‘Harvest reserves’ in floodplain river fisheries - Protecting fish to increase catches

Training workshop materials

UK Department for International Development (DFID)
Fisheries Management Science Programme (FMSP)

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Background

This presentation is one of a series of five presenting key outputs from FMSP floodplain projects, carried out in the Asian region between 1992 and 2005. The five papers focus on:

- General management guidelines for floodplain river fisheries (as published in FAO Fisheries Technical Paper 384/1)
- Selection and management of harvest reserves (key messages)
- Materials for a training course on harvest reserves
- Management of sluice gates and water levels in flood control, drainage and irrigation (FCDI) schemes for integrated benefits of agriculture and fisheries (key messages)
- FMSP approaches to modelling floodplain fisheries

This presentation was prepared by FMSP Project R8486 – 'Promotion of FMSP guidelines for floodplain fisheries management and sluice gate control'

Introduction

The following materials are provided for adaptation or use in workshops aimed at the selection and/or management of harvest reserves. They are based on the 'Management Guidelines' produced by FMSP Project R7043 (Hoggarth, 2000, see next slide), which may be provided as a handout. They may also be used in conjunction with the related presentation providing 'key messages' for harvest reserves.

The proposed workshop structure uses a step by step approach to providing the selection and management guidelines, with participants applying the selection criteria to their own locality and then considering management needs and options over several stages. This approach allows participants to contribute their own selection criteria to the process, which may improve the process and help with adoption. Where reserves already exist, workshop participants may usefully consider how well these meet the identified criteria or guidelines at each stage.

Selection Criteria and
Co-management Guidelines for
River Fishery Harvest Reserves

DFID Renewable Natural Resources Research Strategy

Fisheries Management Science Programme

April 2000

DFID Department for International Development

MRAG

Dinas Perikanan

CRIFI

This presentation based largely on this FMSP document

Hoggarth (2000)

Content:

1. Guiding principles
2. General guidelines for co-management of river fisheries
3. Specific management guidelines for harvest reserves
4. Summary of key steps for co-management of river fisheries

25 pages with examples in text boxes

Download: www.FMSP.org.uk
(R7043 project page)

Content of Guidelines document

1. **Introduction**
   - 1.1 Guiding principles
   - 1.2 What is a harvest reserve?
   - 1.3 Why use harvest reserves?
   - 1.4 What is co-management?
   - 1.5 Legal and cultural basis for co-management in Indonesia
   - 1.6 What is adaptive management?
   - 1.7 Structure of the guidelines

2. **General Guidelines for Co-Management of River Fisheries**
   - 2.1 Where should co-management systems be developed?
   - 2.2 Institutional strategy (who should manage and how?)
   - 2.3 Technical strategy (which management tools to use?)
   - 2.4 Adaptive strategy (monitoring and improving the fishery)

3. **Specific Management Guidelines for Harvest Reserves**
   - 3.1 Which water-bodies should be selected as reserves?
   - 3.2 How should harvest reserves be managed?

4. **Summary of Key Steps for Co-management of River Fisheries**
   - 4.1 Choosing village co-management units
   - 4.2 Building the skills required for co-management
   - 4.3 Activities in each village co-management unit
   - 4.4 Catchment management and coordination

- Note focus on both general guidelines for developing co-management in floodplain river fisheries (where and how)….
  …. and specific guidelines for harvest reserves

- The workshop programme suggested below follows a slightly different structure which was found to improve learning

Guiding principles for Managing River Fisheries

Management must be…

Locally-appropriate

- There is no single right answer
- Promote a range of alternative livelihood opportunities and management solutions

People-centred and participatory

- Develop solutions in partnership with local people

Integrated and inter-disciplinary

- Take a broad view of the fishery, the wider river system and any potential impacts
- Consider both biological and social factors

Adaptive and flexible

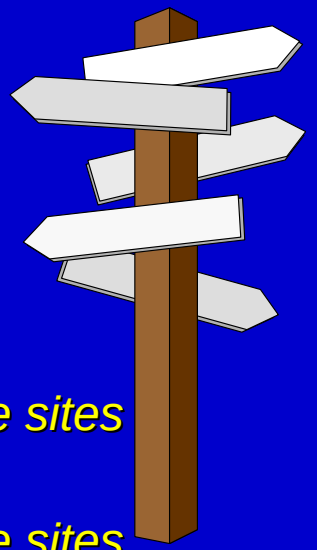
- Note that resources change over time
- Communities and their impacts also change
- Some changes are long-term (e.g. global warming, human popula
- ... and some changes are rapid (e.g. the introduction of a
  or an effective new fishing gear).

Sustainable ('wise' use)

- Ecological sustainability (conserve fish stocks and habi
- Sustainability of livelihoods (people need income to live)
- Institutional sustainability (develop self-supporting management

See section in Management Guidelines document

Suggested workshop programme



Day 1 Introduction and background

e.g. using ‘key messages’ presentation on harvest reserves

1. Which water-bodies should be used as reserves?

   Apply selection criteria to existing local reserves or candidate sites

2. Where should co-management be encouraged?

   Apply selection criteria to existing local reserves or candidate sites

Day 2

3. Who are the stakeholders?

   Identify stakeholders around existing local reserves

4. What are the management needs of river fisheries and reserves?

   Distribute roles among stakeholders around existing local reserves

5. What spatial management units could be used?

   Identify management units at local, catchment and other levels

6. What management measures could be used (reserves and/or others?)

   Assess local fishery and identify management options

Plenary discussion and workshop evaluation

Working group tasks

Step 1. Which water-bodies should be used as reserves?

For this first step, guidance is provided below on some technical, ecological and social criteria for selecting good harvest reserve sites. Further details are given in Section 3.1 of the Guidelines document. The following slides illustrate some of the selection criteria. Having considered the following criteria, the participants should be invited to suggest their own technical and ecological criteria to add to the list.

Workshop participants should then be invited to consider whether any existing reserves in their area meet these criteria, and/or which water-bodies could be selected as reserves to meet the criteria. A checklist is provided after the illustrations which could be developed and used for this.

A similar approach may be taken in step 2 for the selection of sites having good prospects for successful co-management.

