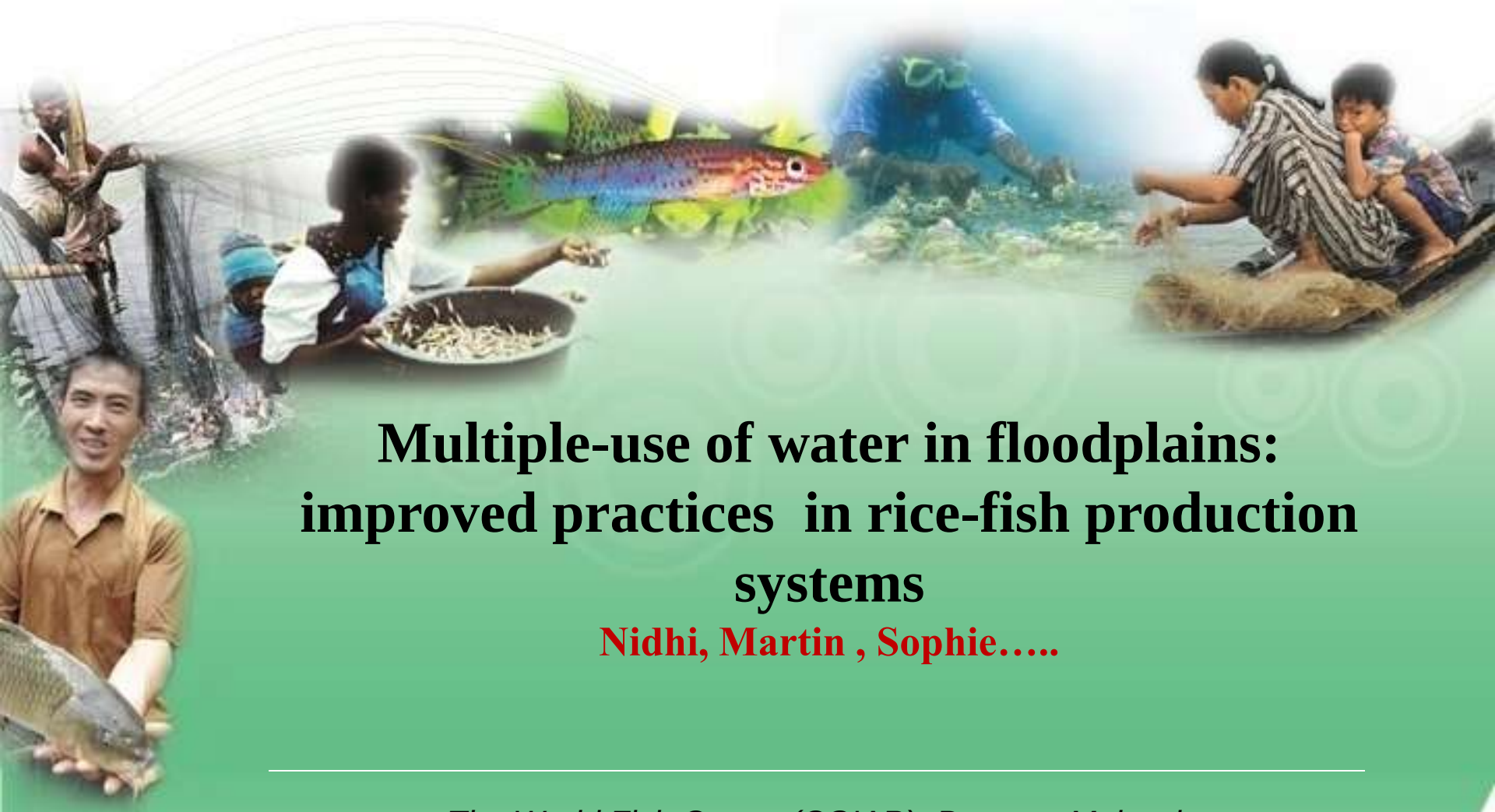

Multiple-use of water in floodplains: improved practices in rice-fish production systems

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The World Fish Center (CGIAR), Penang, Malaysia
Challenge Program Water and Food (CPWF), Colombo, Sri Lanka

CGIAR Challenge Program on WATER & FOOD

MUS Cost-Benefit Analysis
Netherlands, 22-26 February 2010

- Floodplains: Seasonally dynamic and multi-functional agro-ecological systems operational at a landscape level (basin to community)

- Livelihoods support for millions (primarily subsistence households)

- Resilience is a characteristic of an Argo-ecosystem–capacity of that system, when wounded, to heal itself.

