending the lessons to Cambodia and Myanmar—countries that have not yet undertaken widespread intensification of rice production.

Over the past two decades, governments in Vietnam, with support from international donors, have built extensive networks of dykes to control the annual floodwaters and enable production of two or three crops of rice per year. Now Vietnamese governments are setting targets for restoration of floating rice fields from the 200 hectares remaining. The research has found that although Myanmar has lost 42% of its floating rice fields, about 748,000 ha remains. As Myanmar opens to the world, the country has an opportunity to decide whether to intensify rice production or enhance the more diverse, traditional food-production system.

The Government of Myanmar has a policy of tripling rice exports to 4 million tonnes per year by 2020. A workshop in 2016 with farmers, researchers and government officials agreed on three priorities to improve the benefits for farmers from floating rice production:

1. Improve understanding of the range of floating rice varieties to enable farmers to select the genetic qualities needed to better adapt to changing flood regimes.
2. Increase farmers' knowledge on how they can better integrate dryland vegetable crops into their floating rice farming system.
3. Develop better markets based on the low farm chemical and more nutritious qualities of floating rice.

Key to conserving the red floating rice varieties as a low-volume but high-value crop is the development of markets. Floating rice has high protein, vitamin E and anthocyanin compared with high-yield white rice, but has a different texture and flavour. Identification of domestic and international markets for floating rice as a healthier choice is an objective for the next stage of this research. ■

The project is supported by the Mitsui & Co. Environment Fund and the Luc Hoffmann Institute for conservation research. Associate Professor Pittock has worked on several ACIAR projects.

MORE INFORMATION: Associate Professor Jamie Pittock, jamie.pittock@anu.edu.au

REPORT

Floating Rice in Vietnam, Cambodia and Myanmar

Nguyen & Pittock
2016

Attracted International and local donors for research for conservation of floating rice-based agro-ecological farming in the Mekong Region

2013	2014	2015	2016-2019

Floating rice status in the Mekong Region (Cambodia, Vietnam, Myanmar)

A great area for conservation: linking conservation and livelihood

Unit: Ha

	c.1990	2010	2015	% Loss
Vietnam MRD	570,000	na	200	99.9
Cambodia	410,000	95,858	46,759	88.6
Myanmar	1,280,000	850257	745,037	41.8
Total	2,260,000		791,996	65.0

Nguyen & Pittock (2016)

Expending the project in the Mekong Region (Cambodia, Vietnam, Myanmar)

Floating rice in Myanmar

Floating rice in Cambodia

Floating rice in Vietnam

Potential research to link Sarus Crane and Wild Rice Conservation in Myanmar

Sarus crane

@ Dr. Kien at wild rice areas (2000 acre) in Kutukama village, Nyangdon township, Ayeyawady region, Myanmar

Future is unpredictable (too much water or too little water?)

Floating rice research team at RCRD was examining rice depth during flood year 2013 in Vinh Phuoc commune, Tri Ton district, An Giang province

Video of the project: https://www.youtube.com/watch?v=gIi19kLZ3xM

Publications on floating rice-based agro-ecological farming systems

Pittock J, **Nguyen KV** (2017). Rice: The role of traditional floating rice systems. ACIAR.

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Nguyen VK (2017 (Accepted)) Conservation of floating rice in the Mekong Delta, Vietnam. Paper presented at the 28th International Congress for Conservation Biology, 23-27 July 2017, Cartagena de Indias, Colombia,

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Nguyen Van Kien, Huynh Ngoc Duc, Nguyen Trung Thanh, Le Cong Quyen, Trinh Hoai Vu, Le Tri Thich, . . . Tran Thi Thuan. (2016). Long-term biophysical and socio-economic monitoring of floating rice-based and intensive rice farming systems in Mekong Delta (pp. 6). United Kingdom: Rufford Foundation.

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International research projects on floating rice based agro-ecological faming systems in the Mekong Region

No	Project titles	Funders	*Period*	Budget	P Investigators
1	Promoting floating rice-based agro-ecological farming systems for a healthy society and adaptation to climate changes in the Lower Mekong Region and Myanmar. This project aims to identify the needs and commitment from governments to extent floating rice-based farming systems in the Mekong region and Myanmar.	Mitsui Environment Fund	2017-2019	AUD 320,000	Jamie Pittock & Van Kien Nguyen **Partners:** RCRD/AGU ECOLAND/RAU Yangon University
2	Selection of high quality traits of floating rice in An Giang province. This project aims to purify two traits of floating rice seeds in An Giang province.	**An Giang Department of Sciences and Technology**	*2015-2019*	**AUD 66,000**	Faculty of Agriculture and Natural Resources & RCRD – Dr N.T.T.Xuan, PI
3	Towards non-toxic environment in Asia Pacific. This project supports community-based floating rice seed selection activity.	**PAN AP**	*2013-2018*	**AUD 17,000 annually**	Dr. Van Kien Nguyen, PI RCRD, An Giang University
4	Resources Governance for Future Livelihoods in the Mekong Delta. This project supports testing farming systems of the floating rice and other upland crops such as chilli, cassava and sesame.	**LMPPI-USAID**	*2015-2017*	**AUD 177,000**	Fulbright Program in Ho Chi Minh City Can Tho University RCRD (Dr. Van Kien Nguyen, co-PI)
5	Conservation of the floating rice –based agro-ecological farming systems in the Mekong Delta, Vietnam	AliSEA	2017	AUD 12,000	Dr. Van Kien Nguyen, PI RCRD, An Giang University