Note colour coding in following illustrations

Blue lines = river channels and floodplain lakes

Green dotted lines = village boundaries

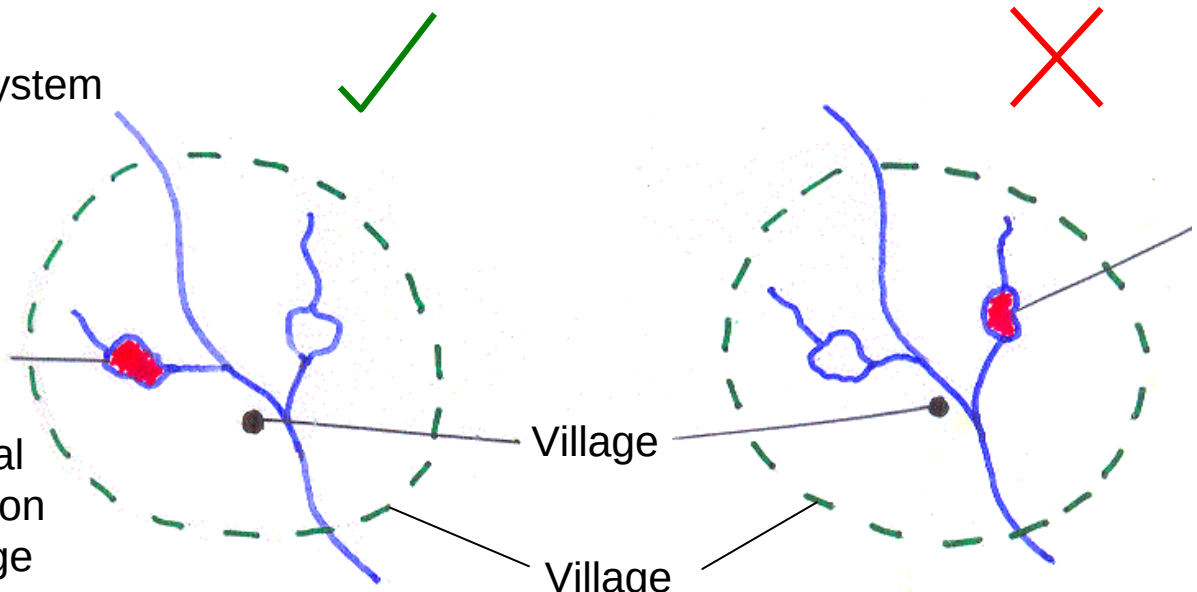
Red shading = reserve water-bodies

Orange shading = floodplain areas

Black circles = villages / towns

Green tick = Yes, do like this; Red cross = No, not like this

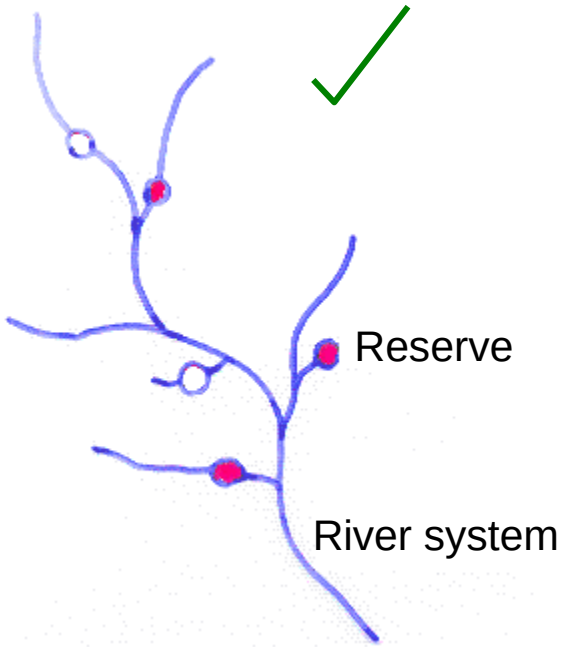
Involve local people in the selection of reserve water-bodies so that they will support and enforce regulations

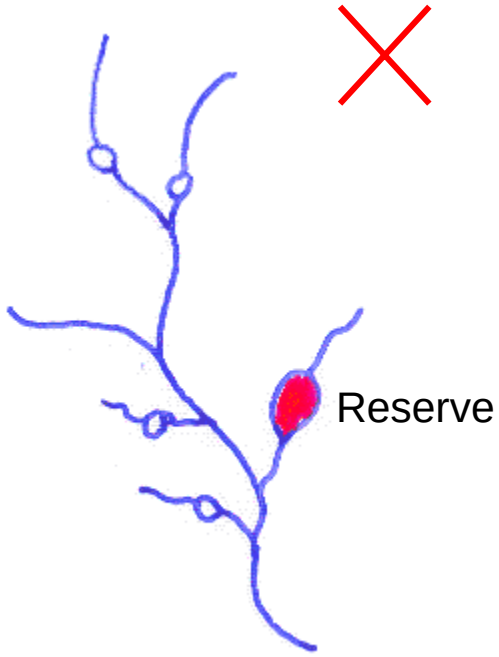


Reserve in water-body chosen by local people based on local knowledge – e.g. in known spawning ground or habitat of valuable species

Reserve in water-body chosen by outside 'expert' - may dry up in some years or be vulnerable to pollution or fish kills

