Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Sustainable agriculture and its role in maintaining ecosystem services: cases and projects

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Regional Office for Asia and the Pacific
Brisbane, 15 Mar 2023

Regional Flyway Initiative:
Understanding Wetland Ecosystem Services and How to Assess Them

Training Series at the EAAFP Meeting of Partners (MOP11)

14 & 15 Mar 2023

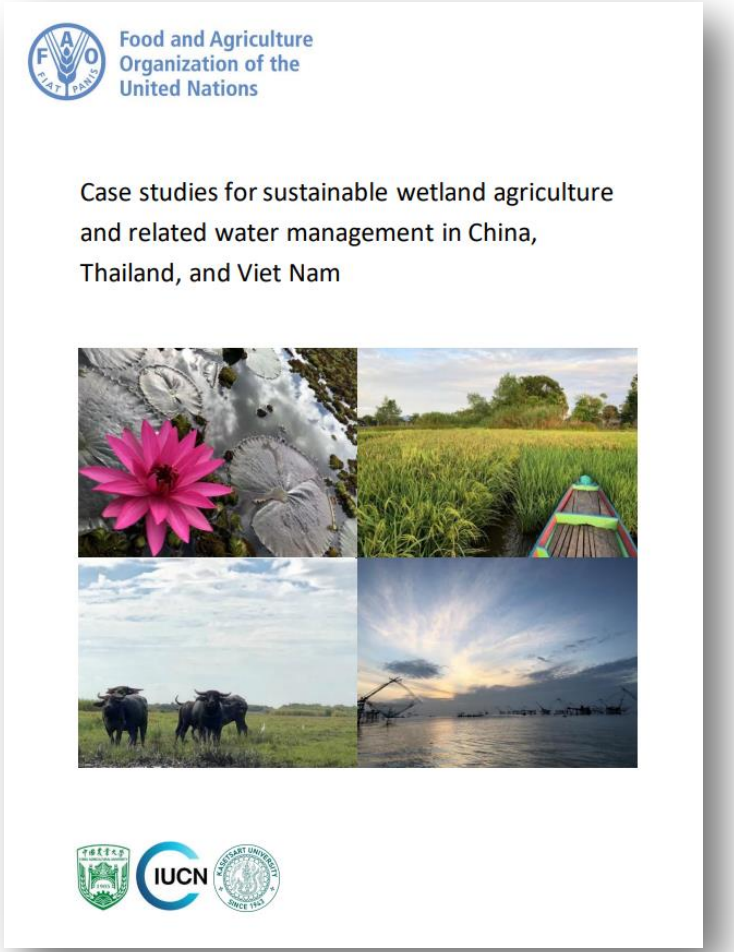
Cross cutting issues and relevant FAO technical divisions/units

- Land and water
- Biodiversity team
- Forestry
- Agriculture/aquaculture production
- ……

Contents for the presentation

- Wetlands and agriculture
- Cases from Thailand: organic rice and GIAHS wetland site designation
- Cases from People's Republic of China: PES and FAO-GEF wetland project
- Floods/flooding cases from Thailand, Viet Nam, Bangladesh and Japan
- Sustainable rice: FAO technical products/tools/proposals

Wetlands and agriculture



Key recommendations for wetland conservation and sustainable agriculture

- Promote the **coexistence** of agriculture and wetlands;
- Use **interventions** available to **rebalance** economic development and ecosystem health of wetlands through participatory processes and the formulation of incentives; and
- Take into account integrated resources management through **adaptive and ecosystem approaches**, in particular, in the context of dynamic drivers of socioeconomic and climate change.

Cases from Thailand

- Organic rice “Sarus crane rice”
- GIAHS wetland site designation

Sarus crane nesting in the buffer zone of Huai Chorakhemak wetland non-hunting area

“Sarus rice” (organic rice)

Wetland and Eastern Sarus Crane Conservation Center, Buriram Province

Comparison of paddy rice production cost between organic and regular (THB/rai, 1 rai = 0.16 ha)

No	Item	Organic	Chemical/traditional
1	Rice seed	250	750
2	Ploughing	450	450
3	Labour for growing	260	80
4	Organic fertilizer	300	
5	Chemical fertilizer		700
6	Labour for fertilizer application		50
7	Weeding cost	400	100
8	Pesticide/herbicide		40
9	Labour for pesticide application		100
10	Labour for harvesting	600	600
11	Labour for drying	300	500
12	Transportation	50	70
Total		2 680	3 440