- Diversifying the agro-ecological systems increases the functional diversity of the agro-ecosystems that in turn facilitates the increase of agro-ecological resilience (measured using ecological and socioeconomic indicators)

- Increased resilience can help the communities to adapt and respond to CC

Community-Based Fish Culture in Seasonal Floodplains

Objective:

Five years action research (adaptive management) project of the CGIAR-CPWF, initiated in 2005: 24 locations in 5 countries Bangladesh, Cambodia, Vietnam, China and Mali

Assumption that seasonally flooded areas can be communally managed for increased fish production during the flood (wet) season

Intervention

Communal fish production refers to production combined from capture and culture fisheries (aquaculture). Seasonal floodplains in wet season conventionally serve as a capture fisheries ground, however the project intervention compliment this process by stocking fish through collective action in the seasonal resource using low cost: high potential technology

Three Aspects

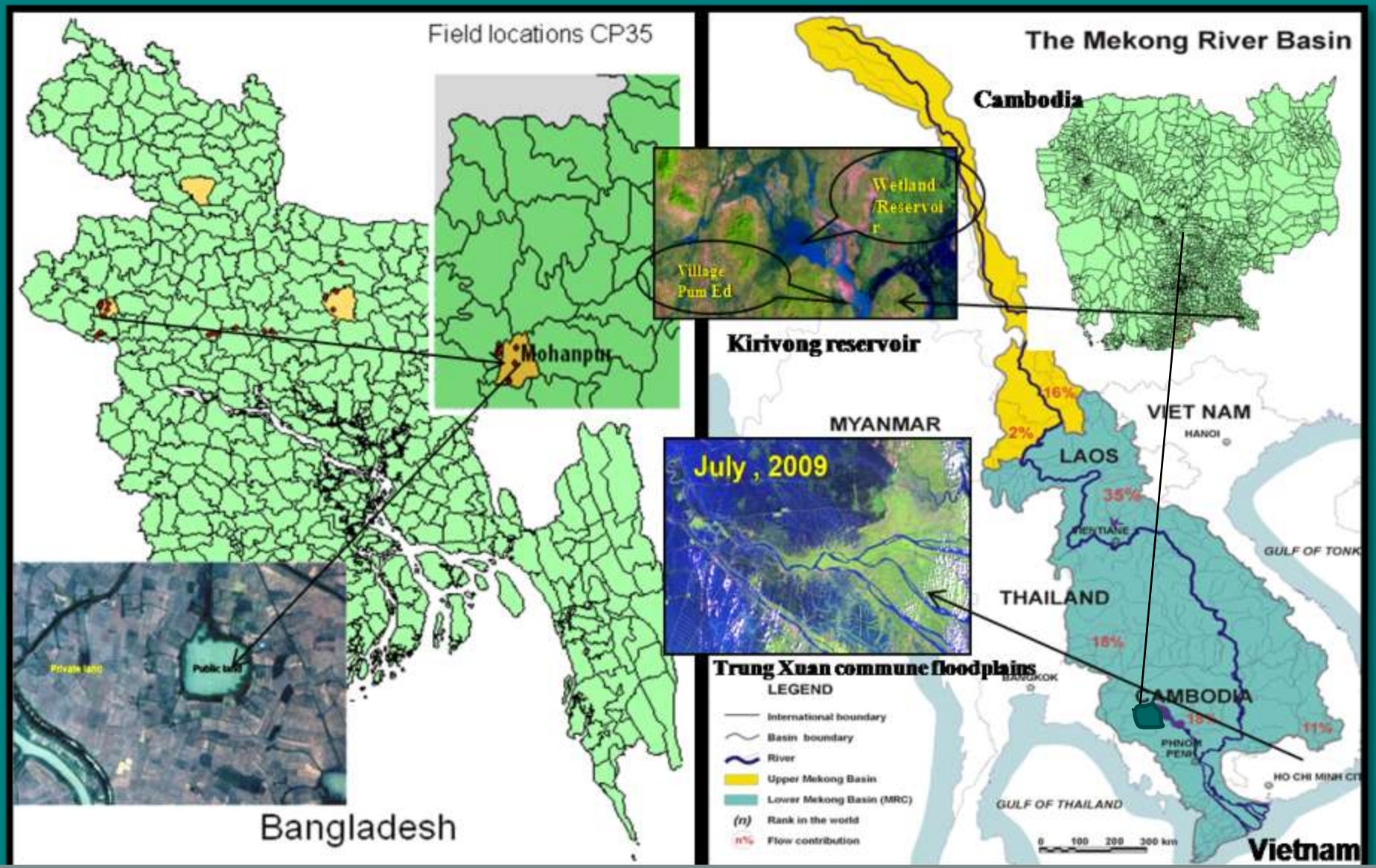
a) Spatial Understanding of resource interactions at Landscape level (cross-scaling within and across basins)
b) Agroecological Diversification (multiple resource use targeting productivity)
c) Social Well Being/ Societal Benefit (addressing seasonal poverty)

