

Learning: Experiences from West Bengal, India

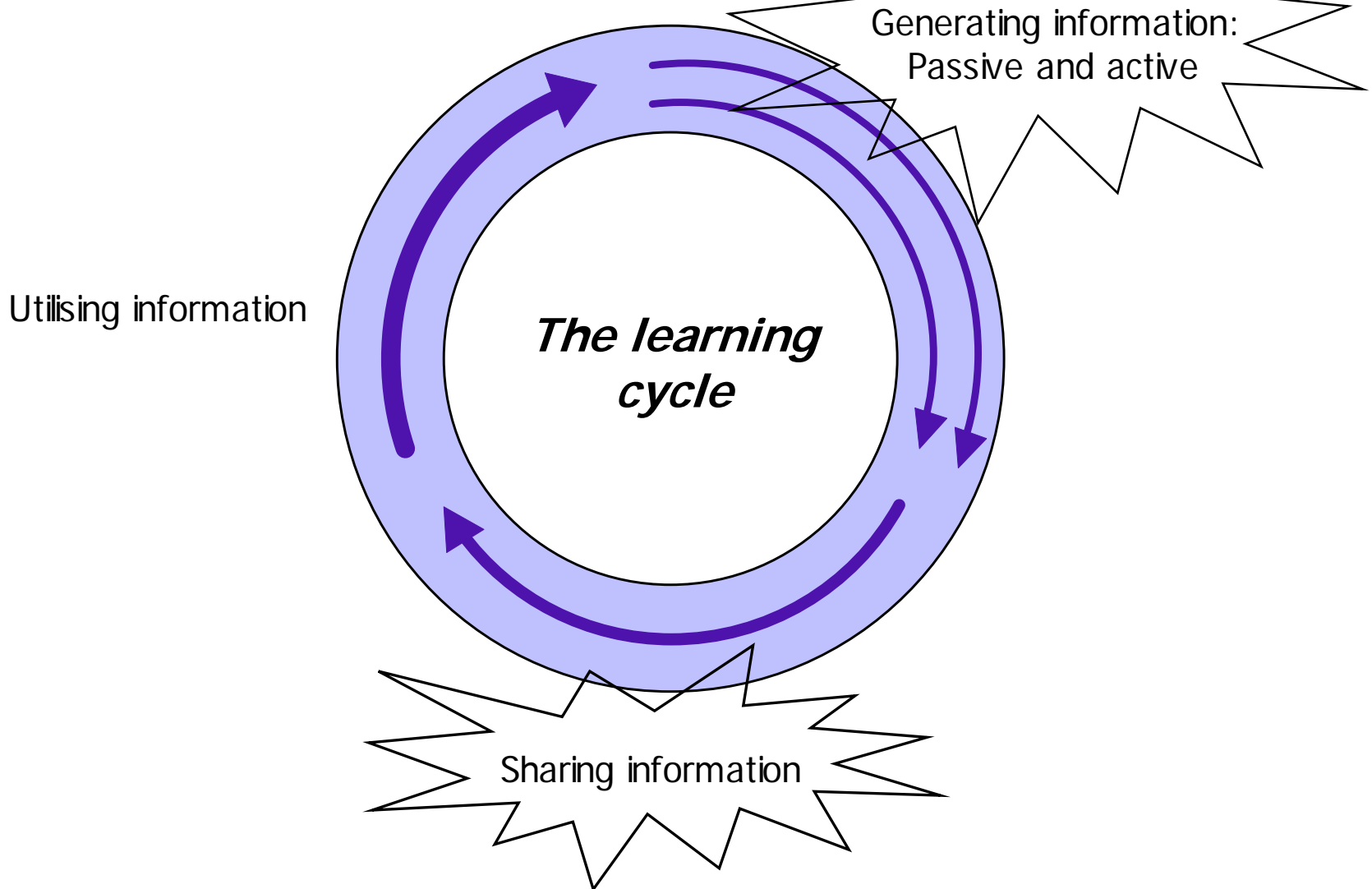


Photo: CIFRI

Objectives of this session

- Explain some of the principles behind the methods used in the learning part of the process.
- Show how these principles were put into practice in West Bengal.
- Share some of the results, learning outcomes and experiences from West Bengal.

What are we talking about?



The resource systems.



Small (0.2 – 0.5 ha) brackish water, privately owned, systems with alternating brackish water fish/shrimp culture followed by freshwater fish with paddy rice culture.

Large (8 - 80 ha), freshwater, leased, systems with alternating dry season rice followed by freshwater fish with paddy rice culture.



The learning strategy in India: freshwater systems

- Compare yields and incomes from fish species mixes including high growth (carp) and high value (Punti and bata) species (active).
- Compare performance of Jaya cross rice variety with varieties traditionally used (active).
- Examine the benefits from the management systems being used (passive).

The learning strategy in India: brackish water systems

- Compare the performance of different saline tolerant rice varieties (active).
- Collect information on culture procedures to identify potential for future experimentation (passive).

Implementing the strategies



Transplanting



Stocking

Generating information



Monitoring



Analysis

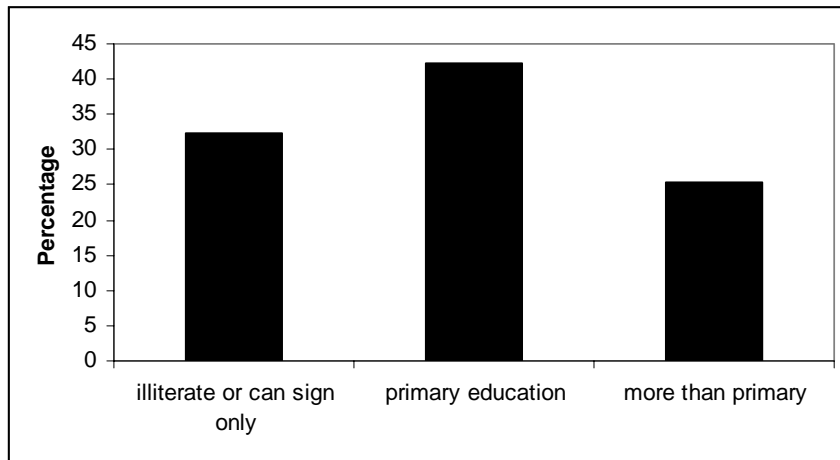


Principles guiding monitoring and data collection

- Focus on data collection relevant to the learning strategy.
- wherever possible use/adapt methods of collection and recording that are familiar and/or are already in use.
- where new systems or data collection methods are needed, these should developed together with those who will use them.

Indian situation

- CIFRI and Fisheries/Agriculture staff most comfortable with forms and sampling. Cannot visit sites often.
- Fishers generally low levels of literacy. Are present at the sites all the time and managing but their involvement is voluntary



Farmer literacy levels (Freshwater)

Monitoring methods



Interviews
(CIFRI staff)



Rice monitoring
(Agriculture staff)



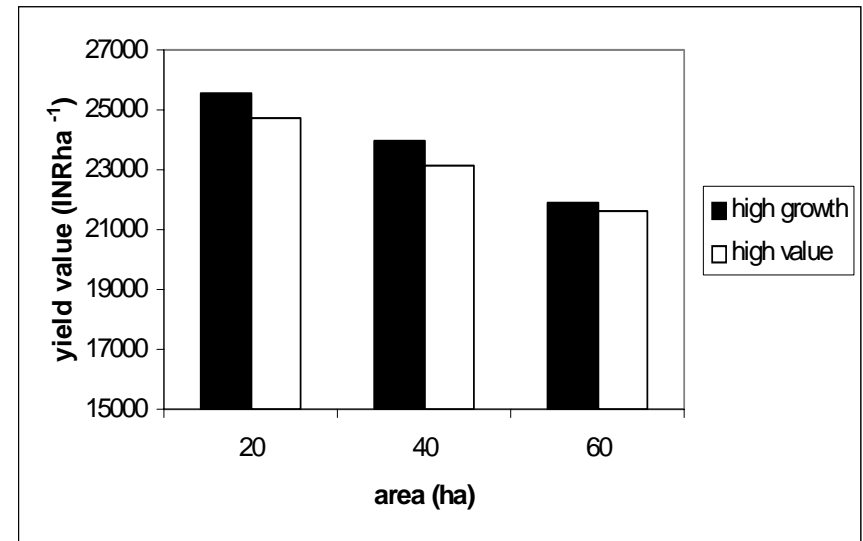
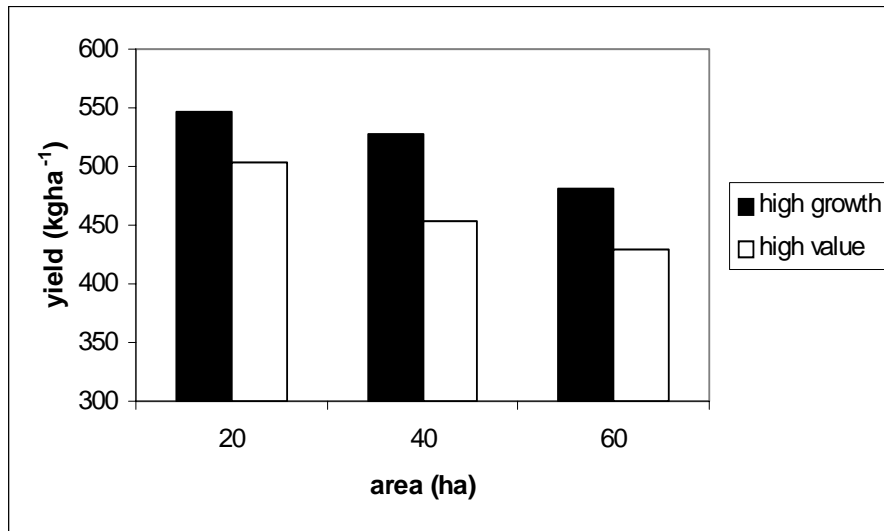
Fish identification and sampling
(CIFRI & Fisheries staff)

A close-up of a handwritten record book with multiple columns and rows of text, likely containing farmer records.