Cost-benefit analysis for organic and traditional paddy (per ha)

		Organic				Traditional			Additional net income (per hh/year) USD [c]
Year	Cost (USD)	Yield (kg)	Income (USD) [a]	Net income (USD)	Cost (USD)	Yield (kg)	Income (USD) [b]	Net income (USD)	
1	560	1 563	3 333	2 773	717	2 500	2 917	2 200	1 284
2	560	1 720	3 667	3 107	717	2 500	2 917	2 200	2 032
3	560	1 875	4 000	3 440	717	2 500	2 917	2 200	2 778
4	560	2 031	4 333	3 773	717	2 500	2 917	2 200	3 524
5	560	2 188	4 667	4 107	717	2 500	2 917	2 200	4 272
6	560	2 344	5 000	4 440	717	2 500	2 917	2 200	5 018
7	560	2 500	5 333	4 773	717	2 500	2 917	2 200	5 764

GIAHS (example one): Wetland-Buffalo Pastoral System Thale Noi, Phatthalung Province, Thailand

Agricultural Research and Development Center supporting the sustainable agriculture

Cases from People's Republic of China

- PES, Eco-compensation programme, Poyang Lake
- FAO-GEF project

The eco-compensation programme in 2019

Implementation area	Actual available funds ($\times 10^3$ CNY)	Compensation for loss	
		Completed area (km^2)	Benefited household
Jiangxi Subtotal	27 000	72.44	108 217
Jiangxi Poyang Lake National Nature Reserve	6 000	-	-
Jiangxi Poyang Lake Nanji Wetland National Nature Reserve	2 000	4.17	709
Duchang County	2 000	12.04	18 679
Poyang County	4 000	6.00	849
Xinjian District	2 000	15.83	12 874
Jinxian County	2 000	4.85	1 176
Yugan County	2 000	8.13	53 000
Lushan City	1 000	0.01	5
Nanchang County	500	-	-
Yongxiu County	2 500	11.09	1 621
Hukou County	500	2.98	6 010
Lianxi District	500	3.59	6 983
Gongqingcheng City	500	3.75	2 915
Dongxiang District	500	-	-
Nanchang Five-Star Protection Community	1 000	-	-

Eco-compensation programme, Poyang Lake

- The eco-compensation programme and the current compensation rate
- The implementation and challenges
- The suggested rate, based on farmers' willingness to be compensated and the rate estimated by the opportunity cost method

FAO-GEF Poyang Lake project: Piloting Provincial-level Wetland PA System in Jiangxi Province

- ➢ Co-management activities
  - ✓ Eco-tourism
  - ✓ Organic/green farming
  - ✓ Wastewater treatment
  - ✓ Hiring farmers to do the monitoring and patrolling
  - ✓ Training for alternative livelihoods
- ➢ Wetlands restoration and water management pilots
- ➢ Wetlands NR management, capacity building, networking, policy

Floods/flooding cases

- Thailand
- Viet Nam
- Bangladesh
- Japan

Thailand: change of cultivation calendar to accommodate floods in harvested paddy field

Rice period													% of farmers
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
3x harvest before BRM 60	2nd rice cultivation				3rd rice cultivation				1st rice cultivation				10%
2x harvest before BRM 60		1st rice cultivation						2nd rice cultivation					90%
2x harvest with BRM 60	1st rice cultivation								2nd rice cultivation				95%
3x harvest with BRM 60	2nd rice cultivation				3rd rice cultivation				1st rice cultivation				5%

The support from government to facilitate the change of farming calendar

- Provision of irrigation water during the dry season
- Short duration rice varieties are freely provided
- Prolonged fishing during the flood period
- Challenges