Overarching Aim : Community Resilience as an CC adaptation approach

Nicknamed :"Socializing the Pixels"

Adaptation :
Initiatives and measures to reduce the vulnerability (increase resilience) and human systems against actual or expected climate change effects
Adapted from IPCC (2008)

AOI: IGB and LMD



Demonstrated sites located in two basins (Lower Mekong and Indo-Gangentic) covering three countries (Bangladesh, Cambodia and Vietnam)

Seasonal Flooding of Rice Fields (Bangaldesh): Alternative Farming System

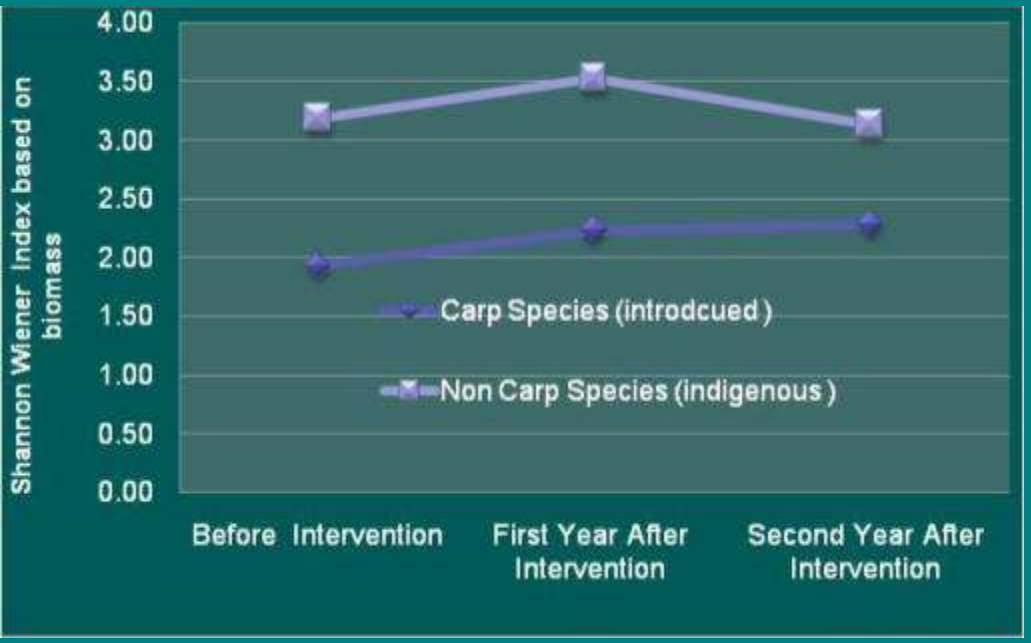
From EO

Season – landuse – ownership

Dry Season – rice fields – individual

Flood/Wet season – fisheries – open access

The extent, depth and duration of annual flood inundation is variable and unpredictable. In an average year, 26,000 km^2 of the floodplain is seasonally submerged, roughly from June till November (6 months). The maximum extent in recent years has been 82,000 km^2, but the extent of inundation in 1998 is thought to be the highest on record with 95,000 km^2 (66 percent of the country) inundated.