Select several small reserves rather than one large reserve





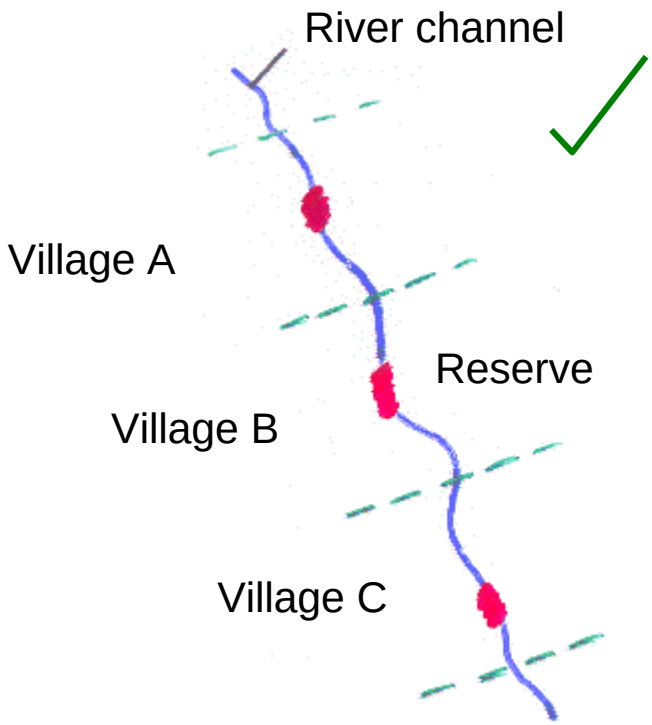
Benefits from reserves to whole river

Costs of reserve management shared between many villages

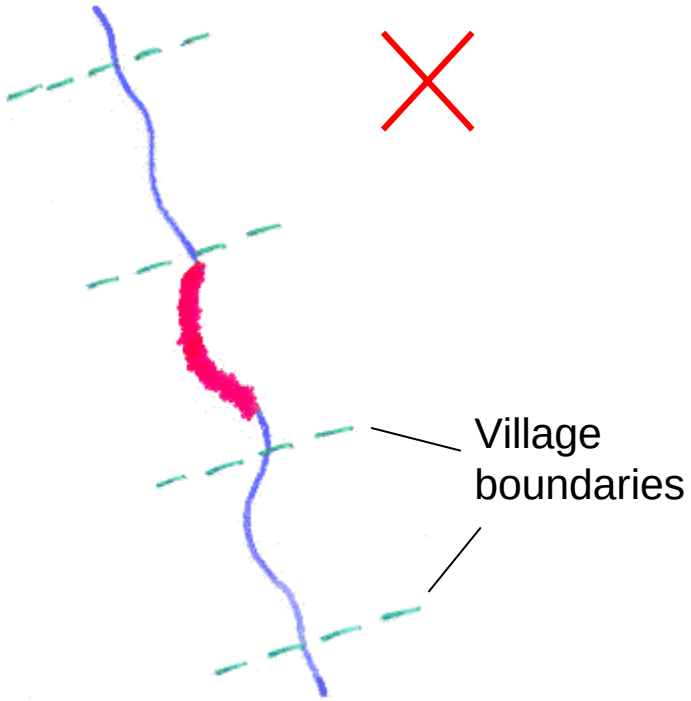
Benefits limited to only one area

High costs in one adjacent village

… and the same if the reserves are in the river channel

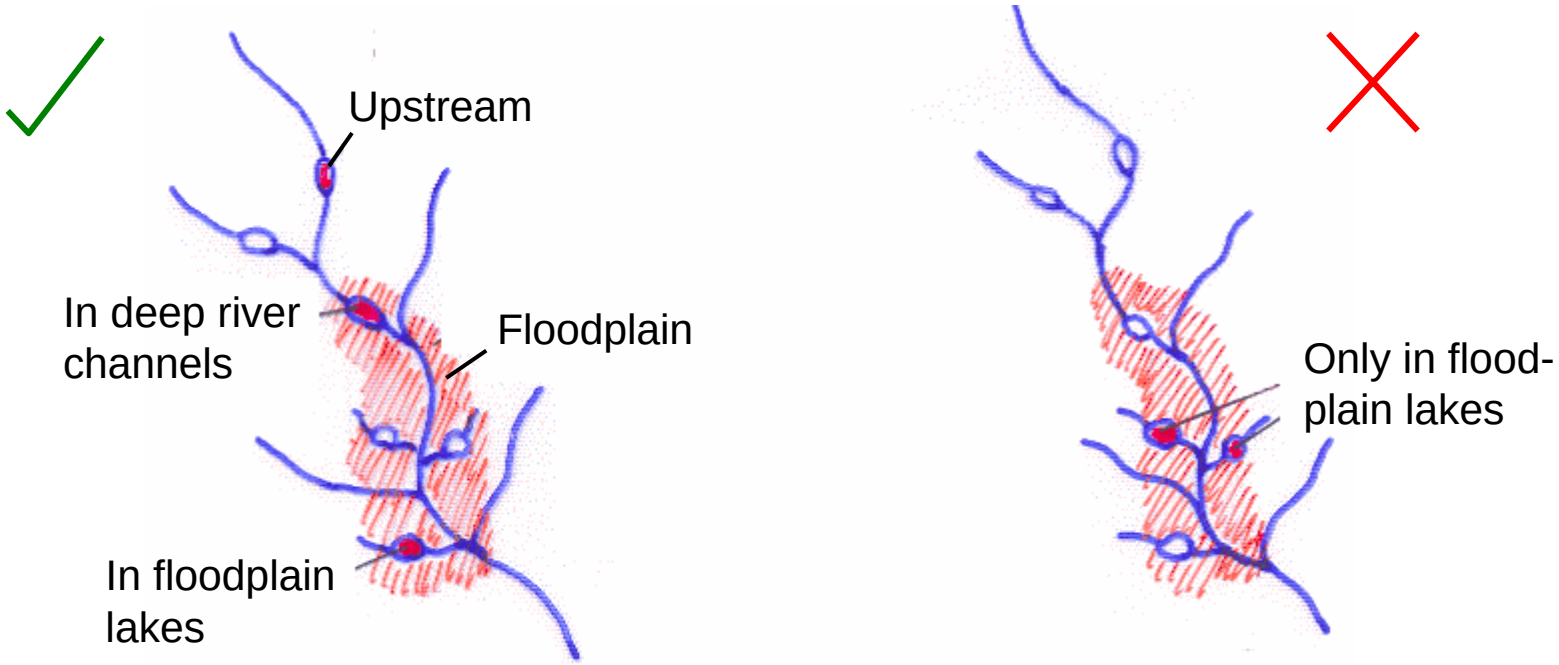


Costs of reserve management shared between many villages



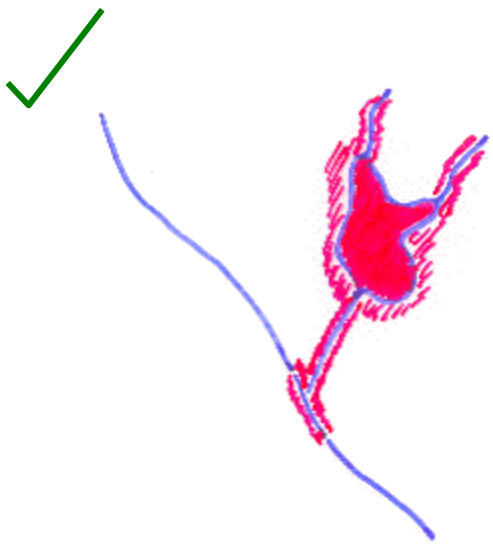
High costs in one adjacent village

Select reserves in several different habitat types

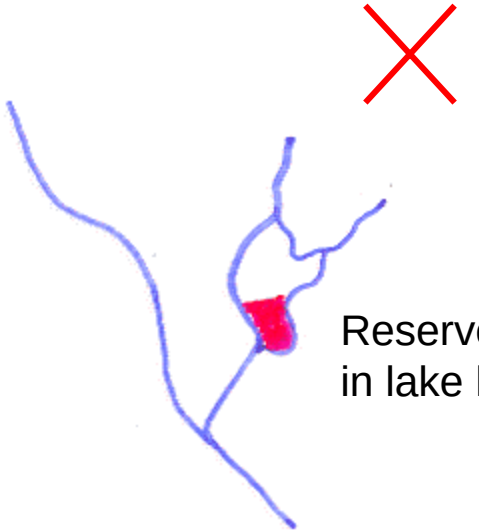


Different habitats are used by different fish species, and for different activities (spawning, feeding, nursery grounds, dry season survival etc)

… and the same if only a single reserve

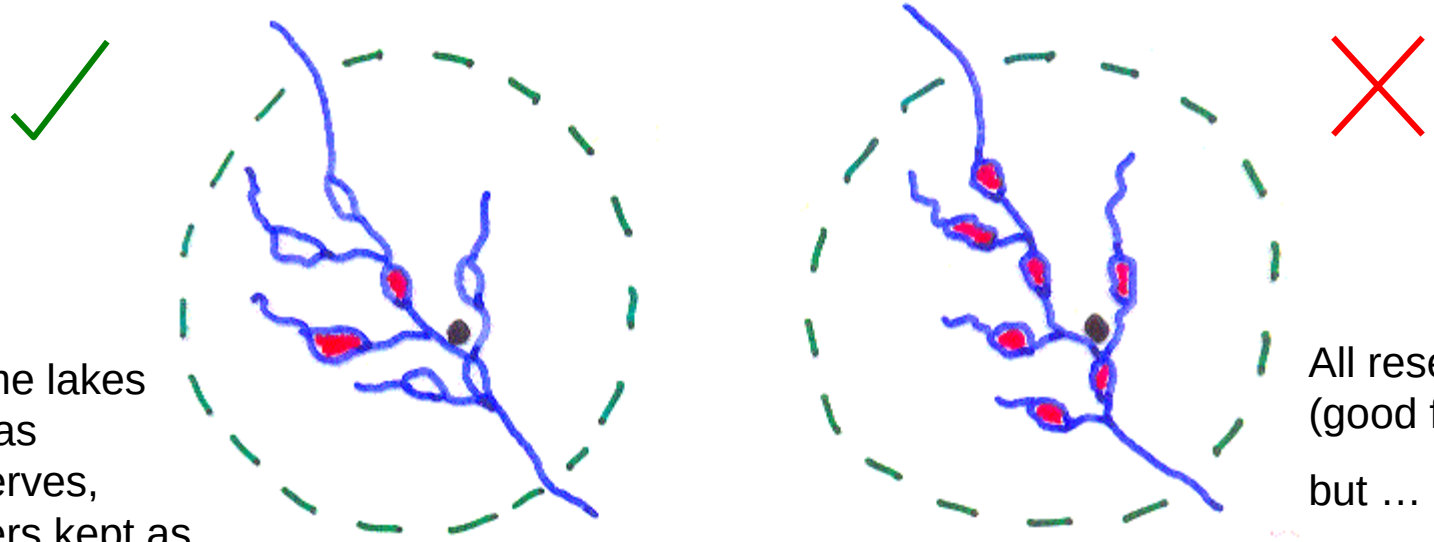


Reserve includes lake, surrounding floodplains, tributaries and connection(s) to main river



Reserve only in lake habitat

Use some village water-bodies as reserves, but not all of them



Some lakes set as reserves, others kept as fishing places

All reserves (good for fish)

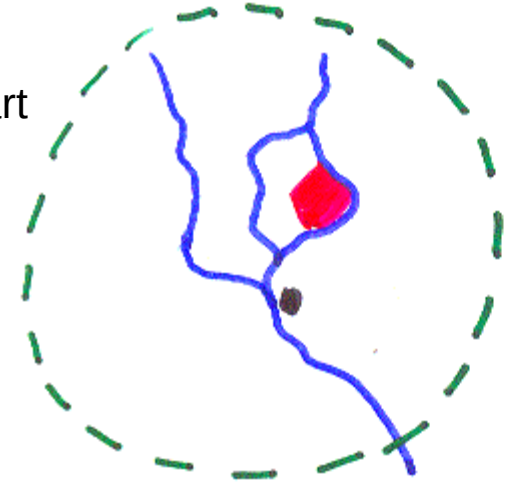
but …

no fishing places (bad for people)

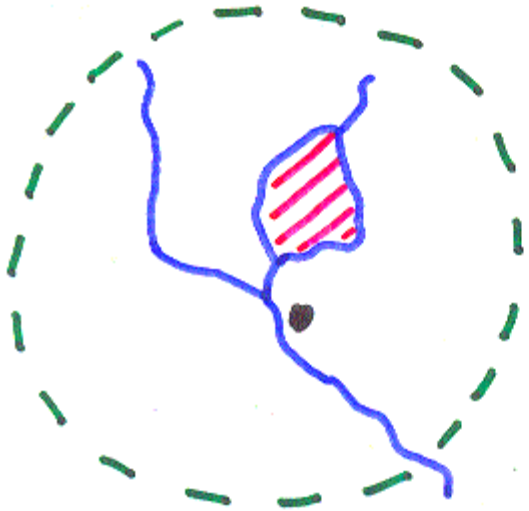
Note: if there are no alternative fishing places outside the reserve, it is likely there will be much illegal fishing (poaching)