Farmer records
(community responsibility)

The information we generated

Active stocking experiment (freshwater)

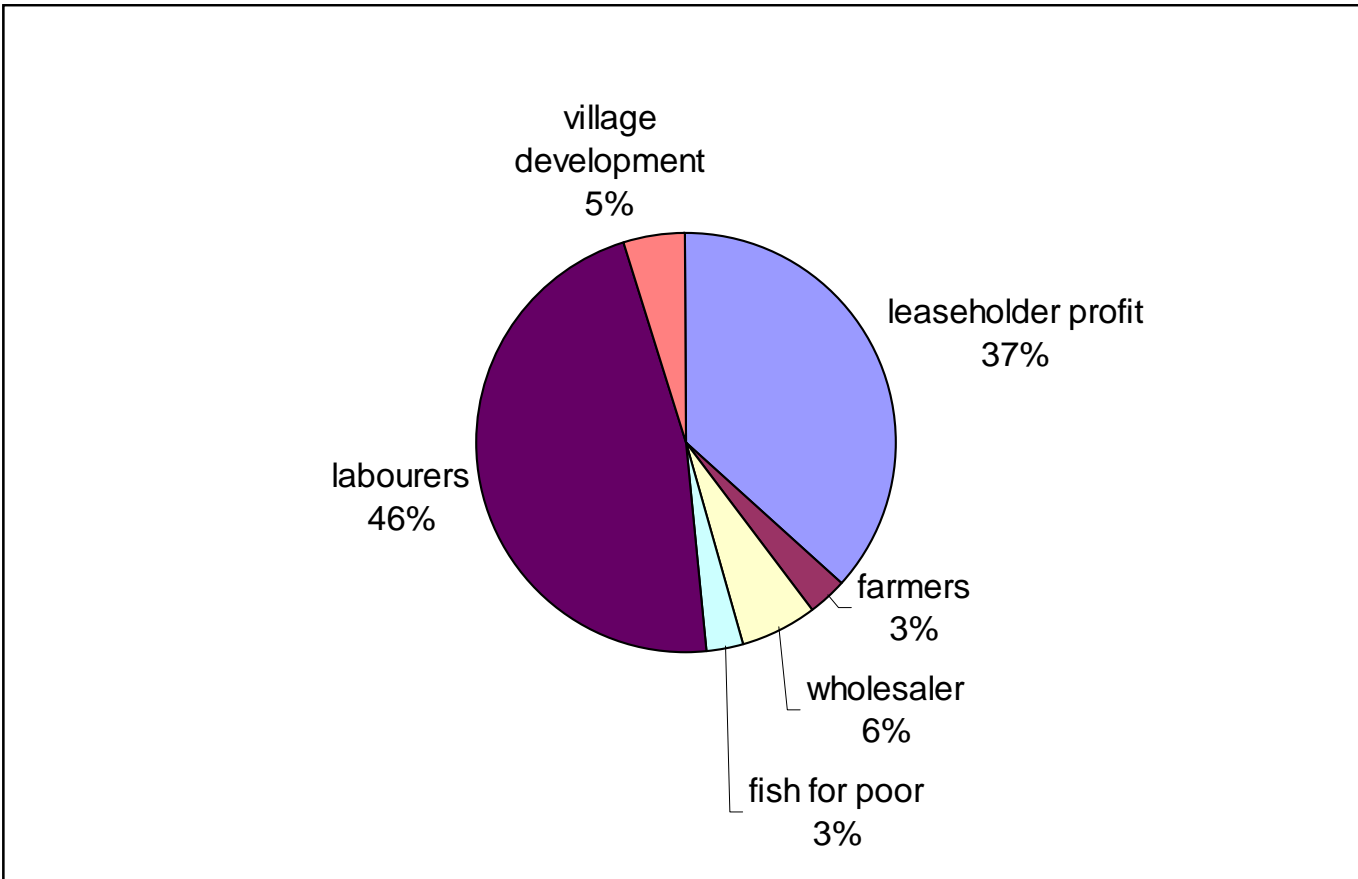


High value bata (*Labeo bata*)

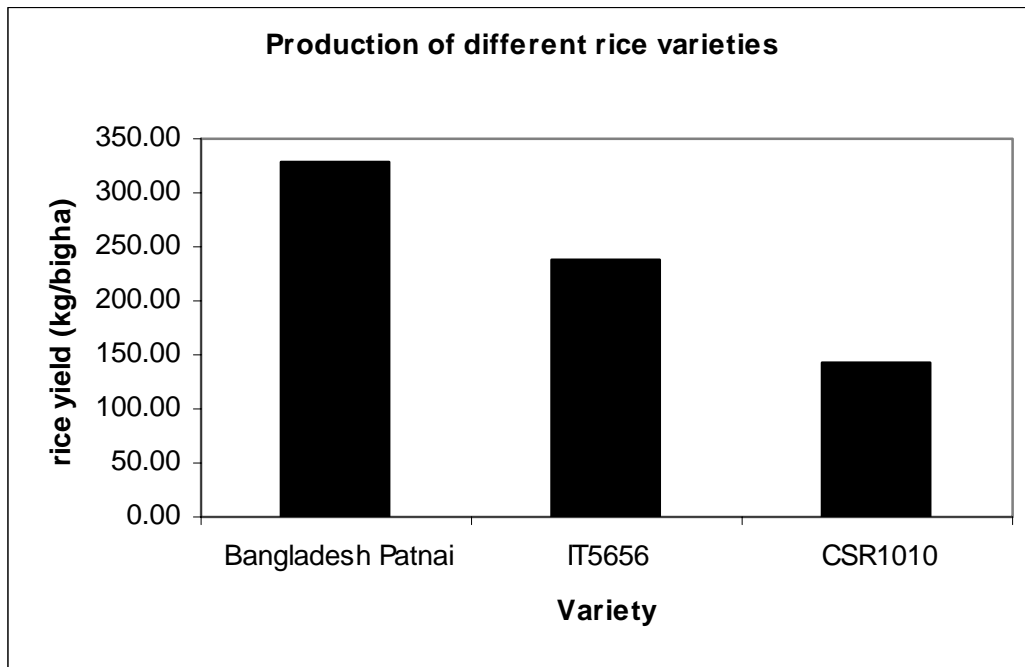


High growth common carp (*Cyprinus carpio*)

Passive experiment (freshwater): benefits from management (leasing)



Active rice experiment (brackish water)



And what we didn't...

Active rice experiment (freshwater)

- Poor implementation of experimental design.
- Insufficient training of farmers in cultivation of the new varieties.

Active fish experiment (freshwater)

- Compromise on stocking treatments meant that experiment was less informative.

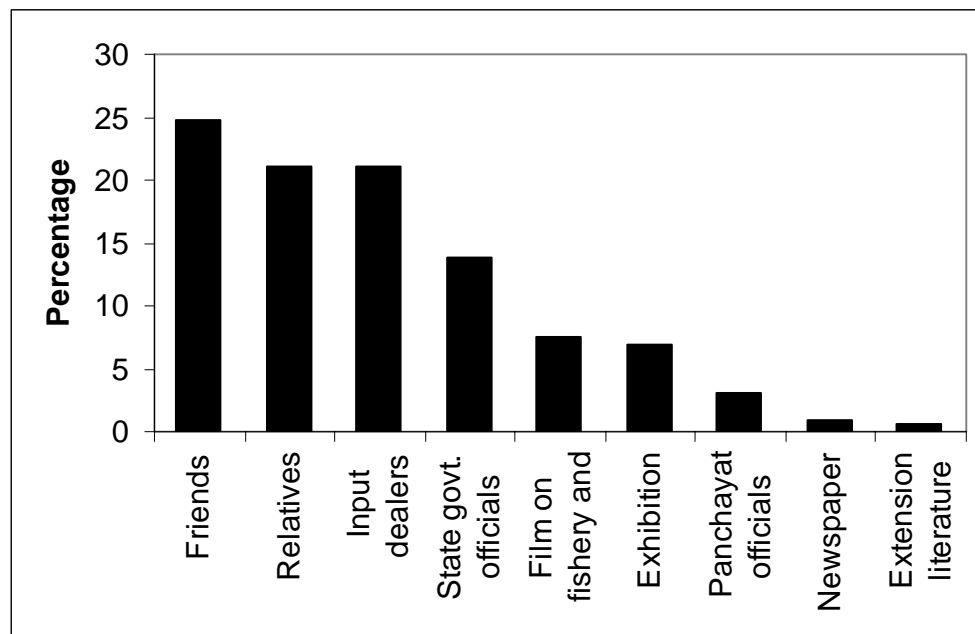
Principles guiding information sharing

- Doing is better than seeing which is better than hearing.
- People learn best in familiar and comfortable learning situations.
- Allow people to develop their own understanding and knowledge.
- Making the most of experiences within and between stakeholder groups is as important as any new information.

Sharing - possible methods

Extension staff had quite a high level of education.

Farmers have low levels of literacy and prefer face-to-face methods, especially amongst trusted groups.