Flood retention in abandoned paddy

Viet Nam: floods based/adaptive farming

Viet Nam: rice cultivation 3-3-2 model

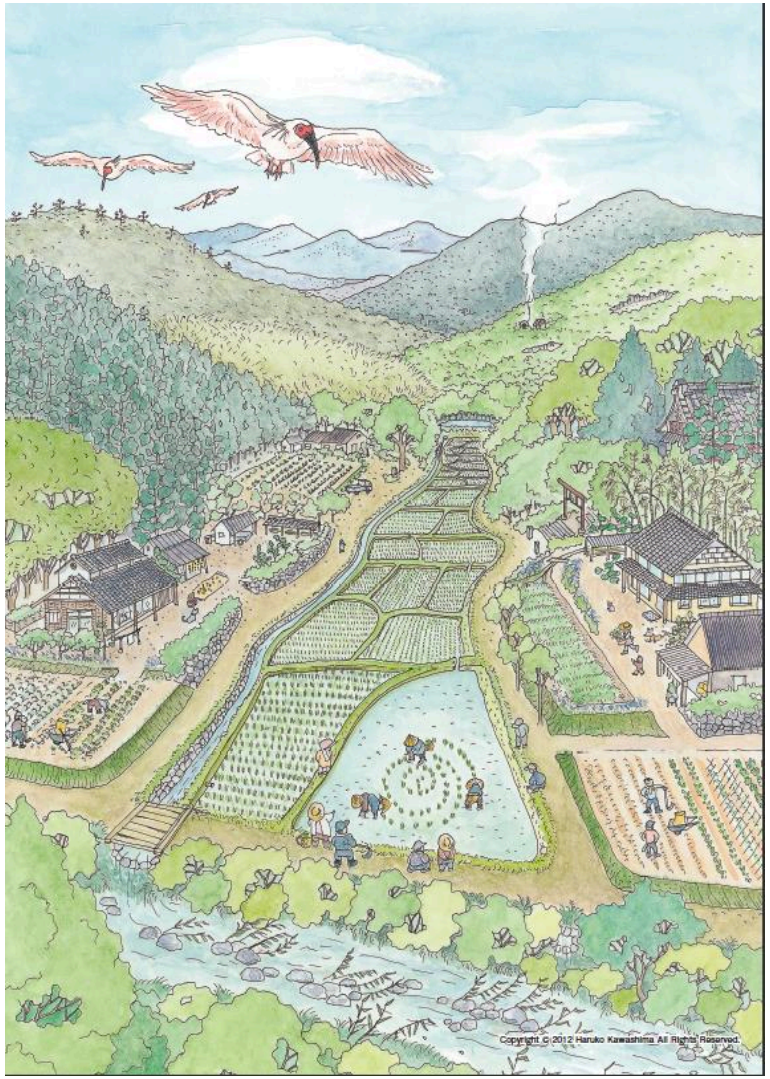
Water management and the cropping

- Open flood zone (no dykes)
- Flood control zone (low dykes)
- Closed flood control zone (high dykes)

Bangladesh: FAO project for coping with floods/saline

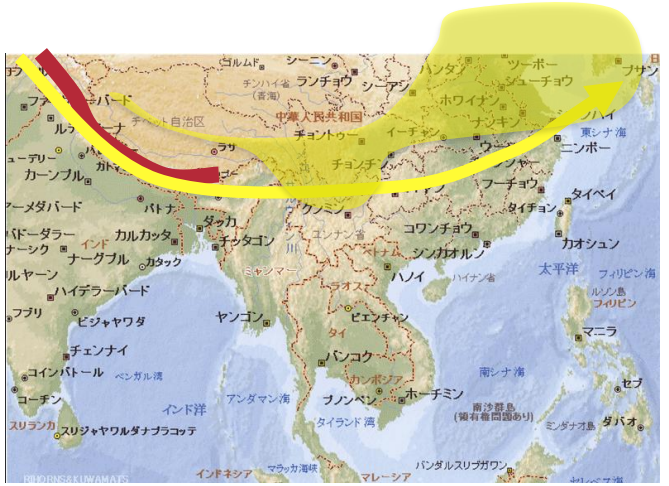
Agriculture Practices for Wetland Ecosystem	Name of the technology to be piloted under wetland condition at farmers' field
Sorjan Agriculture	Sorjan agriculture practices (on farmers' existing ones) for year round vegetables and fruit cultivation
Floating Agriculture	Floating agriculture for vegetables/spices cultivation and their seedling raising
Pyramid Agriculture	Pyramid agriculture for year round vegetables cultivation
Raise bed with mulching	Year round vegetables cultivation through raise bed with mulching
INM of sunflower	Integrated Nutrient Management for sunflower cultivation in southern coastal saline area
PTOS for pulses	Cultivation of pulses (mungbean, cowpea etc.) under rice fallows using Power Tiller Operated Seeder (PTOS) in southern coastal saline area of Bangladesh
Eco-friendly pest management	Eco-friendly pest management of vegetable and fruit crops for safe food production

Japan: GIAHS (example two)



Satoyama (里山)
A complex of semi-natural landscape elements
rice paddy fields, secondary forests, irrigation ponds,
drainage and grasslands etc.