… and the same if only one main water-body in a village

Reserve only in part of lake



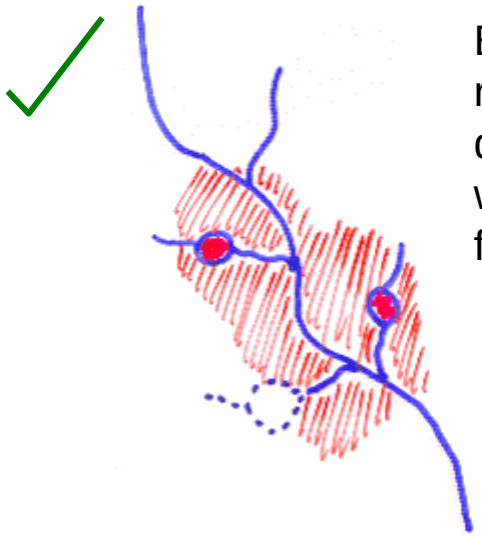
Reserve only in dry season



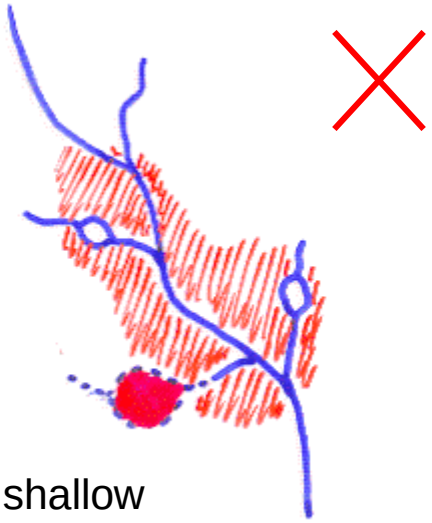
All reserve all year

No fishing places or seasons

Use reserves to protect spawning and dry season habitats … both of blackfish …

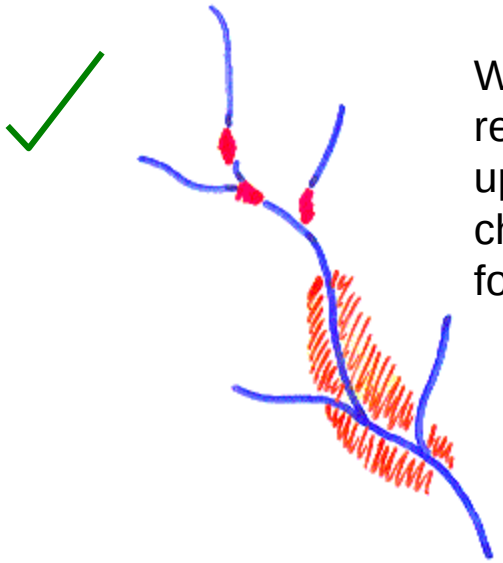


Blackfish reserves in deep, permanent water-bodies in floodplain

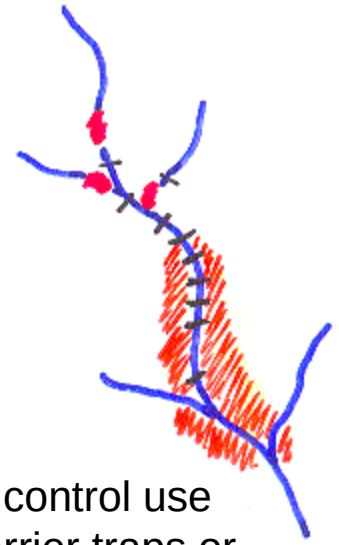


Not in shallow temporary water-bodies that dry up and kill fish

… and whitefish

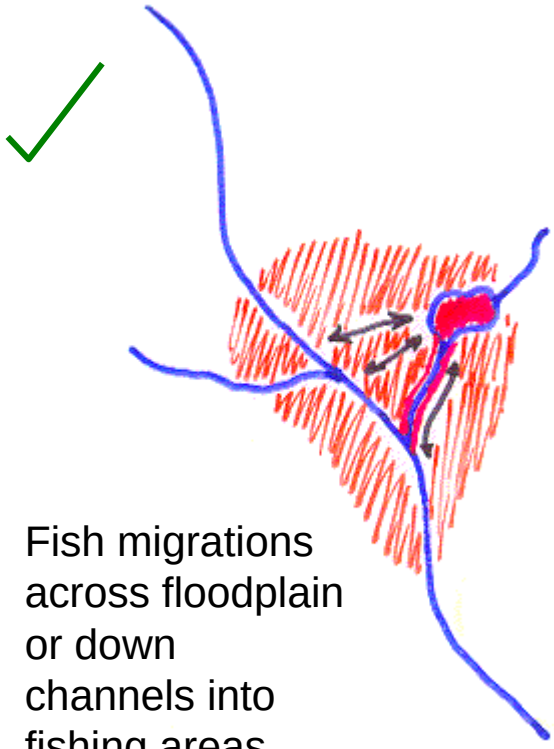


Whitefish reserves in upstream river channels used for spawning

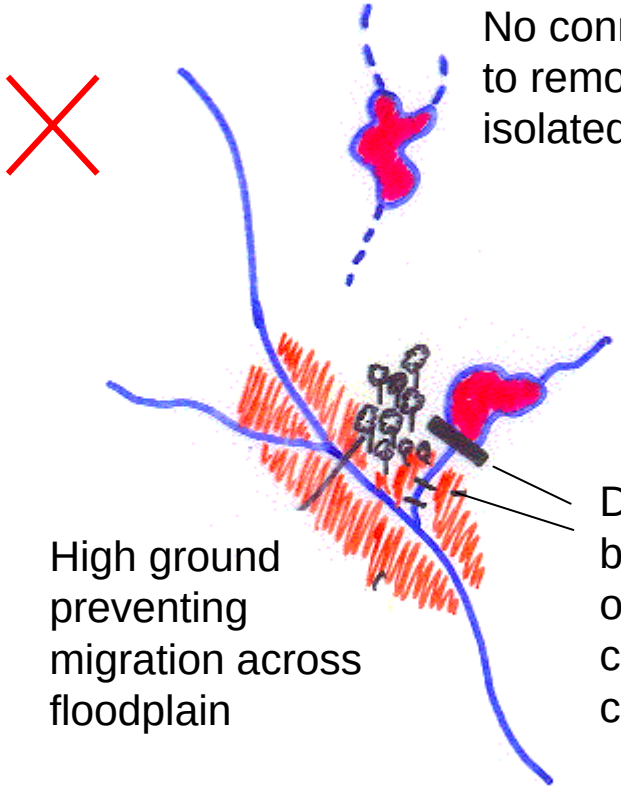


Also control use of barrier traps or fishing gears that prevent spawning migrations