Most important sources of information for farmers

How we shared



Analysing and interpreting the data



Discussing results



Group work



Presentations



Demonstrations and practical training

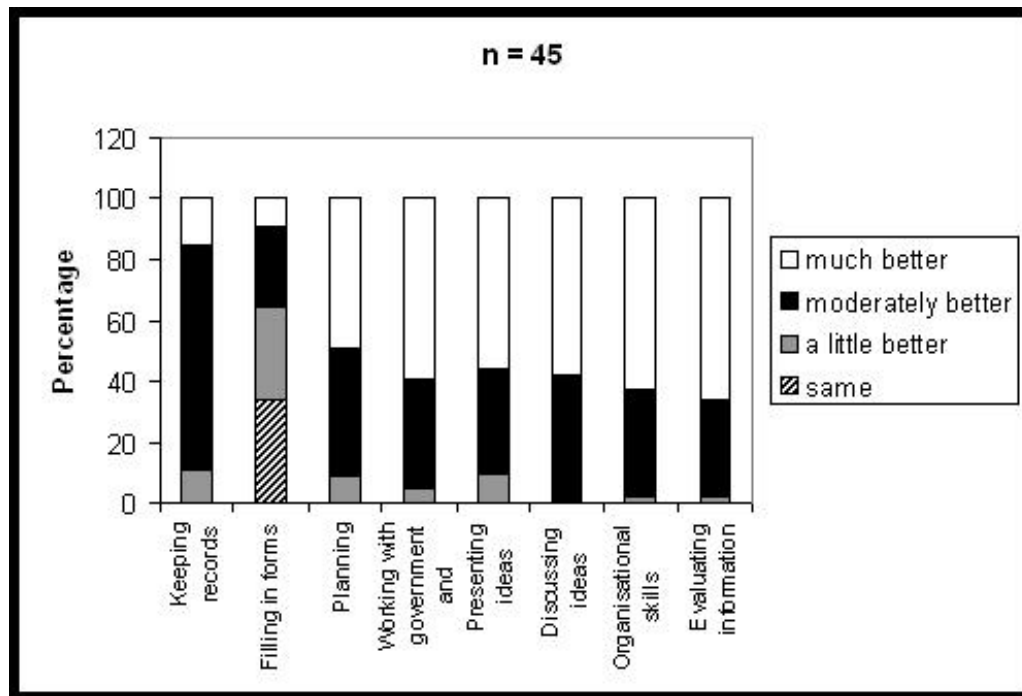
What we learned (outcomes)

We can examine learning in terms of:

- Knowledge
- Skills
- Attitudes
- Practices

Outcomes: knowledge and skills

Both farmers and extension workers believed that their knowledge and skills had improved in a range of subjects.



Outcomes: Attitudes (Researchers and extension staff)

FROM:

“Farmers do not adopt the correct scientific practices”

TO:

“This is a new way of working for us but it is interesting and it has made working with farmers and understanding their problems easier”

“we can see that some of the farmers practices work well now we should try to understand why they work”

“Some of the farmers should come to our workshop with the director general so each can see how they are part of the bigger picture”

Outcomes: Attitudes (Farmers)

FROM:

“I would like to learn from the experiences of others but I do not want to share my own secrets”

TO:

“Now within the group discussing with my neighbours has helped me deal with my disease problems better”

“It is good that the government staff listen and try to understand our problems”

“Now I understand much more about paddy and fish culture”

Outcomes: practices

- At freshwater sites lease prices (used for village development funds) increased by about 12%.
- At brackish water sites villagers working together more and number of farmers involved increased from 25 to 38.

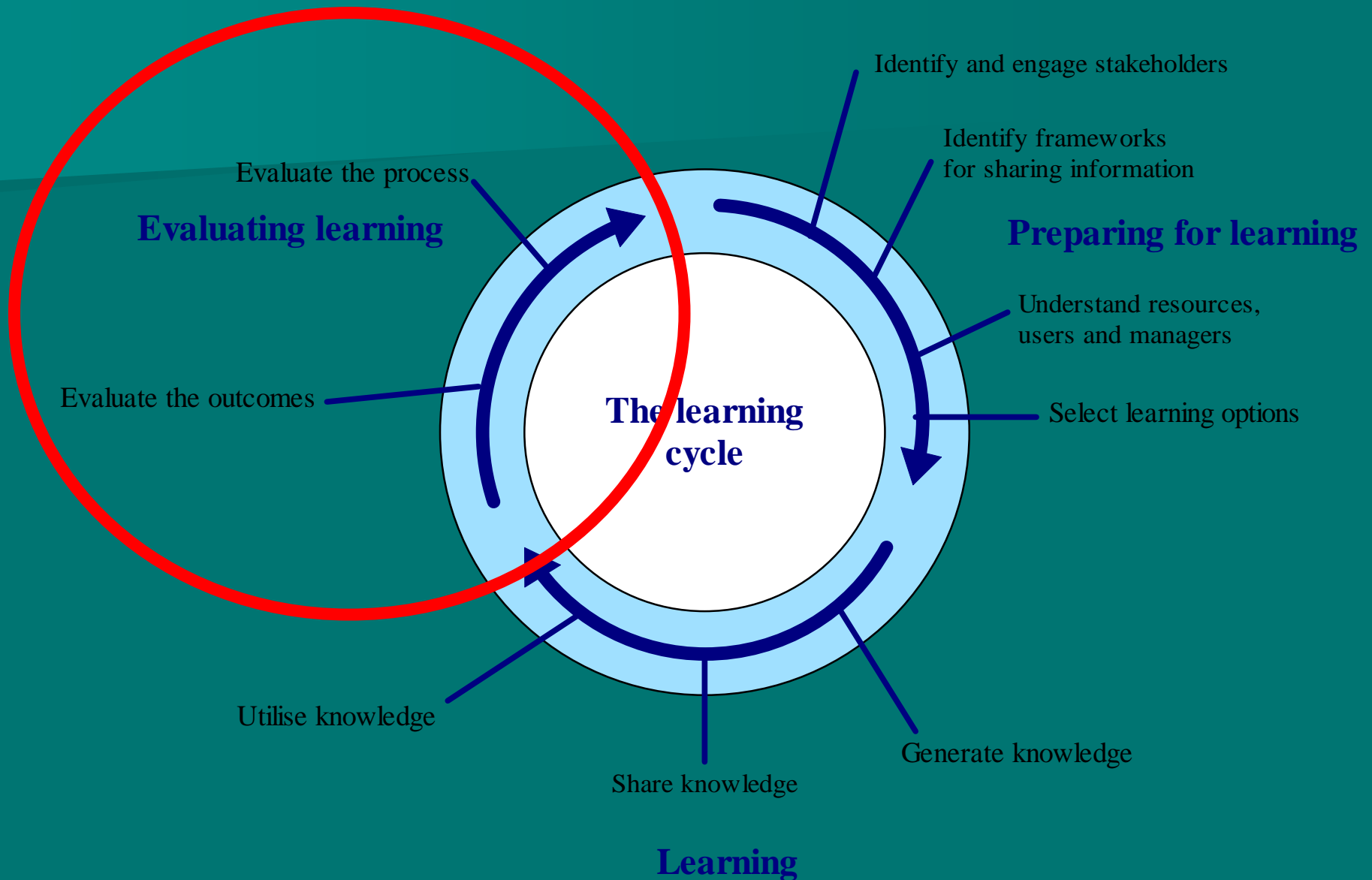
The end...

Uptake of Adaptive Learning Approaches in
Enhancement Fisheries: Final Workshop
30-31 May 2005, IFREDI, Phnom Penh, Cambodia

Evaluating Learning

Sommano Phounsavath, Malasri
Khumsri, Chhoun Kimchhea, Kanokporn
Deeburee, Kaing Khim, Nhung and
John Sollows, Wolf D. Hartmann

The learning cycle



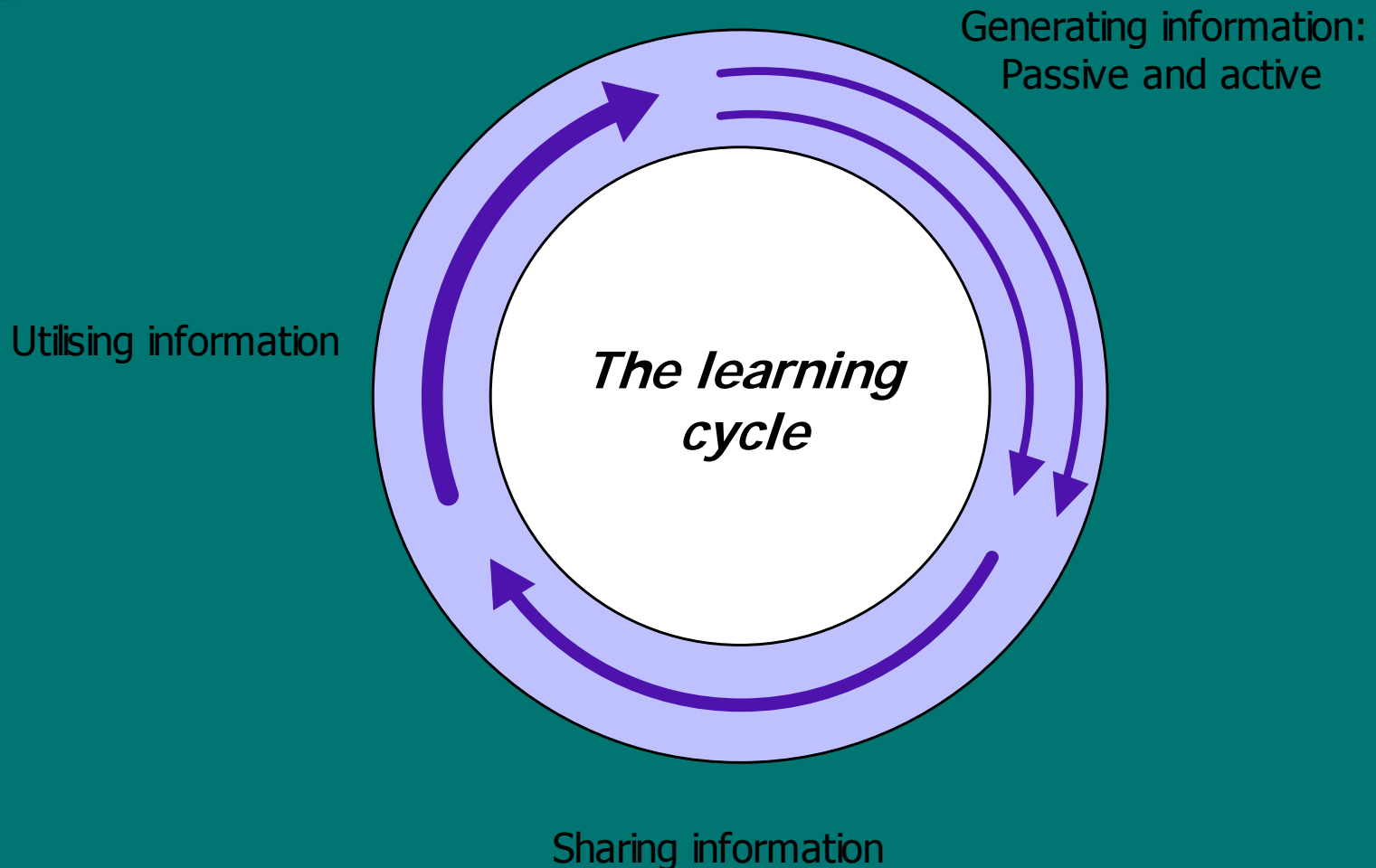
Session topic

- Experiences and lessons learned from implementing adaptive learning in the Mekong Basin
- Evaluating learning
 - Methods
 - Outcomes
 - Processes
 - Cost effectiveness