50% of endangered species in Japan have their core habitat in satoyama.



Sources:
Homma Kosuke, Sado Island Center for Ecological Sustainability, Niigata University, JPN

Ibis-friendly agriculture in the GIAHS site

Modifying traditional farming techniques to enhance biodiversity in satoyama

- **Creating a catch drain or a swale (‘e’ in Japanese) in order to provide a refuge for aquatics when the fields are drained**
- **Irrigating paddy fields in winter to create habitats for aquatics to survive.**

Modifying traditional farming techniques to enhance biodiversity in satoyama

- **Creating fish passes to connect paddy fields with drainage to minimize elevation gaps to allow fish migration**

Sustainable rice production

- Rice production in Asia (around 90% of the world's rice production in Asia)
- FAO technical products/tools/proposals

Rice production in Asia

According to data from FAO, the top 10 rice-producing countries in Asia in 2020 were:

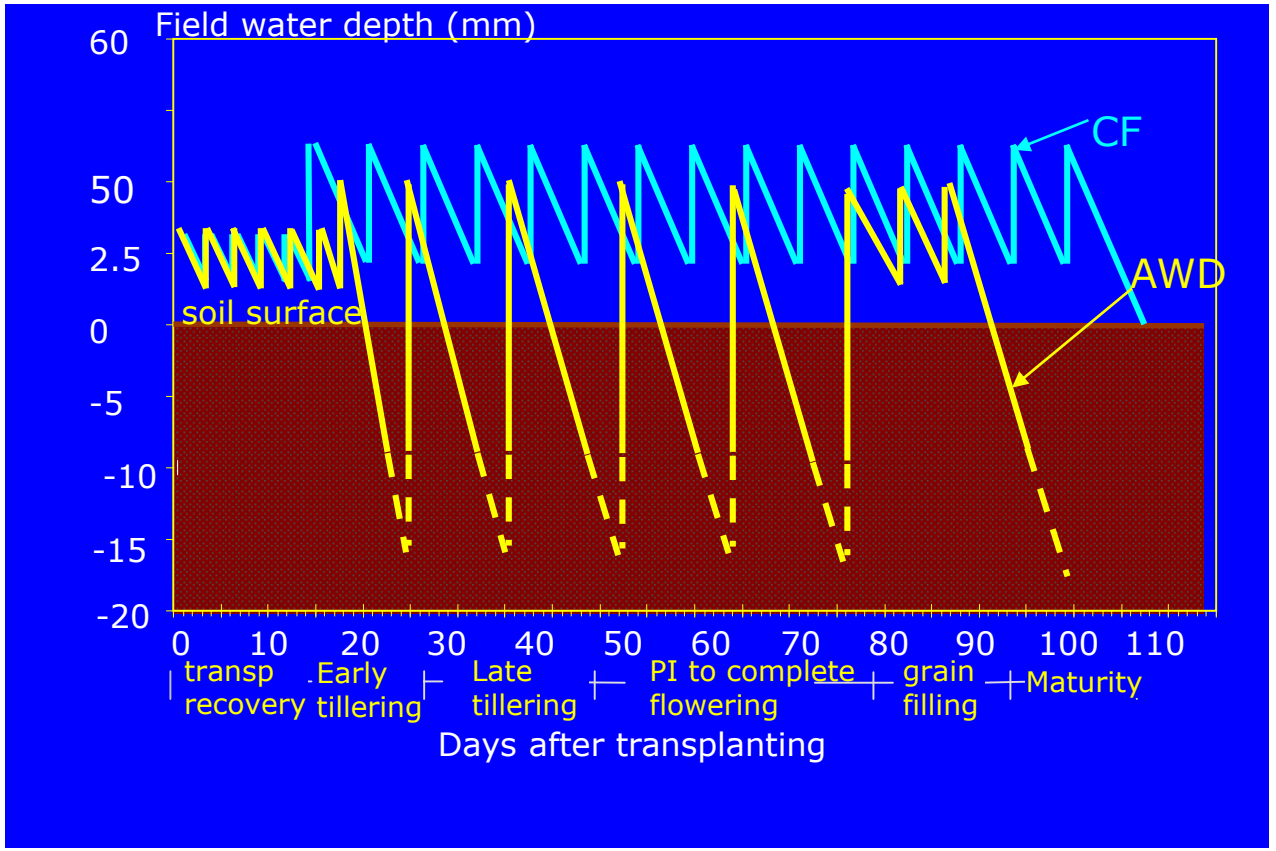
- China: 151.5 million tonnes
- India: 118.9 million tonnes
- Indonesia: 34.6 million tonnes
- Bangladesh: 34.1 million tonnes
- Vietnam: 28.8 million tonnes
- Thailand: 19.2 million tonnes
- Myanmar: 16.6 million tonnes
- Japan: 7.6 million tonnes
- Philippines: 7.1 million tonnes
- South Korea: 4.0 million tonnes