Place reserves in water-bodies with good connections to fished areas



Fish migrations across floodplain or down channels into fishing areas

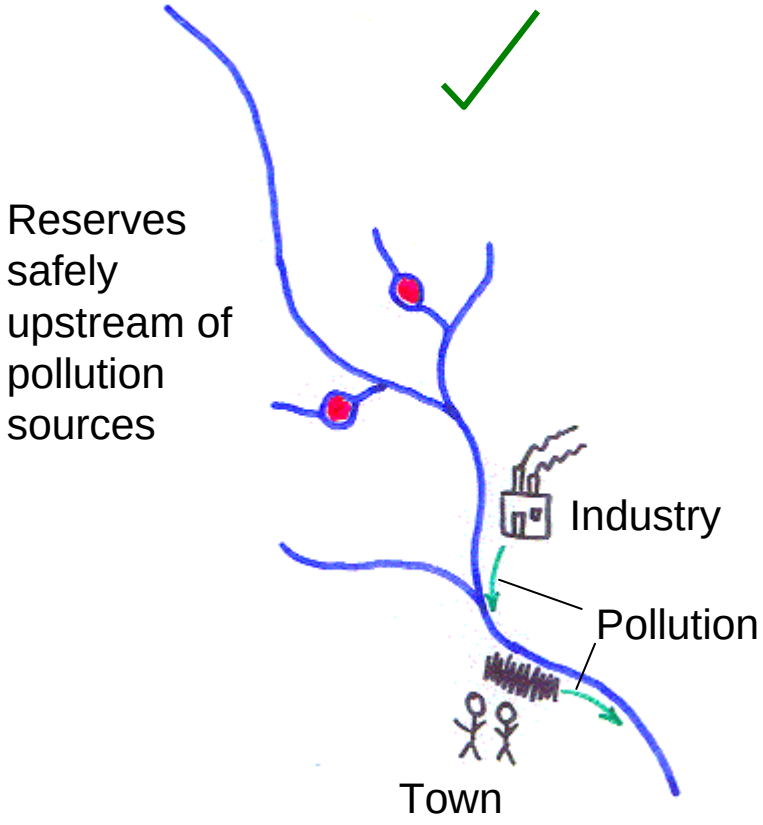


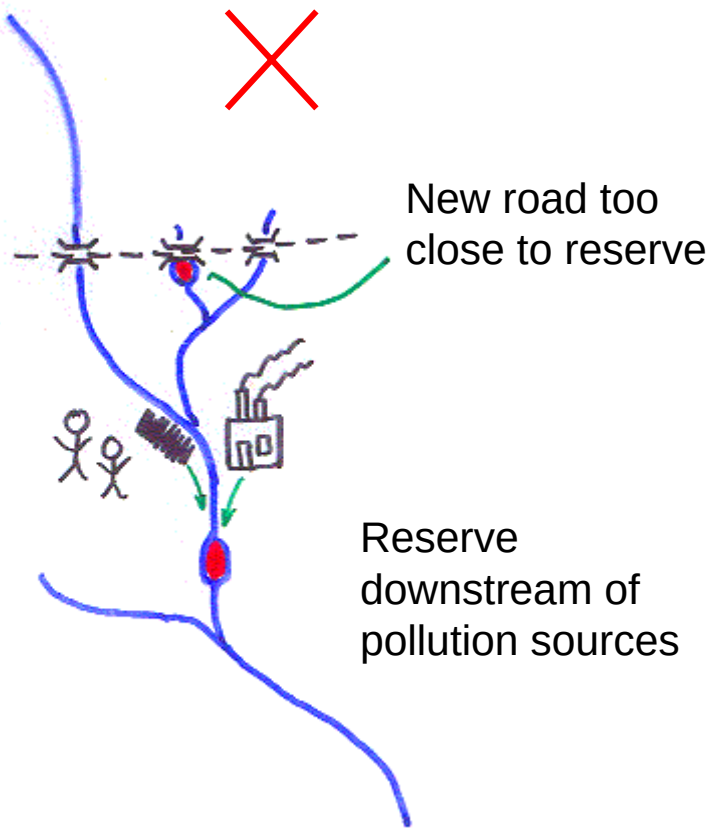
No connections to remote isolated lake

High ground preventing migration across floodplain

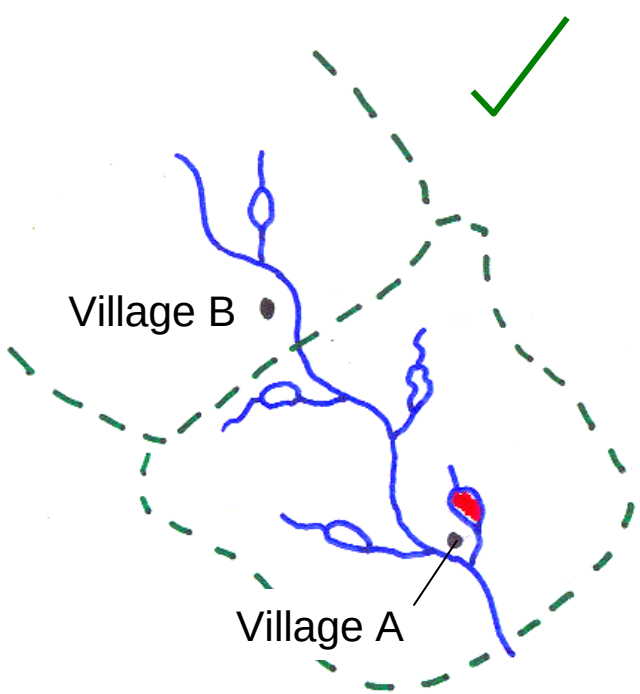
Dam or barrier traps on connecting channels

Place reserves away from sources of pollution or disturbance

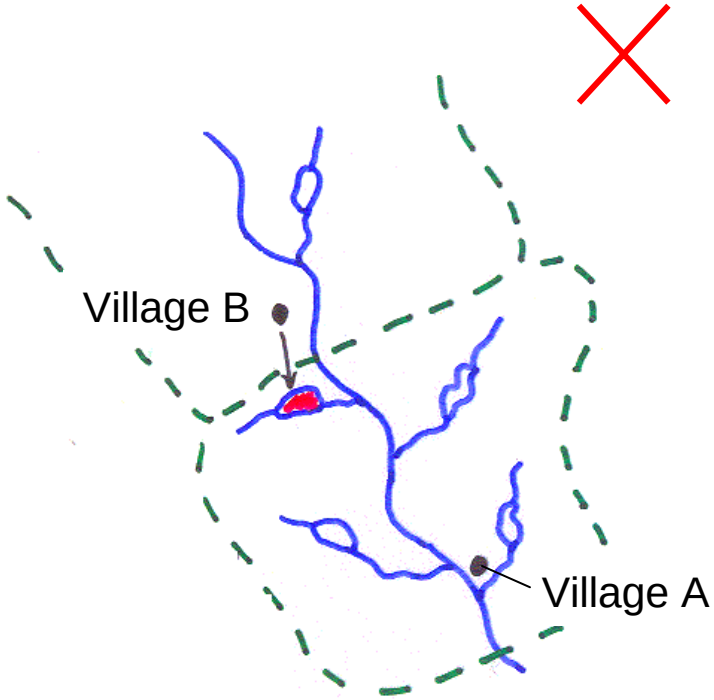




Place reserves in water-bodies close to the village they are owned by (to make it easier to enforce rules)



Village A can protect its reserve easily



Village A can not easily prevent illegal fishing by Village B

Checklist for reserve selection criteria

Add any other criteria, then compare your reserves or candidate sites

Selection criteria	Site 1	Site 2	etc
Selected by and approved of by local people?			
One of several small reserves (instead of one large one)?			
Includes several different habitat types? Or represents a particular habitat type, with other habitats in other reserves?			
Large enough to reduce disturbance of fish, but also leaves enough waters for local people to fish in?			
Blackfish reserve in deep, permanently flooded water-body in flood-plain?			
Whitefish reserve in upstream spawning grounds?			
Has good connections to local fishing areas (and where practical, includes connecting channels in the area defined as the reserve)?			
Upstream of, or far away from, potential sources of pollution?			
If in a large lake, one of several reserves, e.g. in each of the different fishing villages around the lake?			
Close to the village involved in management?			