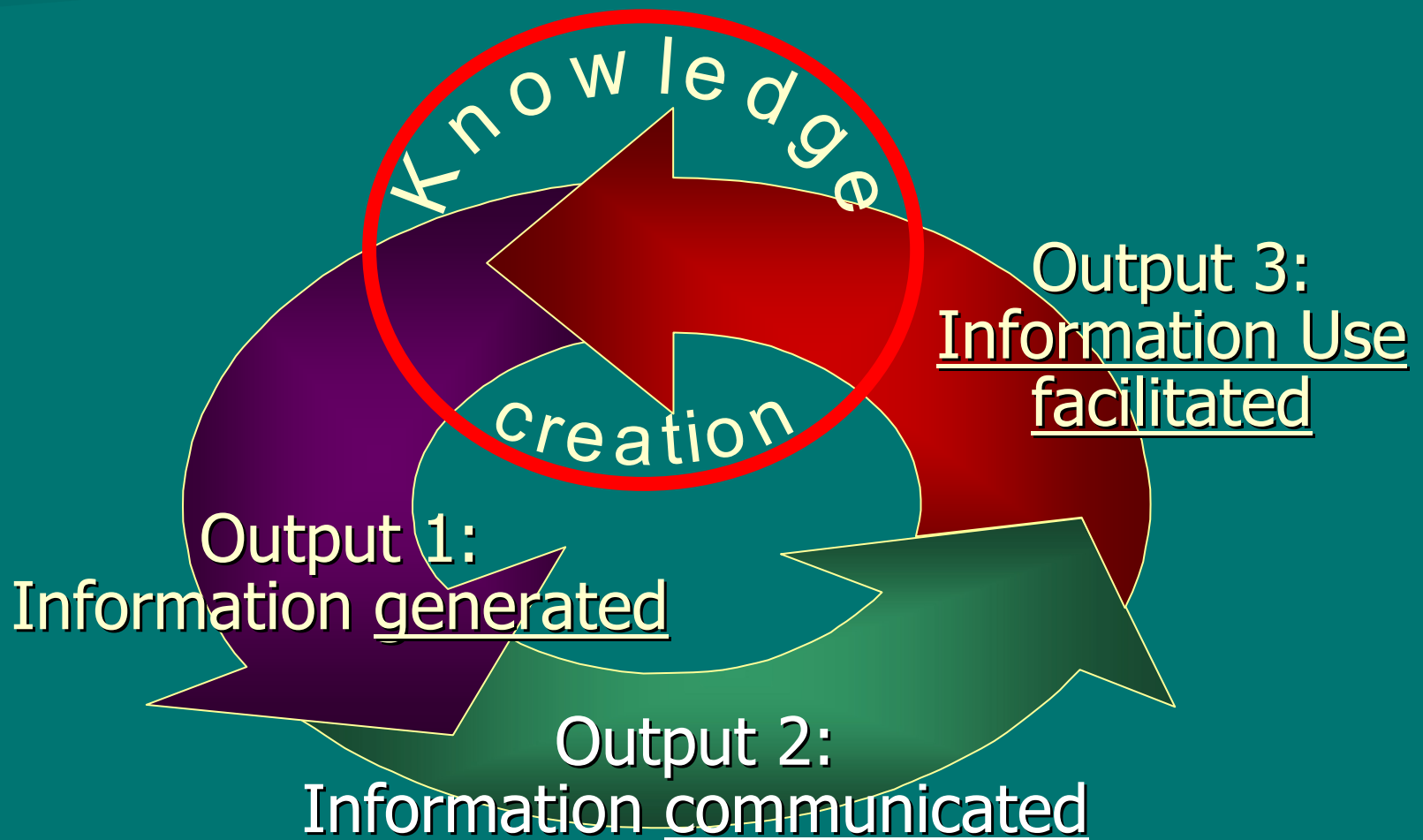
Preview

- MRC/FP and MRRF
- Activities under MRRF/MRAG AL collaboration
- Experiences from MRRF/AL activities
- Some comments on 'learning' and '(co-)management'
- Case (Daklak and Soc Trang, by John)

What are we talking about?



MRC/FP Programme Outputs

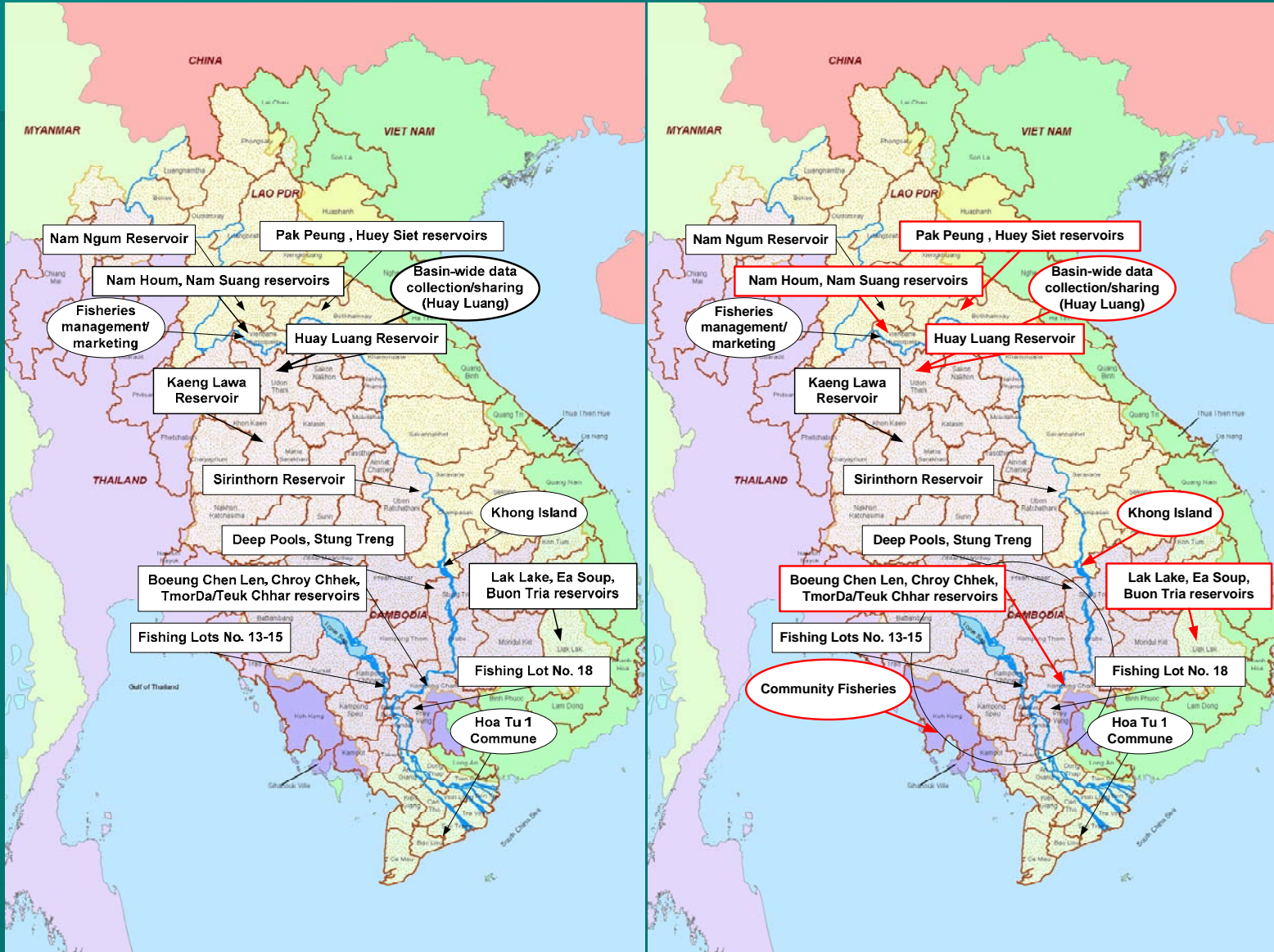


MRRF Sites



- About 25 water bodies in four countries of LMB
- Reservoirs; floodplains; rivers (deep pools); rice/shrimp culture;
- Multi-scale/multi-village

MRRF/AL Sites



AL activities

- Routine management planning and review
- Creation of AL opportunities
 - Stocking
 - Decentralized fingerling production (mobile hatcheries)
- Workshops:
 - “Fisheries Enhancement in the central Highlands”, BMT, VN, Feb 2004
 - “Deep pools and conservation zones”, Khong Island, Lao PDR (conservation zones), Sept/Oct 2004
 - “Learning from Community Fisheries”, Phnom Penh, Cambodia, February 2005
 - “Participatory water management”, Soc Trang, VN, May 2005
 - “Data and information collection and sharing”, Huay Luang, Thailand, January 2005