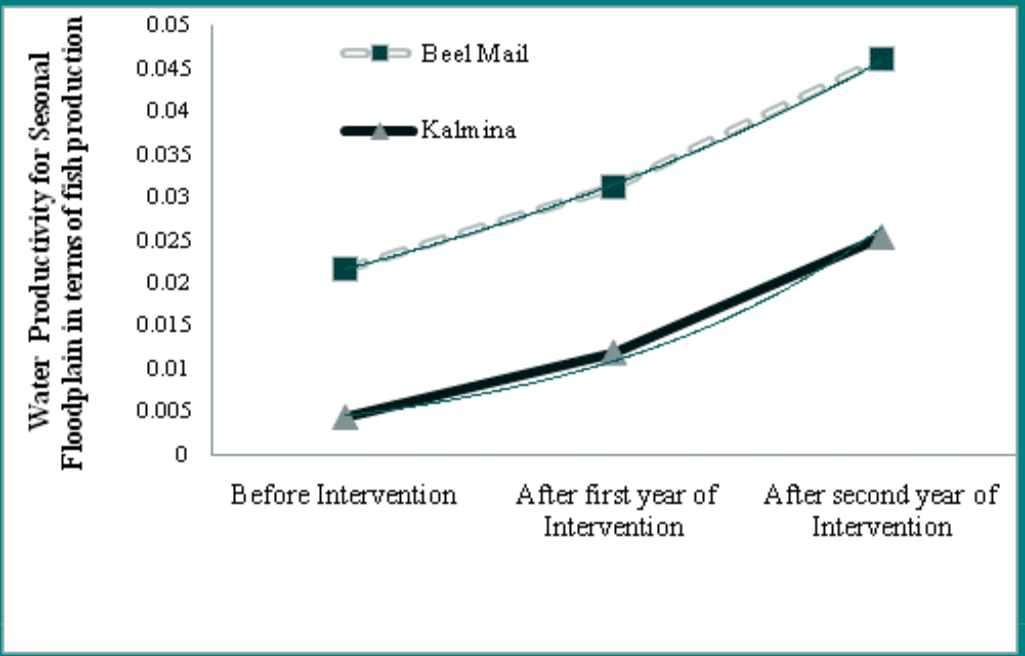
Performance Indicators

(a) Fish biodiversity (ecological measure) [Bell and Morse, 1999]

(b) Seasonal floodplain productivity as a socio-economic indicator

$(\Sigma^{N}_{i=1} AiYi \quad P_i/P_b)\ P_w$

where *Ai* is the fish production area, *Yi* is the yield of fish in field (*i*), here i=1; P_i is local price of fish from field (i); P_b is the local price of the main fish (carps are the main locally-grown, nationally/regionally-traded fish species), P_w is the trade value of the cultured fish crop at national level prices and *N* is the number of fish species (here taken as clusters) in the production system. *(Nagabhatla et al 2009 (Ecology and Society, in review)*



Benefits observed

- 10% lower cost of rice production
- Net returns from fish production of $220-400 per ha
- No reduction in the wild fish catch (capture fisheries)