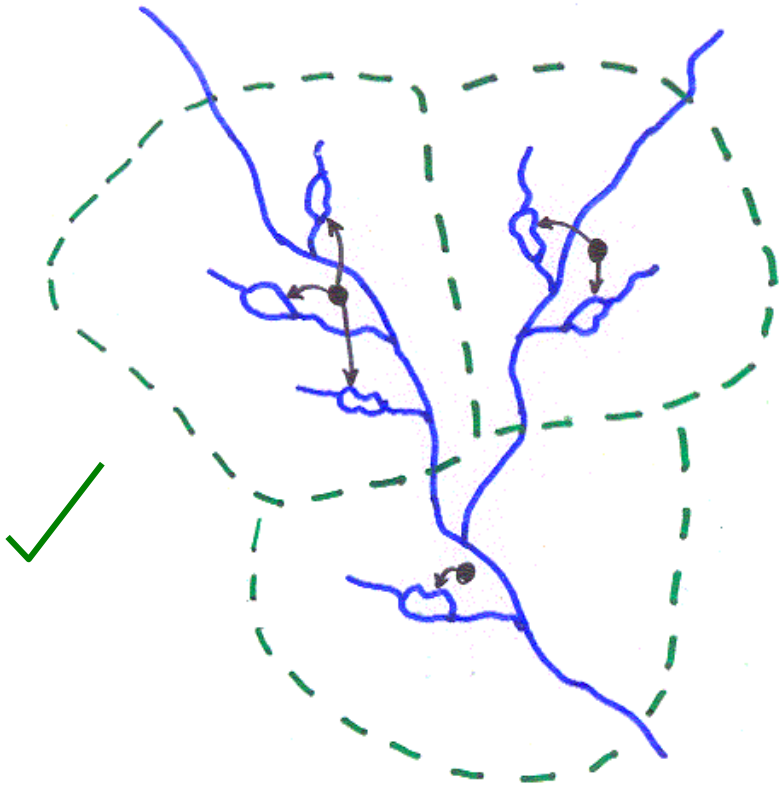
Step 2. Where should co-management be developed?

As suggested in ‘key message’ number 1, a harvest reserve or any other local management regulation is likely to be more effective if it is selected by and managed in collaboration with local stakeholders.

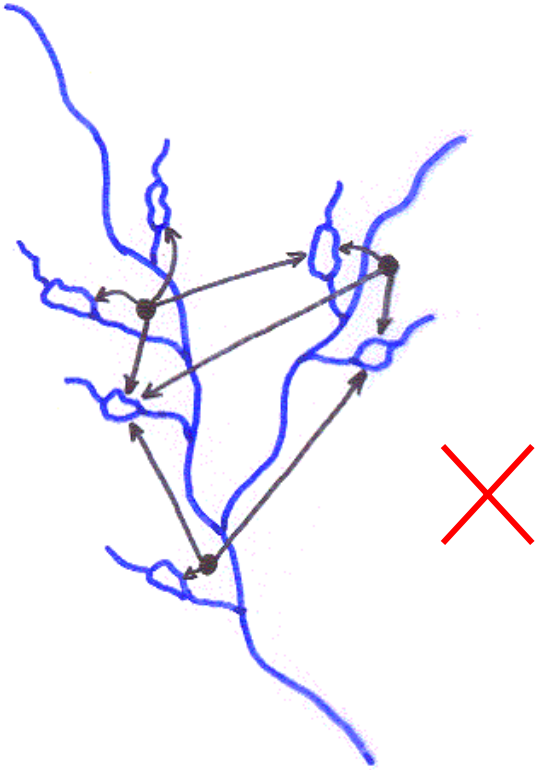
Co-management will be easier to develop in some locations than others, where particular conditions are met that empower community action and enforcement. Such conditions are described in **Section 2.1** of the Management Guidelines (Hoggarth, 2000); and in Chapter 3 of Hoggarth et al, 1999. Some of these conditions are illustrated in the following slides, and may be used as criteria for the selection of the sites that offer good chances of success.

As with the reserve selection criteria, a checklist is given after the illustrations that may be used to consider the suitability of existing or candidate local sites.

Develop co-management where local fishing rights are owned by villages

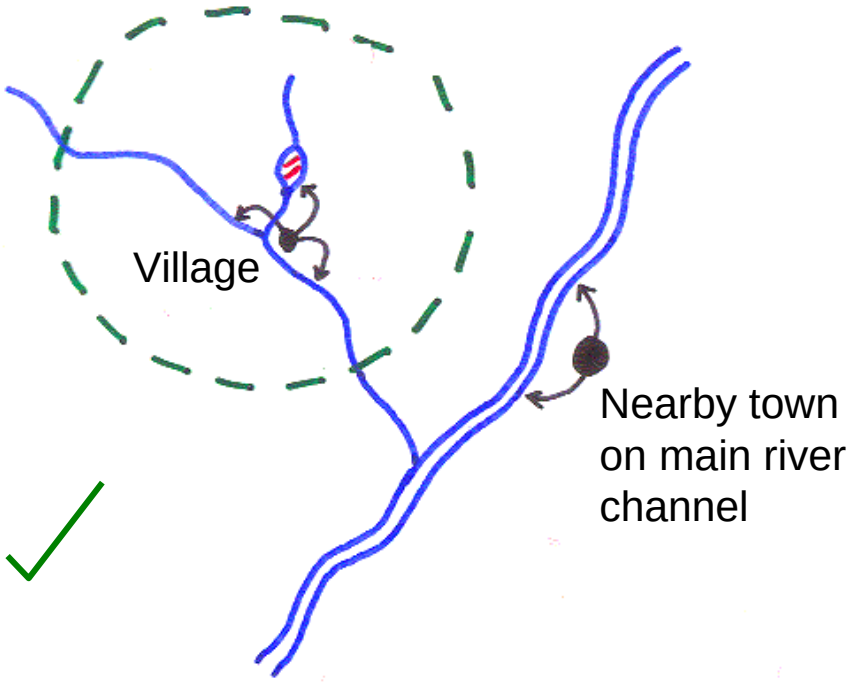


Villages only (or mainly) fish within own water-bodies

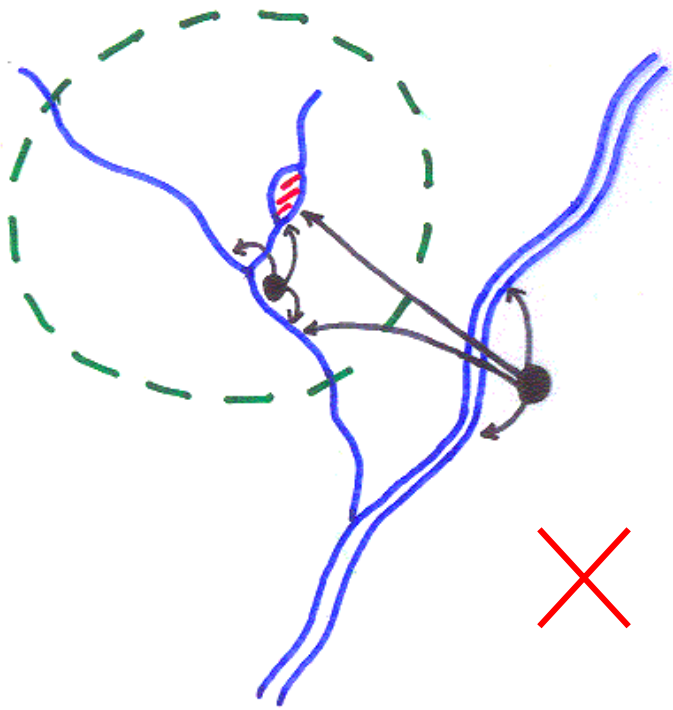


All water-bodies are ‘open-access’ to fishers from any village

Develop co-management where ownership rights are permanent and accepted by neighbours