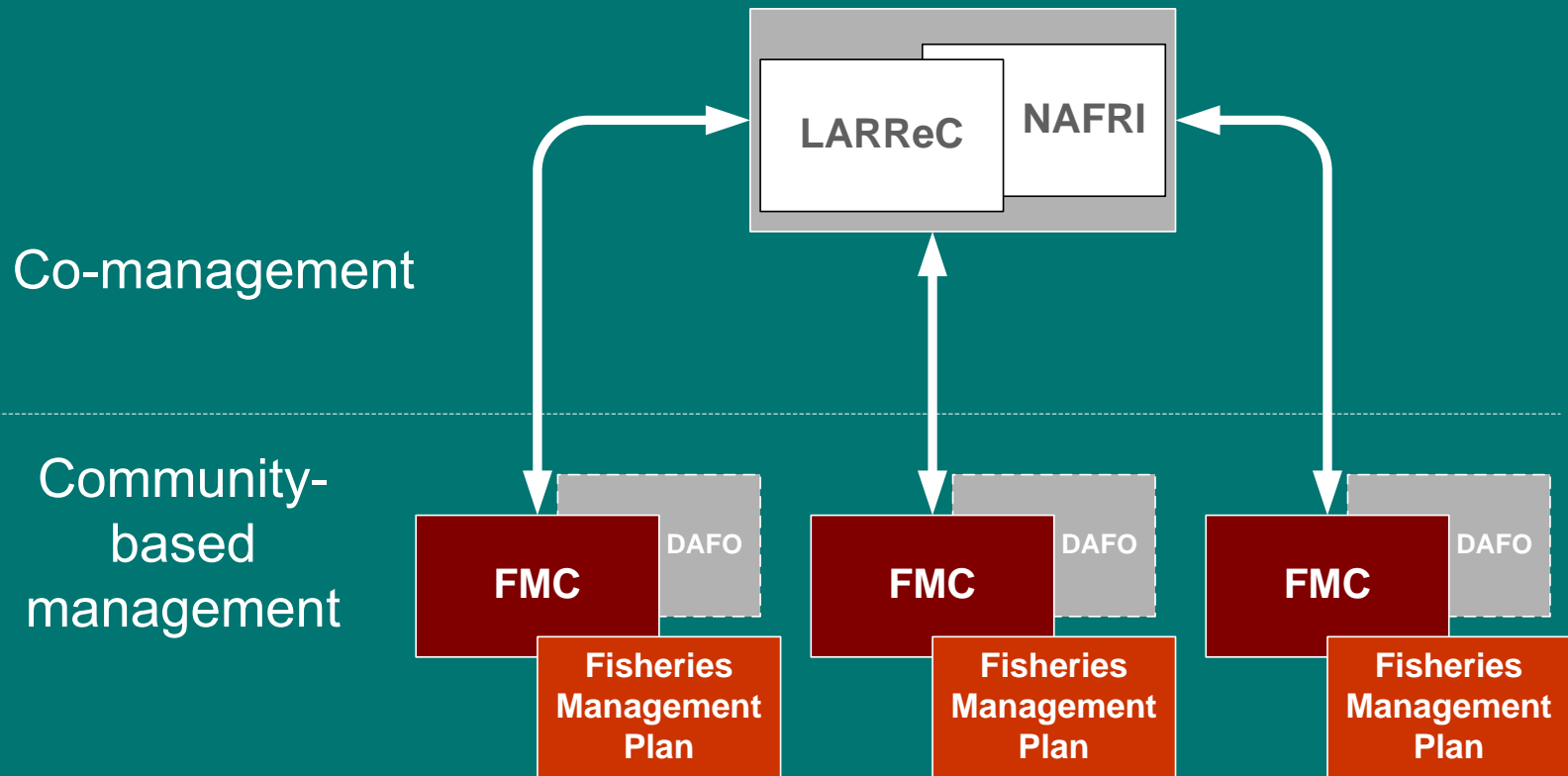
AL activities

- Routine management planning and review
- Creation of AL opportunities
 - Stocking
 - Decentralized fingerling production (mobile hatcheries)
- Workshops:
 - “Fisheries Enhancement in the central Highlands”, BMT, VN, Feb 2004
 - “Deep pools and conservation zones”, Khong Island, Lao PDR (conservation zones), Sept/Oct 2004
 - “Learning from Community Fisheries”, Phnom Penh, Cambodia, February 2005
 - “Participatory water management”, Soc Trang, VN, May 2005
 - “Data and information collection and sharing”, Huay Luang, Thailand, January 2005

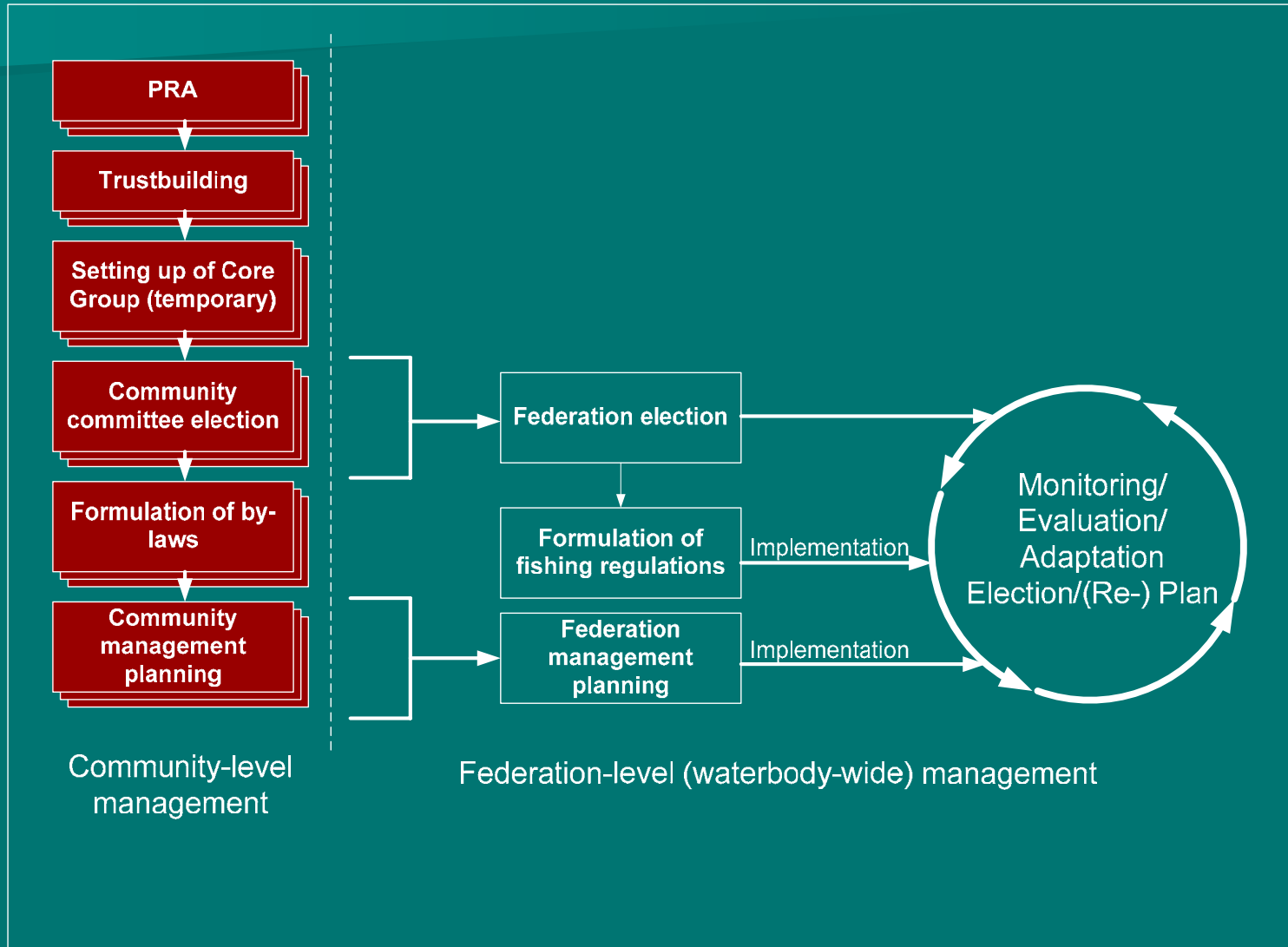
Emphasis of MRRF's AL work

- Sharing information
- Utilizing information
- Generating information

Structure for AL (Lao PDR)



Process for AL (Cambodia)



Management concerns

Country	Management Concerns	Management Objectives	Management Activities
Cambodia	Effort increase Illegal fishing Habitat destruction Inefficient management	Income diversification Combat illegal fishing Habitat protection Efficient management	Training Organizing management Revise/enforce rules Credit provision
Lao PDR	Low/decreased yields Illegal fishing Habitat destruction Lack of management Fish disease	Income diversification Combat illegal fishing Habitat protection Efficient management	Training Organizing management Revise/enforce rules Improve marketing Fund raising
Thailand	Low/decreased yields Habitat destruction Inefficient management Fish disease	Income diversification Habitat protection Efficient management	Training Organizing management Revise/enforce rules Improve marketing
Vietnam	Low/decreased yields Inefficient management	Income diversification Efficient management	Training Organizing management Credit provision

Management Plans, Lao PDR

Plan items	Reservoirs				Results
	NH	NS	HS	PP	
Organize reservoir fishing committee	✓	✓	✓	✓	4 RFMCs organized and functioning
Data collection	✓	✓	✓	✓	Catch assessments implemented
Review fishing regulations	✓	✓	✓	✓	Improved regulations implemented
Conservation zones	✓	✓	✓	✓	CZs , demarcated and enforced
Cage-culture	✓	✓	✓	✓	4 action plans formulated
Stocking	✓	✓	✓	✓	Regular stocking
Organize fisher groups	✓	✓	-	-	Informal groups organized

User management needs and interests

Compliance



Management plan implementation



Fish marketing



Fish harvest



User management needs and interests

Banking and accounting



Management impact



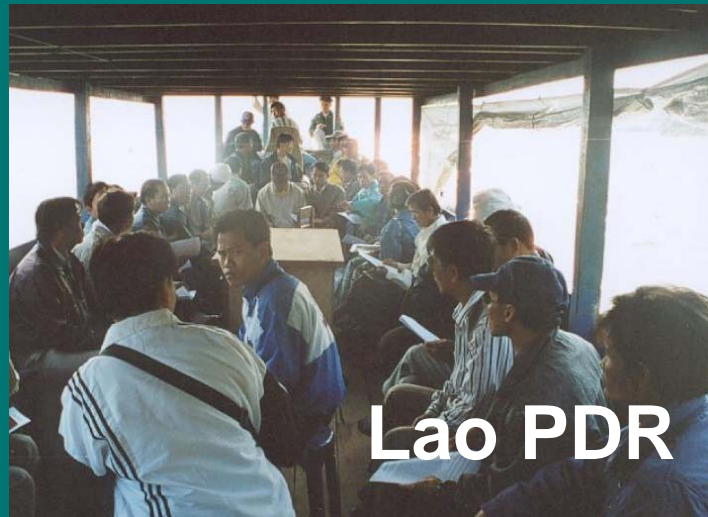
Is there “Co-management” at Bung Wa Tai?