FAO technical products/tools/proposals

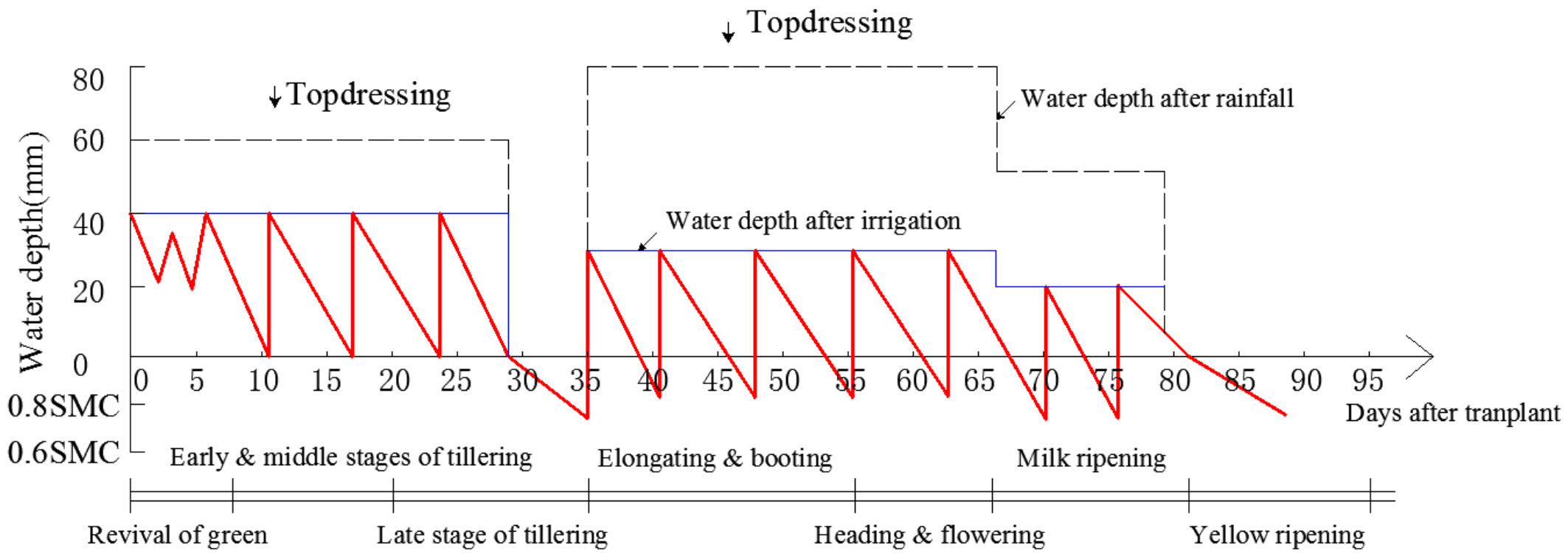
- Integrated water and fertilizer management
- Saline issues, FAO projects, and saline agriculture e-learning formulation (On-going)
- Invasive alien species (Initiated)
- Floods solutions (Plan to do)