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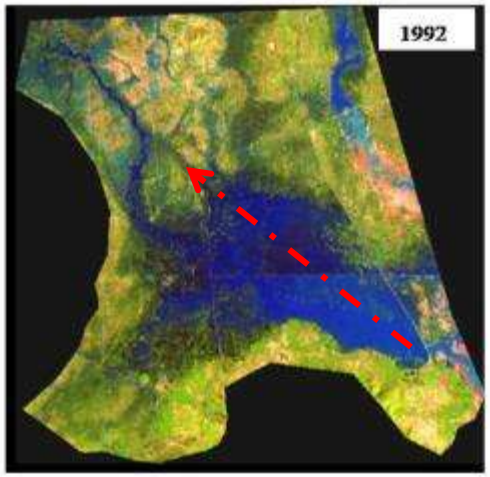
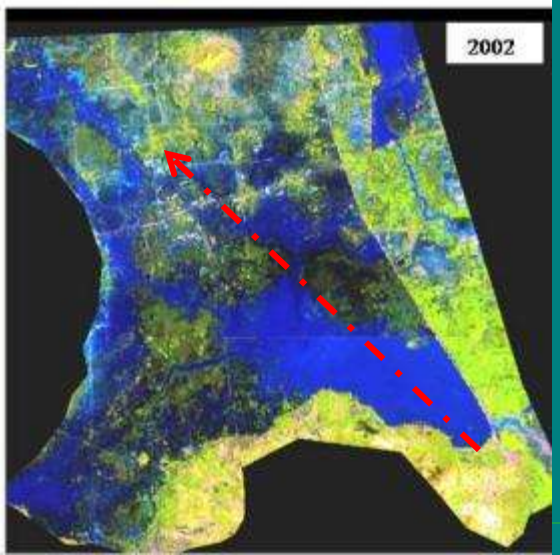
Ecosystem benefit analysis for Bheel Mail floodplain ecosystem									
Land /Water Resource use Activity	Equivalent Constanza's et al. 1991 biomes	MEA (2005) ecosystem function	(US$/ha/ year)-use coefficient	ESV of the food plain in wet Season	%	Rank	ESV of the food plain in dry season	%	Rank
Cropland	Cropland	Provisioning	92	644	0.1	3	2484	2.6	4
Fish Culture / Capture Fisheries	**Floodplain**	**Provisioning Regulating Supporting Cultural**	**19580**	**6E+05**	**99.1**	**1**	**58740**	**61.3**	**1**
Vegetables	Cropland	Provisioning	92	322	0.1		552	0.6	5
Irrigation Channels	Lakes /River/Channels /water Source	Regulating Supporting Cultural	8498	3399	0.6	2	29743	31.1	2
Deep Tube Well/ Shallow Tube Well	Lakes /River/Channels	Regulating Supporting	8498	849.8	0.1	3	4249	4.4	3
				6E+05	100.0	3	95768	100.0	

Fisheries is the natural harvest (non depletive) of the floodplain with a maximum dollar value in terms of ecosystem service.

1977





- Floodplain use for agriculture increased: in 1979 (1391ha) to 1992 (1711ha) to 3131ha in 2002

- Cropped area (about 20% land in basin and increasing) seasonality inundated for more than 3 months.

- Seasonal Shift from land based intervention to water based

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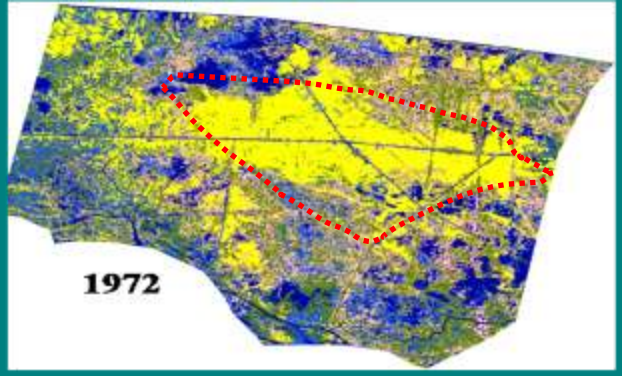