No	Project titles	Funders	*Period*	Budget	Investigators
6	Scoping floating rice-based agro-ecological farming systems for a healthy society and adaptation to climate changes in the Lower Mekong Region and Myanmar. This project aims to identify the needs and commitment from governments to extent floating rice-based farming systems in the Mekong region and Myanmar.	**Mitsui & Co., Ltd. Environment Fund Fiscal 2015**	*2016*	**AUD 43,000**	Van Kien Nguyen & Jamie Pittock RCRD/AGU (VN), ECOLAND/RUA (Cambodia), Cooperative University (Myanmar)
7	Long-term biophysical and socio-economic monitoring of floating rice-based and intensive rice farming systems in Mekong Delta. This project supports baseline monitoring of soils, water, biodiversity, and socio-economic indicators of the floating rice farmers in three project sites (Vinh Phuoc & Luong An Tra communes of Tri Ton district, and My An commune of Cho Moi district.	**Rufford Foundation** **[complete]**	*2015-2016*	**AUD 8,000**	Dr. Van Kien Nguyen, PI RCRD, An Giang University
8	Recovering and valuing wetland agro-ecological systems and local knowledge for water security and community resilience in the Mekong Region. This project investigates the capacity of community to recovery and adapt to water scarcity and shortage in the Mekong Delta.	**SUMERNET** **[complete]**	*2014-2015*	**AUD 118,000**	Dr. Carl Middleton, PI (Chulalongkorn University, Thailan) Dr. Van Kien, co-PI Nguyen (RCRD)
9	Enhancing Resilience of the Community through Climate Change Adaptation: Research and Training Activities for Preservation and Development of Floating Rice-Vegetables Farming Systems in Vinh Phuoc Commune, Tri Ton District, An Giang Province, Mekong Delta, Vietnam. This project supports studying resilient farming systems of the floating rice, and provides trainings on economic, safe production and biodiversity	**SFRT – SEARCA** **[complete]**	*2013-2014*	**AUD 17,000**	Dr. Van Kien Nguyen, PI RCRD, An Giang University

Floating Rice Project websites

Mitsui-ANU: On-going
https://www.mitsui.com/jp/en/sustainability/contribution/environment/fund/results/1224468_7406.html
https://www.mitsui.com/jp/en/sustainability/contribution/environment/fund/results/1221735_7406.html

AliSEA: on-going (Book publication)
http://ali-sea.org/item/alisea-sgf-conservation-of-the-floating-rice-based-agro-ecological-farming-systems-in-the-mekong-delta/

Rufford Foundation (complete) – research report
https://www.rufford.org/projects/van_kien_nguyen

SUMMERNET – (complete) – book chapter
http://www.sumernet.org/content/first-steps-toward-wetland-and-agro-ecological-farming-recovery-mekong-region

LMPPI-USAID (complete)
http://www.lmppi.edu.vn/

RCRD/AGU
http://rcrd.agu.edu.vn/duanluamuanoi/?q=vi/hoat-dong-cua-du-an

Videos, Newspapers and Facebook about floating rice in the Mekong Region

https://luchoffmanninstitute.org/fellows/meet-our-fellows/kien-van-nguyen/
http://nhandantv.vn/hoi-sinh-lua-mua-noi-an-giang-v47460
https://nelson.wisc.edu/events/event.php?e=3443
http://fennerschool.anu.edu.au/news-events/role-traditional-floating-rice-systems
https://www.youtube.com/watch?v=TEMb2TTCECU
https://www.youtube.com/watch?v=5rz2iQhLPZo
https://www.researchgate.net/publication/280717475_Floating_rice-based_systems_in_An_Giang_Orovince_Vietnam
http://www.mekongcommons.org/conserving-the-benefits-of-floating-rice-in-viet-nam/
https://www.omicsonline.org/proceedings/the-values-and-recovery-progress-of-floating-ricebased-agroecological-systems-for-adaptation-to-climate-change-in-the-vi-55643.html
https://www.rufford.org/projects/van_kien_nguyen
http://econpapers.repec.org/article/asiajosrd/2015_3ap_3a202-217.htm
http://econpapers.repec.org/article/asiajosrd/2015_3ap_3a202-217.htm
http://rcrd.agu.edu.vn/duanluamuanoi/sites/default/files/Nguyen%20Van%20Kien%20-%20TTNCPTNT-DHAG.pdf
http://www.thesaigontimes.vn/118864/Lua-mua-noi-van-con.html
http://www.thesaigontimes.vn/122810/Chuyen-gia-Nen-bao-ton-cay-lua-mua-noi.html
http://thanhnien.vn/kinh-doanh/lua-mua-noi-song-lai-539358.html