Integrated Water and Fertilizer Management for Paddy Rice in Asia

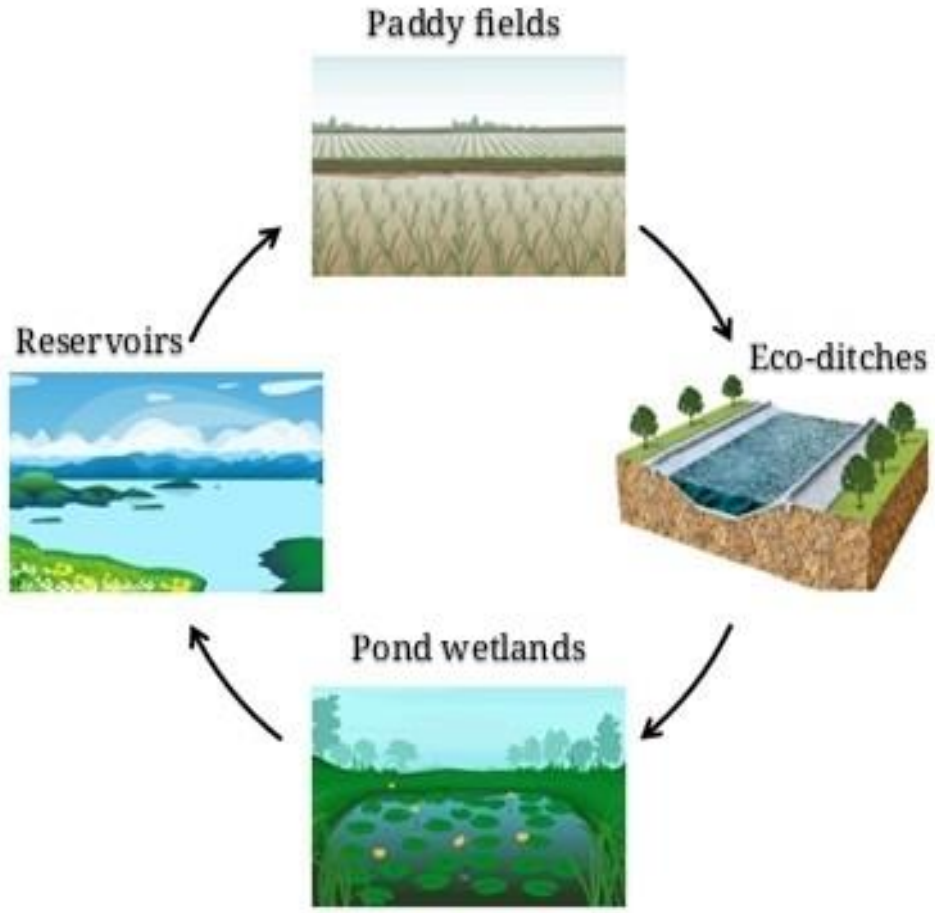
Alternate Wetting and Drying (AWD) technologies