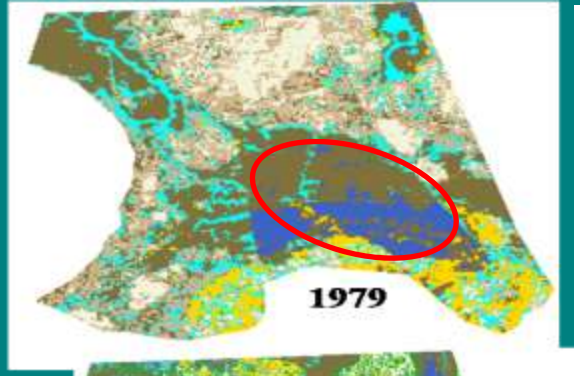

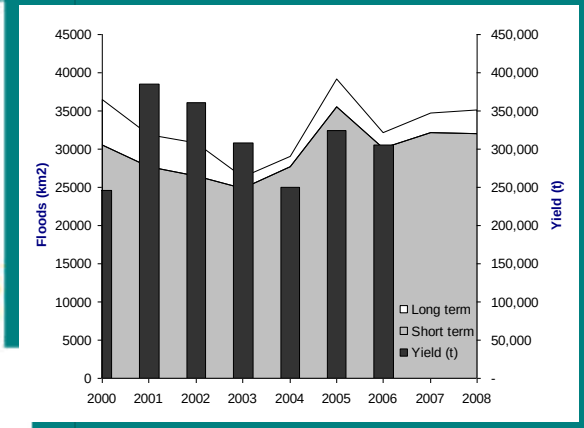

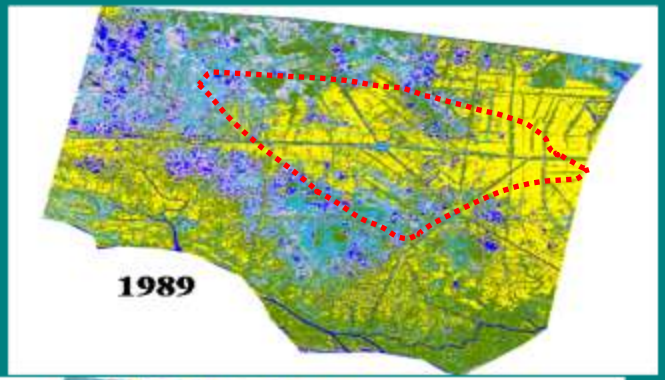

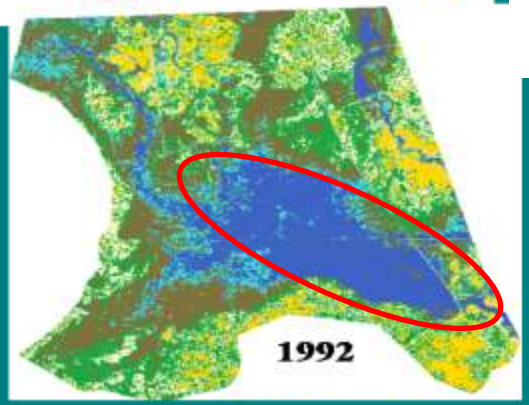

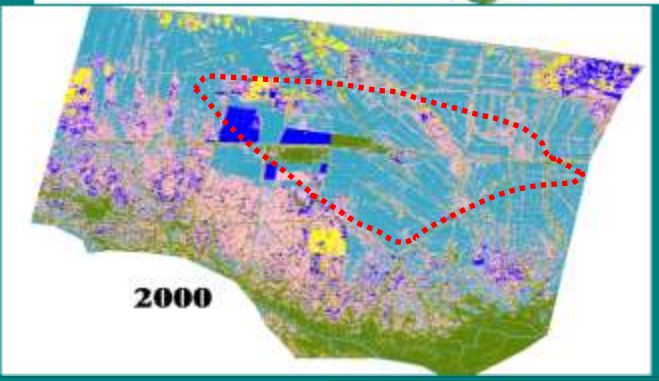

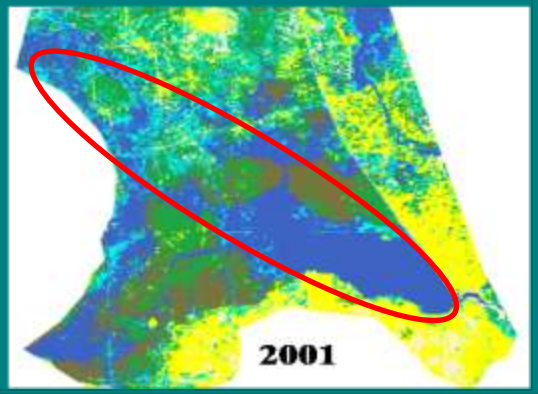

Vietnam

1	Water Body/Irrgation canals /river channel
2	Inundated flooplains with some vegetation
3	Swampy Area/marshland
4	Other weland vegetation
5	Cultivated area

Cambodia

1	Water Body / Reservoir
2	Marshy Land with Shrubs (wetlands)
3	Culitvated area
4	Shallow water (inundated land) with some vegetation
5	Grasslands and other vegetation
6	Open area/ Fallow (including settlements)