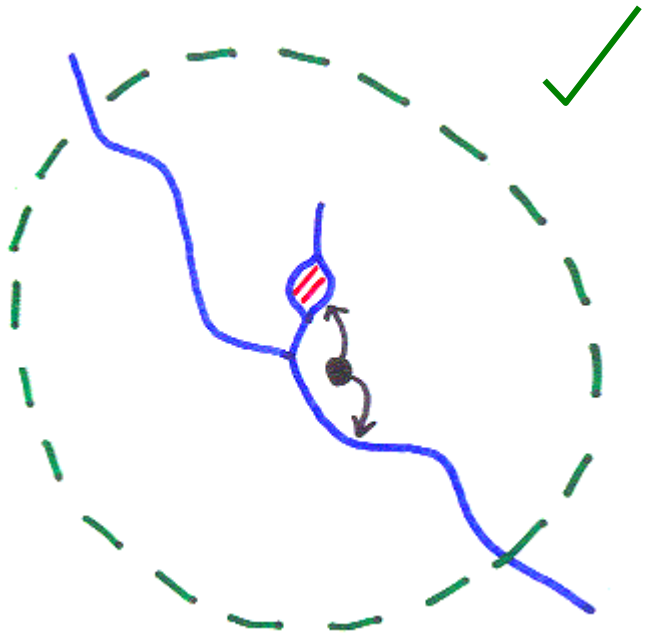


Only local people fish in village water-bodies



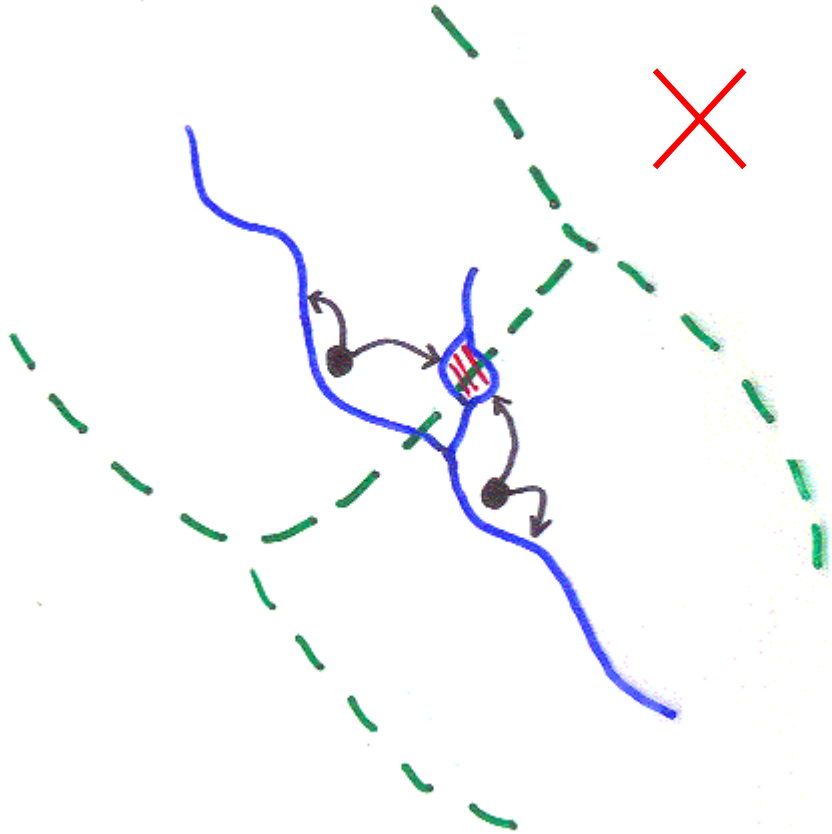
Town people also fish in village water-bodies (either as temporary leaseholders or as illegal fishers)

Develop co-management where main fishing water-bodies (or reserves) are fully inside village boundaries



Easier to manage (only need to manage local people

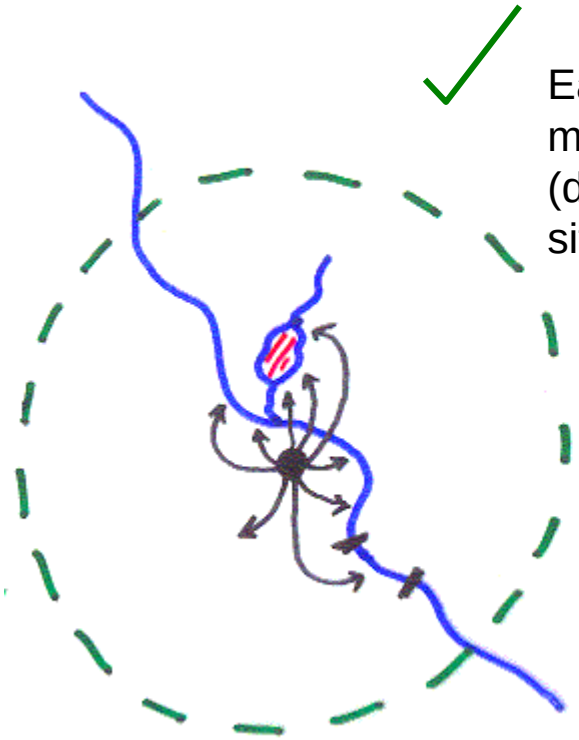
Develop in this site first



Harder to manage – collaboration required between villages

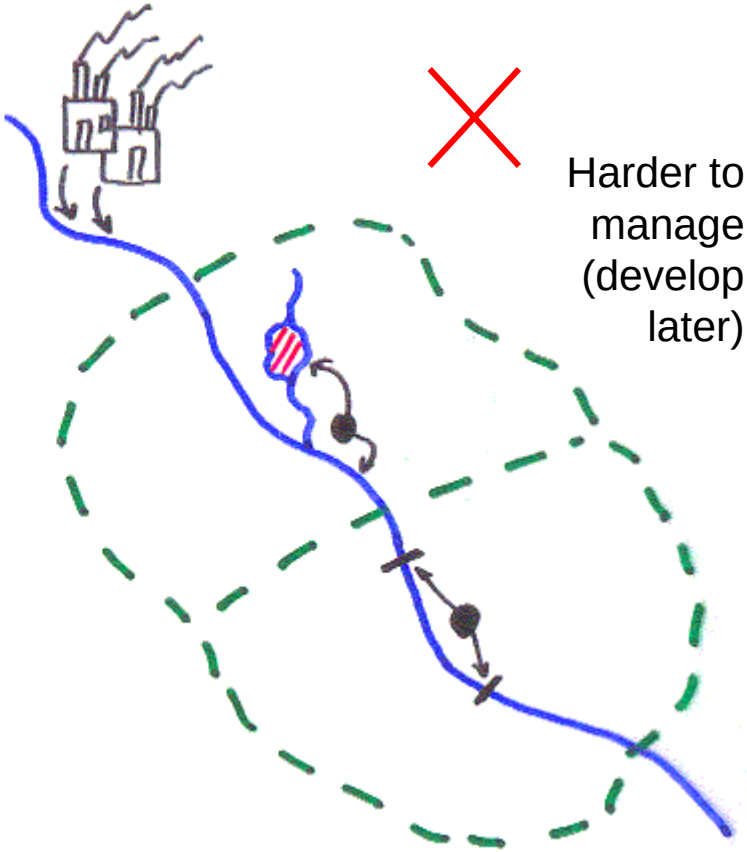
Develop in this site later

Develop co-management where local people agree there are *local* problems that they can help to solve



Easier to manage (develop this site first)

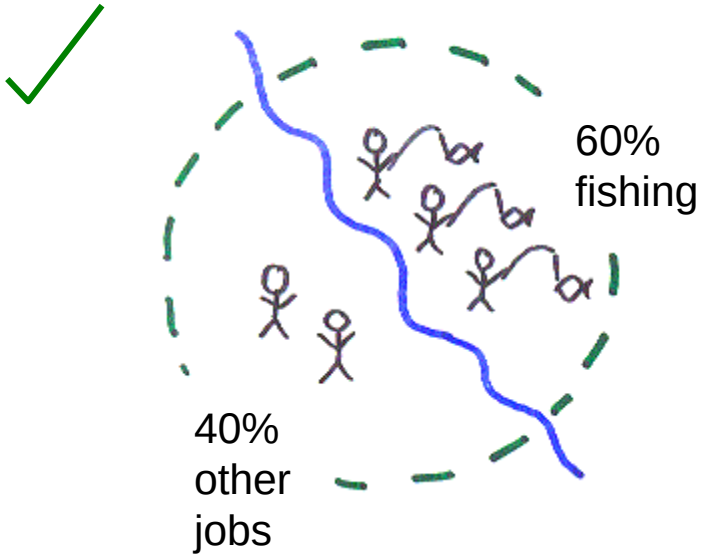
Problems are mostly local and may be managed by village (e.g. too much fishing, or barrier traps used by local people in own village)