Management function	Community	Government
Making of regulations	X	X
Enforcement/patrolling	X	X
Fisheries enhancement	X	X
Fish marketing	X	-
Capacity-building	-	X
Funding	X	X
Creation of income alternatives	X	-
Management decision-making	X	X

Methods

- JUGO workshops
- Subcontracting information generation
- Exchange and study/information visits

Joint User/Government Officer Workshops: Conservation Zones, 2001



Linking “research” and management

Scientific/technical services to be provided by LARReC for implementation of reservoir management plans 2003/2004

Study/Technology transfer	NH	NS	HS	PP
Fish disease study	√			
Marketing survey	√	√		
Ecotourism study			√	√
Cage-culture research		√		
Pen-culture	√	√		
Mobile hatchery operation			√	√
CPUE analysis	√	√	√	√

Study visits



First transboundary exchange by users on management issues (fish processing)

Sharing and communicating

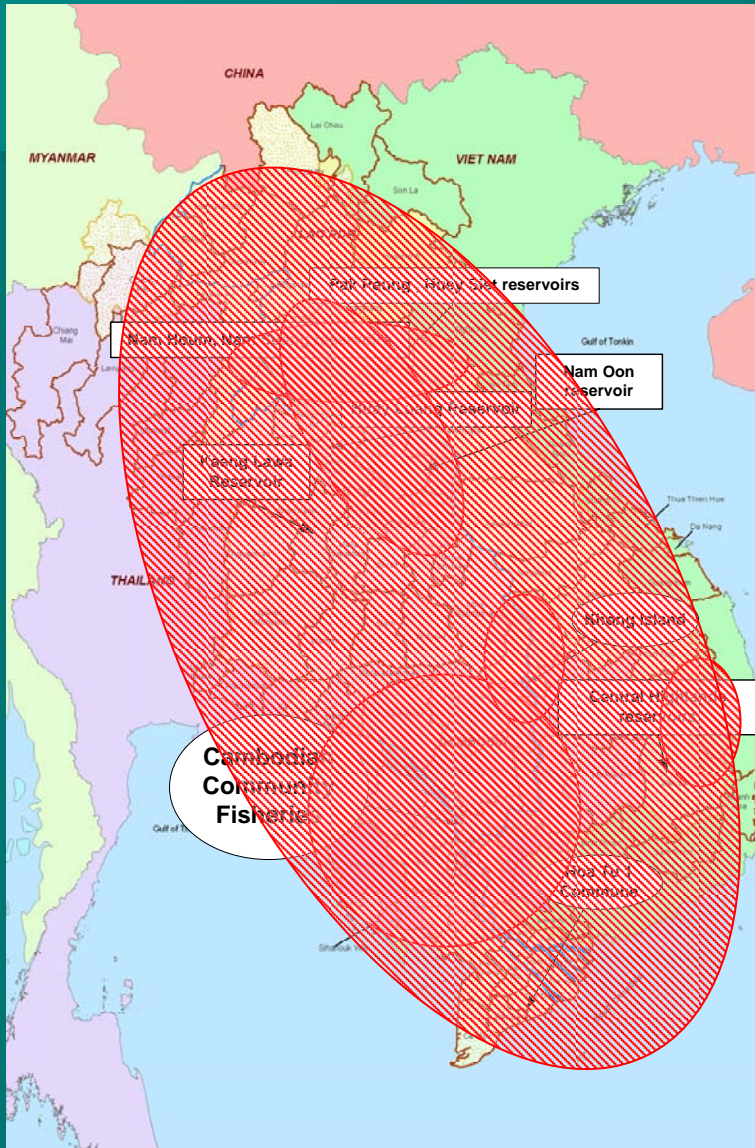
Vertically
Across levels
(local → national → regional)



horizontally
between communities &
waterbodies



Information sharing by users



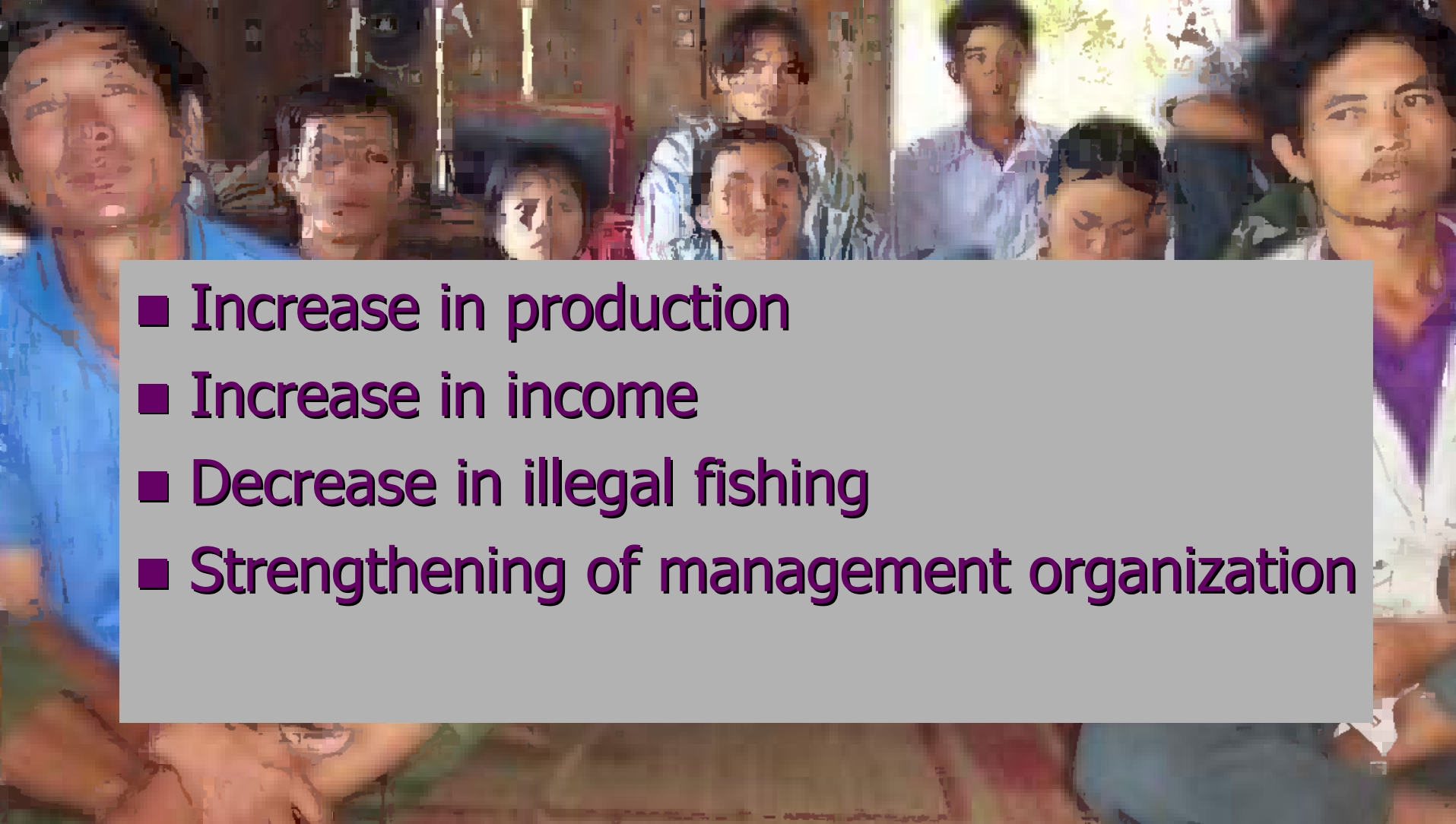
- Lao reservoirs
- Lao and Thai reservoirs
- Khong Island districts
- Central Highland reservoirs
- National Community Fisheries
- TAB

Does co-management work? Satisfaction and perceived benefits

Gender	Satisfaction		Benefit	
	<i>Vietnam</i>	<i>Thailand</i>	<i>Vietnam</i>	<i>Thailand</i>
Men	33%	75%	67%	73%
Women	58%	96%	8%	61%
Total	44%	82%	75%	92%

Benefit	Much better	Somehow better	No difference
Knowledge sharing	59%	16%	25%
Improved communication	32%	48%	20%
Opinions are heard	78%	22%	0%

Does co-management bring benefits?

- 
- Increase in production
 - Increase in income
 - Decrease in illegal fishing
 - Strengthening of management organization

Experiences in evaluation

- Multiple issues/dimensions
- Emphasis on
 - Outcomes – not process
 - Facts – not learning as such
- Attempts at user evaluation of learning process not very successful (tacit learning?)