Example of integrated water and fertilizer management

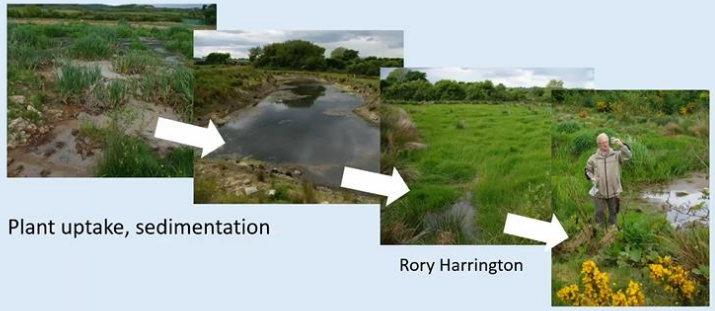


Drainage treatment for agricultural non-point source pollution control



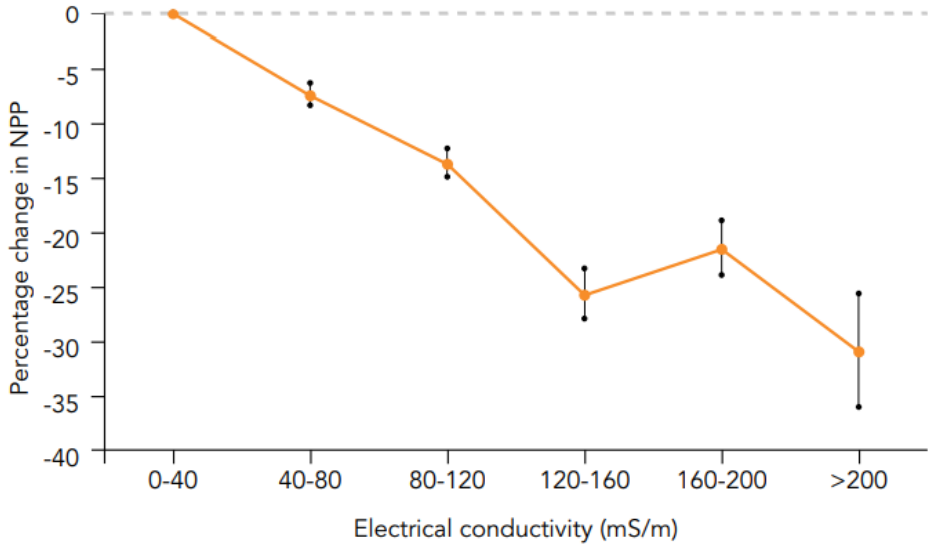
Constructed Wetlands: Minnesota

Integrated constructed wetlands (ICWs) for treatment of runoff from farmyards (Dunhill area, Ireland)



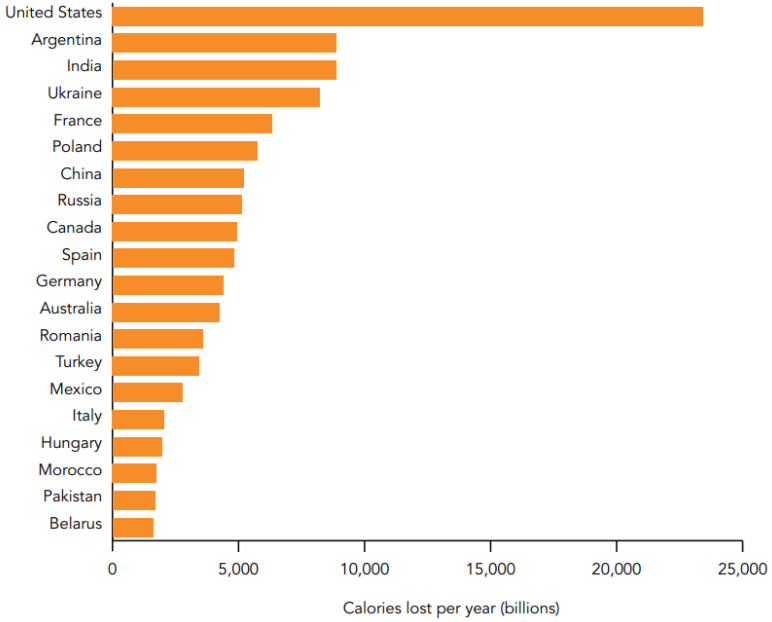
Saline issue background

FIGURE 3.1: Impact of Salinity in Surface Water on Agricultural Productivity



Note: mS/m = millisiemens per meter; NPP = net primary productivity.

FIGURE 3.2: Mean Losses in Agricultural Production because of Saline Water, by Country, 2001–13