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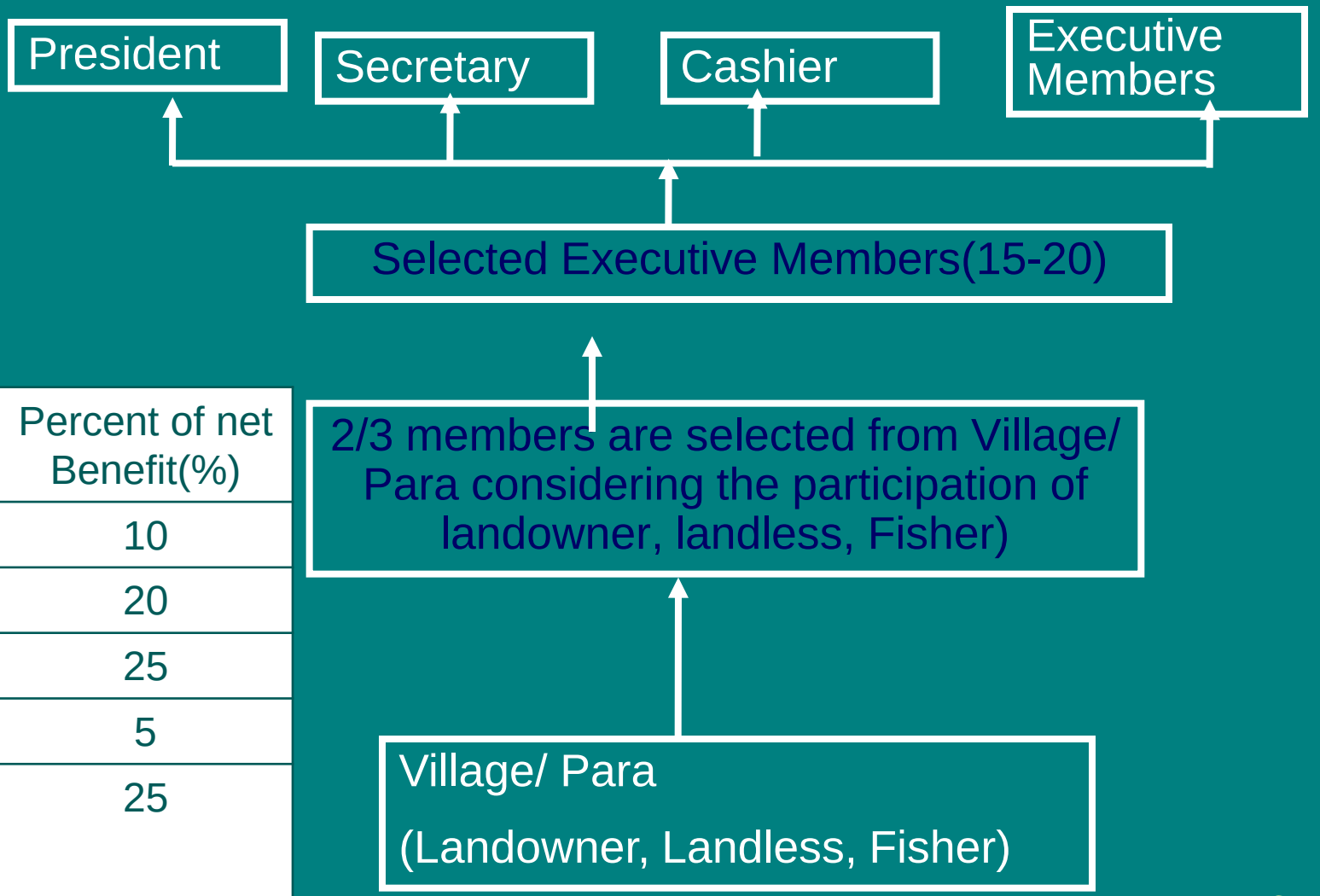
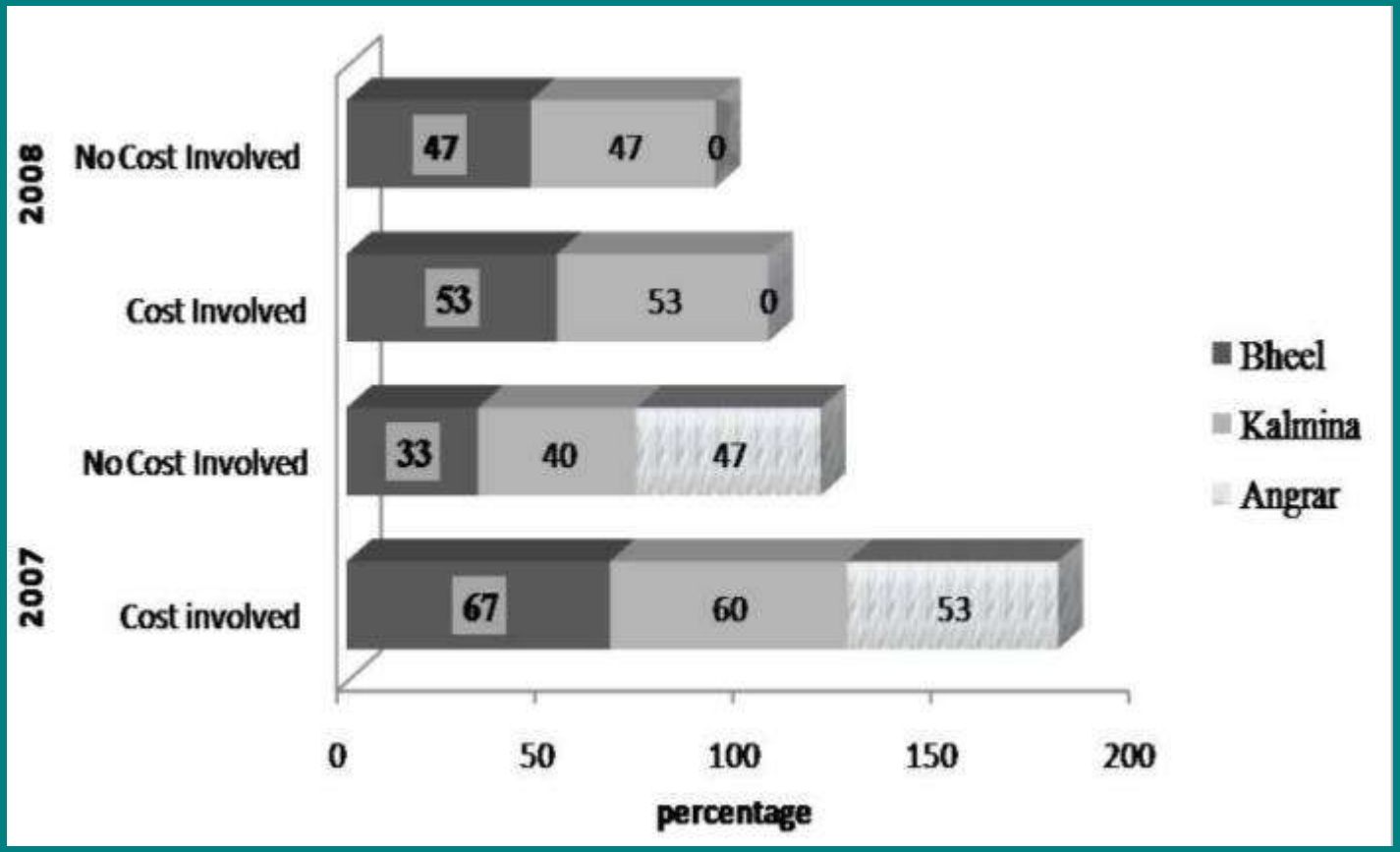
SDSS supported by Institutional Process of FMC formation



Stakeholder	Percent of net Benefit(%)
Fisher	10
Landowner	20
Ditch-owner	25
Landless	5
Deposit fund for next year fish culture activities	25
Fund for Operating FMC	15



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Potential for Scaling

- Irrigation channels
- Wetlands
- Lakes, reservoirs, community water bodies (village tanks)
- Backyard
- GW abstraction
- Rain water harvesting units

Start where you are. Use what you have. Do what you can. *Arthur Ashe*

Thank you

• growth