Contrasting our experiences

Item	MRRF	MRAG
Issues	Multiple	Single?
Villages	Multiple	Single?
Objective of doing	Improved resource use	Learning
Design	'For real/Tangible results'	Experiment
Emphasis	Routine management P&I by 'co-managers'	Research project approach
Information source	'Experience'	Experiment
Subject of adaptation	Institutional (Management plan)	Management implementation

What's in a word?

- Learning; adaptive learning; management; co-management; adaptive co-management.....what next?
- What we do is 'management' ("The What")
- Involving two key partners, i.e. users and government in management, is called 'co-management' ("The How")

What is 'management'?

- Riparian languages: First and foremost *controlling*, also *caring of and about* something
- *To manage* is to exercise “the right to regulate internal use patterns and transform the resource by making improvements”

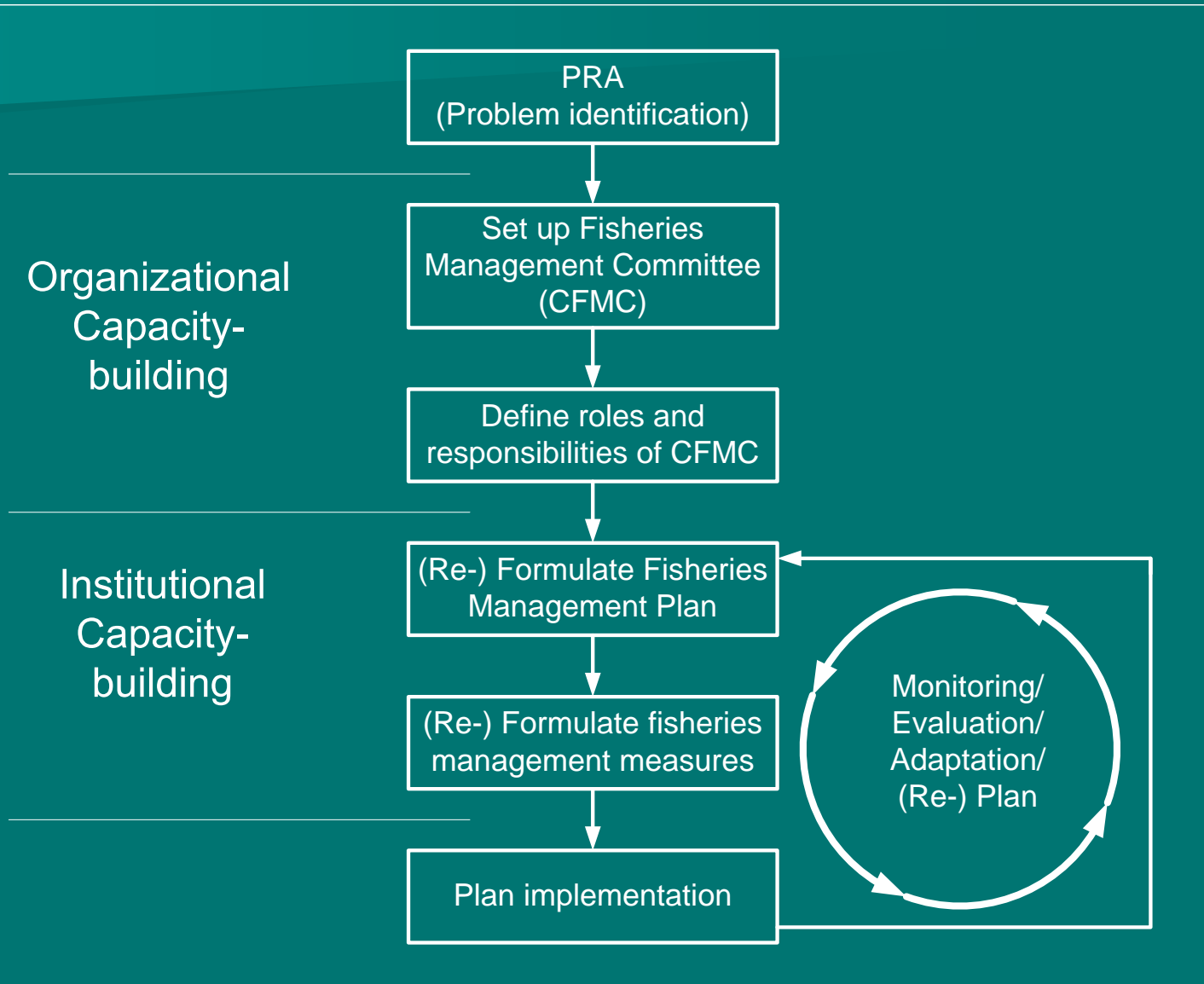
AL and 'good governance'

- Management (the "what") – a governance issue (the "how")
- 'Good governance' (participation; accountability; transparency) = democracy ("adaptive democracy"?)
- Co-management: an example of 'good governance' = democratic management; adaptive by definition?

Cases: Stocking in Central Highlands, participatory water management in Soc Trang



Process for AL



Immediate Objective

(Desired change in behavior of target groups)

- 'Jointly' *(multiple stakeholders)* develop and implement plans for sustainable management of selected river and reservoir fisheries at different levels
- Disseminate *(fisheries line agencies; TAB; etc.)* experiences made as models for basin-wide aquatic resource (co-) management"

What is 'management'?

- Strategic management (fishery policy formulation and planning)
 - Definition of objectives and directions to meet them
 - Legislation
 - Decision regarding structure of management system
- Tactical and operational management
 - Formulation of suitable mix of management measures
 - Annual levels for each management measure
 - Day-to-day decisions
 - Research and data collection to provide necessary knowledge base

Management Functions and Activities

Functions	Activities
Policy decision-making	Setting objectives; planning; training; researching; organizing;
Data collection/monitoring	Gathering; analyzing;
Regulating access	Licensing; formulation/ratification of restrictions on areas and seasons
Regulating harvest	Restricting gear; setting quotas etc.
Enforcement	Policing; awareness creation;
Habitat/resource protection/enhancement	Creation of conservation zones; stocking, bank restoration, etc.
Resource use coordination	Stakeholder identification; IRUP&M; Establishing of negotiation platforms;
Benefit maximization	Supply management; quality enhancement; product diversification

Our working defining and concept of co-management

A formalised process of sharing authority and responsibility by government and organised user-groups in decentralised decision making....'

Openly stated and regularly followed

Ability/capability to act on one's own

'Decisions are made at the lowest possible level'

Power or right to control actions

'Divide or join in'

'Management is decision making'

Learning

- Reducing uncertainties?
- Tacit/discursive

Learning and Knowledge

Calvin and Hobbes

by Bill Watterson

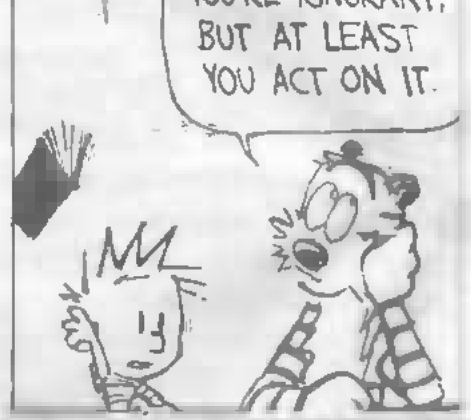
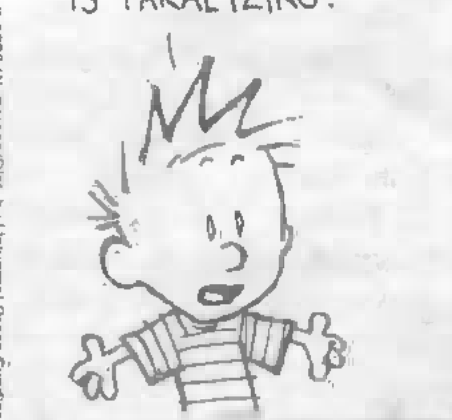
THE MORE YOU KNOW, THE HARDER IT IS TO TAKE DECISIVE ACTION.

ONCE YOU BECOME INFORMED, YOU START SEEING COMPLEXITIES AND SHADES OF GRAY.

YOU REALIZE THAT NOTHING IS AS CLEAR AND SIMPLE AS IT FIRST APPEARS. ULTIMATELY, KNOWLEDGE IS PARALYZING.

BEING A MAN OF ACTION, I CAN'T AFFORD TO TAKE THAT RISK.

YOU'RE IGNORANT, BUT AT LEAST YOU ACT ON IT.



MRRF Outputs

Output 1:
Management strategies
developed

Output 2:
Fisheries (co-) management
plans formulated and
implemented

Output 3:
Capacity of co-managers
strengthened

```
graph TD; O1[Output 1: Management strategies developed] --> O2[Output 2: Fisheries (co-) management plans formulated and implemented]; O2 --> O3[Output 3: Capacity of co-managers strengthened]; style O3 stroke:#f00,stroke-width:4px
```

MRRF Interest in AL: Perceived problems (Kolkata, June 2003)

- Incompatibility of information needs of co-managers?
- Division of labor in co-management
- Incompatibility of methodologies of information generation
- “Scientific” orientation of counterparts and line agency
- Difficulty of explaining why and what for information is necessary (to users)
- Cost of information generation (for users)

Some Ex-Post Evaluations of Adaptive Learning Experiences from MRRF Viet Nam

-- Management of (River and) Reservoir Fisheries,
Dak Lak

-- Strengthening of Participatory Management of
Water Resources, Soc Trang

Structure for each “Project”

- (1) A little background
- (2) The Evaluation Questions
 - 1. Was the information generated what was expected?
 - 2. Has the information been effectively shared and utilized?
 - 3. Were the methods and processes used to generate and share information effective?
 - 4. Are the benefits from the information gain worth the costs in acquiring it?
- (3) Additional stuff, where appropriate

MRRF Dak Lak

1. Dak Lak province, Central Highlands, since 1995.
2. Fisheries co-management in six water bodies began 1998
3. > 300 reservoirs in Dak Lak, mostly under 100 ha, mainly for irrigation
4. Stocking common, usually under contract with local authorities (privatised or quasi-privatised)
5. Reservoir fisheries managers decide what to stock, invest, regulate, and sell.