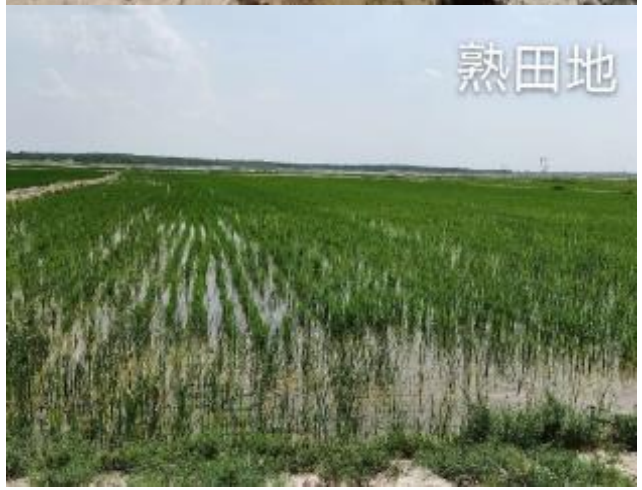


Source: WB report, 2019

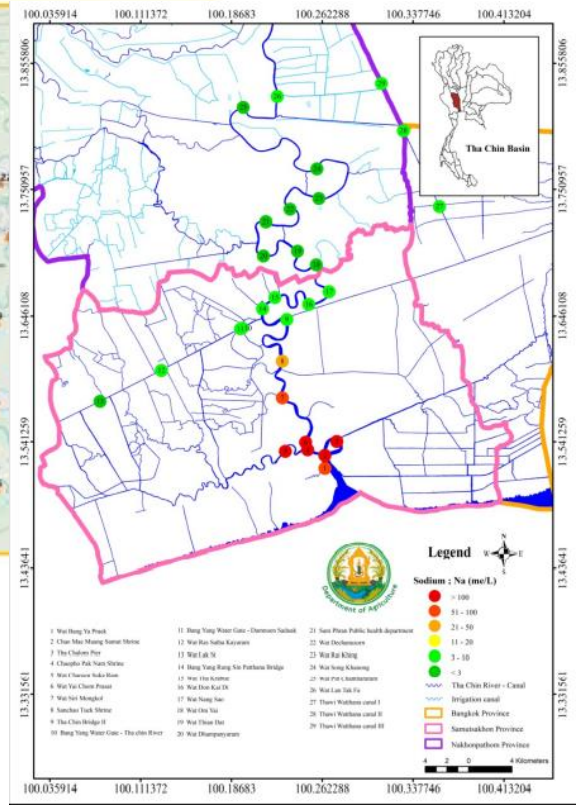
Saline agriculture

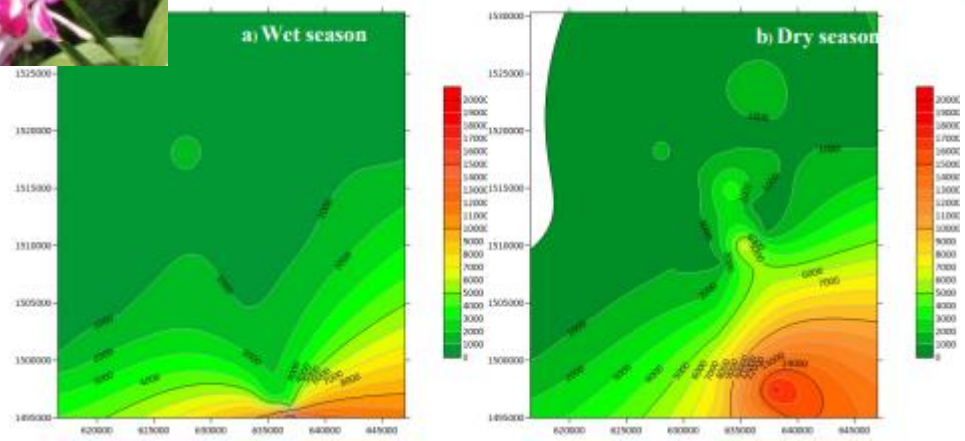
- Saline agriculture assessment in Asia-Pacific, and the e-learning formulation
- FAO-GEF Jilin project, China
- FAO project in Thailand

FAO-GEF Jilin project：Biodiversity Conservation and sustainable land management in the soda saline-alkaline wetlands and agro-pastoral landscapes in the western area of the Jilin Province



FAO project of saline water impacts on orchid farm in Thailand





Invasive species baseline, initiated: Golden Apple Snail

Photos from internet

Invasive species: Water Hyacinth

Photos from internet

Invasive species: Giant mimosa in Thale Noi wetland, Thailand

Photo source: https://www.thethirdpole.net/en/nature/opinion-affordable-solutions-can-control-invasive-plants-southeast-asias-wetlands/

Floods solutions (plan to do)

- Infrastructure
- Floods based/adaptive agriculture
- Landscape ecosystem restoration: FAO co-lead UN decade on ecosystem restoration

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THANK YOU

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