Focused workshop on “Learning for Fisheries Enhancement in the Central Highlands of Viet Nam” (February, 2004)

Enhancement Workshop Objectives

- To compile pertinent information available with the Viet Nam sub-component of MRRF as well as, possibly, other agencies involved, to be presented at the workshop;
- **To provide an opportunity for people involved in reservoir fisheries development activities to exchange knowledge and experiences on stocking practices for small(er) water bodies in Viet Nam;**
- **To systematically evaluate experiences made so far and formulate “lessons learned” on fisheries enhancement in Viet Nam;**
- **To develop recommendations for future enhancement activities and disseminate these recommendations in a simple leaflet.**
- Start-up with preparatory activities for the formulation of a programme of stocking Lak Lake.

In general, how do people manage?

- Own knowledge plus training
 -
 - Experience, communicating, **adapting**, and repetition of same.
 -
 - Planning tends to be short-term,. flexible, and adaptive.
 -
 - If you can get them away from day-to-day problems, they can define their objectives.
- Sustained living standards and peace of mind
 - Organize to assure sustained high fish yields
 - United approach to community welfare
 - Cooperation with local governments in fisheries management

C
o
m
m
o
n

In general, how do people know what to stock?

- **A: Mainly from experience / Trial-and-error.**
 - It works not too badly!
 - In 1999-2000, the Reservoir fisheries manager at Ea Kao “followed” our “recommendations” **before** we made them.
 - (A lot of good scientists never went to university.)
 - **Therefore, if a farmer or fisher disagrees with or doesn't follow your recommendations, try to find out why!**
-
- B: Recommendations from our project or experienced reservoir managers?
-
- C: Limited by what is available and how much money they have.

Was the information generated what was expected?

- By and large, yes, as well as other information related to reservoir fisheries management.
- Every reservoir is different: The “best” management depends on the reservoir, and should adapt to changing circumstances, from year to year.
- Some “meat”:

Ea Soup Stocking recommendations, February, 2004

- - Best time for stocking: March to May.
- - A stocking combination of Silver/ bighead carp (50%), grass carp (30%), Indian carp (10%), and tilapia (10%) is acceptable for fishing.
- - Selection of good, healthy fingerlings is important.
- - Patrol the fishery closely for ten to fifteen days after stocking.
- - Stock far from outlets and spillways.

May be interesting to know current opinion.

Buon Tria Stocking recommendations, February, 2004

- --**Best time for stocking: February-March.** Water levels in the reservoir are high and there is plenty of natural feed.
- -- The fishers lack the money to buy suitable gear to catch stocked fish, considering the abundance of bamboos and tree stumps in the reservoir.
- -- **Silver barb and tilapia are easy to catch and get a good price..**

May be interesting to know current opinion.

Note the differences from Ea Soup!

What did we learn from following stocking and production in various reservoirs from 1996/97 to 2001?

- Every manager stocks, based on his own experiential learning and what is available. Our experiment was passive, to get very rough guidelines/ point of beginning for inexperienced managers.
- General guidelines will not apply perfectly to any reservoir. Experiences managers do not need them.

The guidelines

Precautions apply!

Species	Number per hectare			Size (g)
Res. Area	150-200 ha	50 ha	5 ha.	
Silver	1250	2500	4500	0.5-1
Bighead	800	1500	3500	1-2
Indian	1000	1000	2000	0.5-1
Common	Depends; 1000 in small reservoirs?			?
Grass	Depends			?

Fishers' Wisdom (1)

Why stock silver carp?

- (a) MRC: Stock **indigenous species**.
- (b) Government: Stock **high-value species**.
- No arguments against either principle.
-
- **So, why stock silver carp, which is both exotic and low-priced?**
- From the Head, Ea Soup Fishers' Union:
- **Food security!** Nothing beats it as an easily-caught, easily-raised protein producer.

Fishers' Wisdom (2)

What size should be stocked?

- Conventional wisdom: **Stock big fingerlings**, for higher recovery and better returns
 - BUT
-
- Difficult to get in Dak Lak AND more expensive per fish.
-
- **Good returns from stocking smaller ones.**
-
- Most reservoirs are poor in wild species: high drawdowns/ small catchment areas.
-
- “Optimal” stocking size seems **species-specific.**

Has the information been effectively shared and utilized?

- Based on observations at the workshop and the post-workshop evaluation by participants, information seemed to have been effectively shared.
-
- Key project staff missing. No follow-up to assess utilization.
-
- The fishers' groups adapt their stocking strategies continuously, based on experience and circumstances.
-
- Project guidelines have been shared in various fora, mainly within Dak Lak province. Staff have used them. Level of utilization is not known, but the Province requested such guidelines long ago!

Were the methods and processes used to generate and share information effective?

- By and large, yes, except for the field trips, for some participants.
- Visiting small reservoirs (< 5 ha.) doesn't help managers of bigger reservoirs (>100 ha.) much. Too simple.
- Fisher groups managing reservoirs would benefit from visiting reservoirs managed by other groups, rather than visiting quasi-privatized fisheries.

Are the benefits from the information gain worth the costs in acquiring it?

Was the workshop worth the cost?

- **Probably.** The discussions were excellent, but the benefits may never be measured. Not a problem for the intended beneficiaries.

-

Is fishers' monitoring worth the cost?

- Fishers will not monitor any more than they have to, since it takes time and maybe money, so their efforts are **likely to be very cost-effective, but may miss some things.**

-

Was our monitoring worth the cost?

- ?? Big effort, reduced some uncertainty about some stocking practices, and developed expertise in reservoir fisheries among government staff. To what extent are the guidelines used?

Strengthening of Participatory Management of Water Resources, Soc Trang

1. Began December, 2003, (operationally in April, 2004)
2. Two farmers' groups in Hoa Tu 1 Commune, My Xuyen District, Soc Trang Province, Mekong delta
3. Rice-shrimp culture, evolving into shrimp monoculture, is the economic mainstay
4. Excessive dependence on shrimp culture, with a trend towards intensification
5. Problems with disease and pollution led authorities to organize farmers' groups to coordinate and manage shrimp culture and water resources.

Preliminary Survey to assess progress of project against indicators (April-May, 2005)

The survey

- Aimed to contact all members of each participating organization (24 + 31 members)
- Contacted 17 non-participating farmers
- Indexed scores to qualitative questions:
(-2 much worse or much less to +2 much better or much more)

Was the information generated what was expected?

- Yes. No major surprises at any level, but with better foresight, we could have developed a questionnaire which answered more questions.
- Some “meat”:

**Your understanding of the Club/Cooperative plan,
compared to one year ago is**

**much better somewhat better the same somewhat
worse much worse**

Group	Mean Score	% with improved understanding
CLB 4	.92	75
Phu Loi Co-op	.80	81
Others	.20	30

Farmers' Comments

- (a) Plans still needs improvement to assure compliance (1) and generate benefit for members (1), both from CLB 4.
- (b) Attendance at meetings is important for understanding the plan (3, from Phu Loi co-op) and following the plan (1, from CLB 4).
- (c) Division into four subgroups makes plan application easier (1, from CLB 4).

Your understanding of training courses give over the past year, as compared to earlier courses, is
much better somewhat better the same somewhat worse much worse

Group	Mean Score	% with improved understanding
CLB 4	1.125	92
Phu Loi Co-op	.97	94
Others	.73	73

Farmers' Comments

- (a) Twenty-five member farmers indicated that the courses had high applicability, and one indicated that applicability was low, because she had little money.
- (b) Training was more effective because it was by subgroup. (8, all from co-operative)
- (d) Regular follow-up is important. (1 each from Co-Op and CLB 4).

Have they applied the training?? (1)

- Results fragmentary (and probably always will be)
- Fish culture course (Aug. 2004)
- 64% stocked last year
- $\geq 72\%$ plan to stock this year

Have they applied the training?? (2)

- Shrimp culture course (Feb./05) encouraged low stocking densities
- Mean stocking density has dropped by 28%
- 62% of farmers reduced densities
- WHY?

Appropriate	Money	Area	Other
39%	25%	16%	20%

How does your level of compliance with club/cooperative decisions and regulations in 2004 compare with your compliance in 2003?

much better somewhat better the same somewhat worse much worse

Group	Mean Score	% with better compliance
CLB 4	.70	65
Phu Loi Co-op	.81	87
Others	.27	50

Farmers' Comments

- (a) Not all members follow regulations (3 each, from CLB 4 and the Co-operative).
- (b) Participatory decision-making important (3 from CLB 4) .
- (g) Not satisfied with/ do not trust executive (3 from CLB 4, 2 from co-operative)
- (h) Technical training helps compliance (1 from co-operative, 1 from outside.)

(a) Did you raise any questions or concerns with your club or village head in 2004?

**(b) Compared with 2003, response to your concerns was
much better somewhat better the same somewhat
worse much worse**

Group	Mean Score	% more staisfied
CLB 4	.65	65
Phu Loi Co-op	.55	55
Others	.25	37.5

Has the information been effectively shared and utilized?

- In terms of understanding and following plans and training courses, there has been good progress, but there is plenty of room for improvement, especially with non-participating farmers.
-
- This is important, because all operations use (and pollute) the same water resources.

Were the methods and processes used to generate and share information effective?

- Yes to (some) training courses, but how to be MORE effective?
- Sharing of survey results: remains to be seen. Project will use
- Meetings: Progress, but Rome wasn't built in a day!
- A question continuously asked of local stakeholders.

Are the benefits from the information gain worth the costs in acquiring it?

Farmers, particularly subgroup leaders, monitor water quality, stocking, appearance of disease, harvests, and other items. Some do a better job than others, but this is improving.

Post-project, they will adapt these monitoring systems to their needs, limitations, and inclinations.

Good question for the farmers.

Project staff-monitored activities will be used to plan future project activities, so are probably cost-effective.