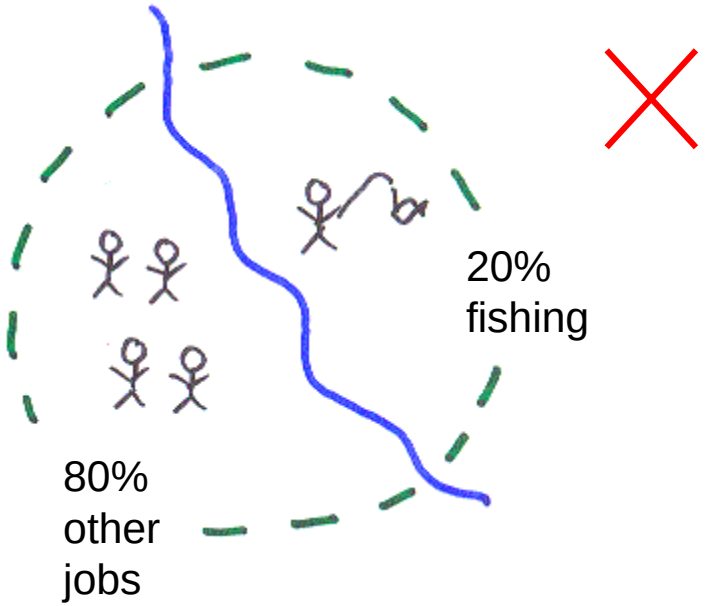


Harder to manage (develop later)

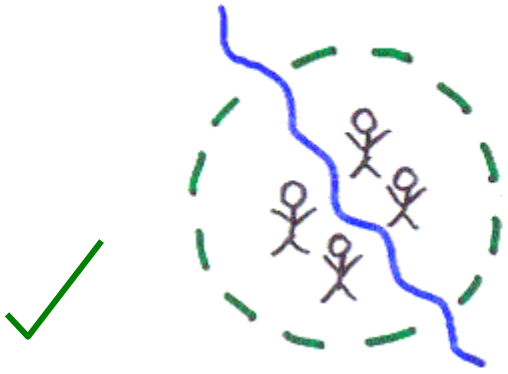
Problems come from outside village (e.g. pollution from upstream, or barrier traps downstream prevent access of whitefish)

Develop co-management (of the fishery) in villages where many people are dependent on fishing, fish-trading etc

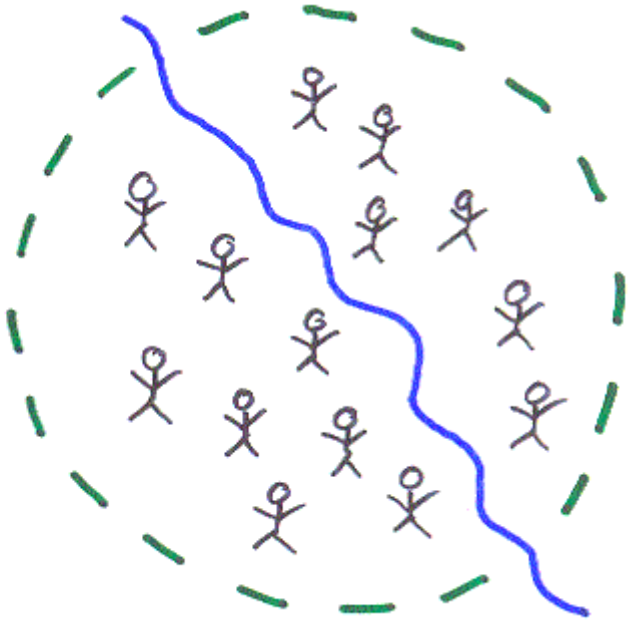




Develop co-management in smaller villages first

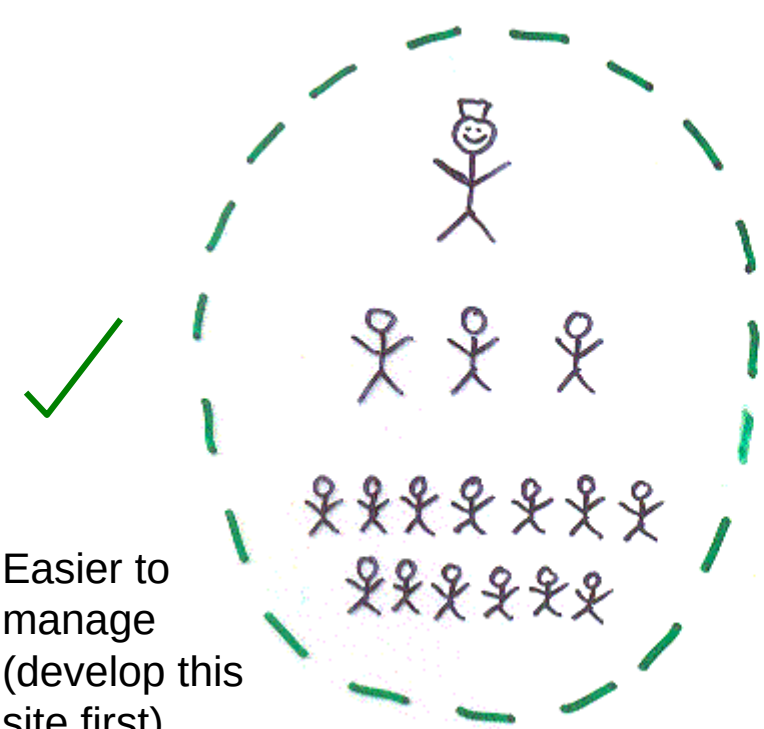


Easier to manage (develop this site first)

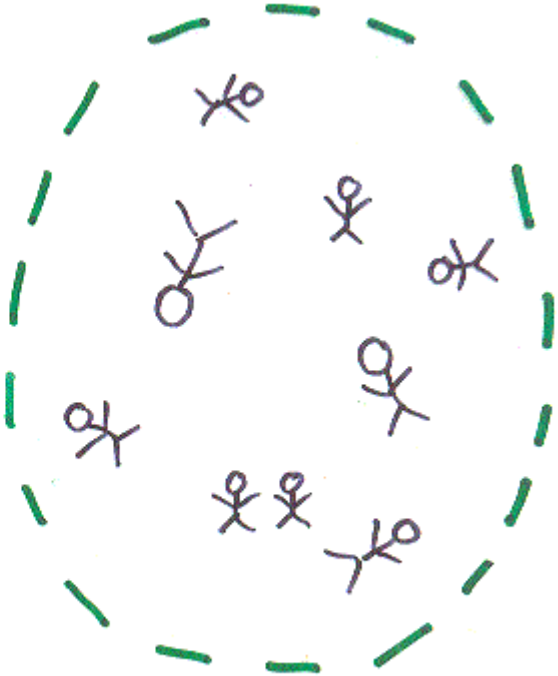


Harder to manage (develop later)

Develop co-management in villages with strong existing organisations (e.g. village committee) and skilful and respected leaders

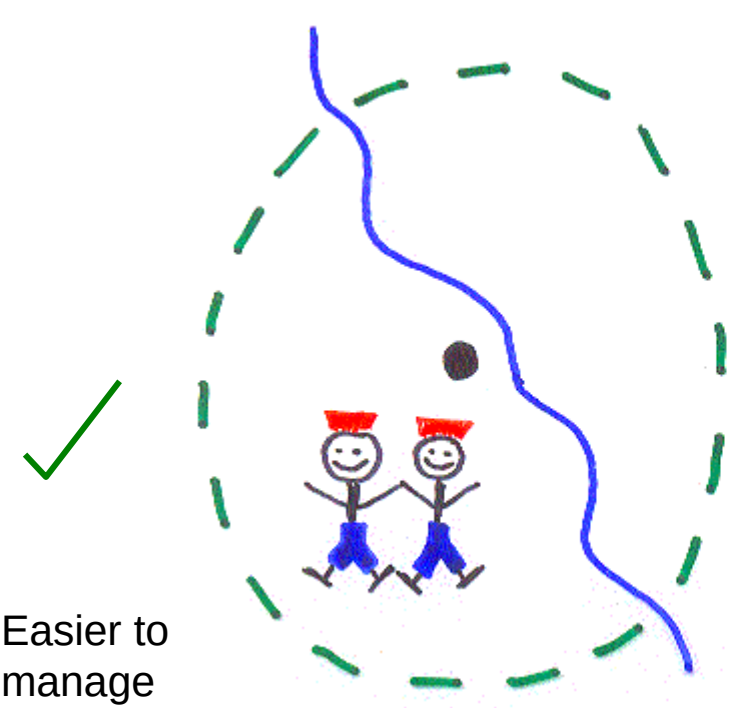


Easier to manage (develop this site first)

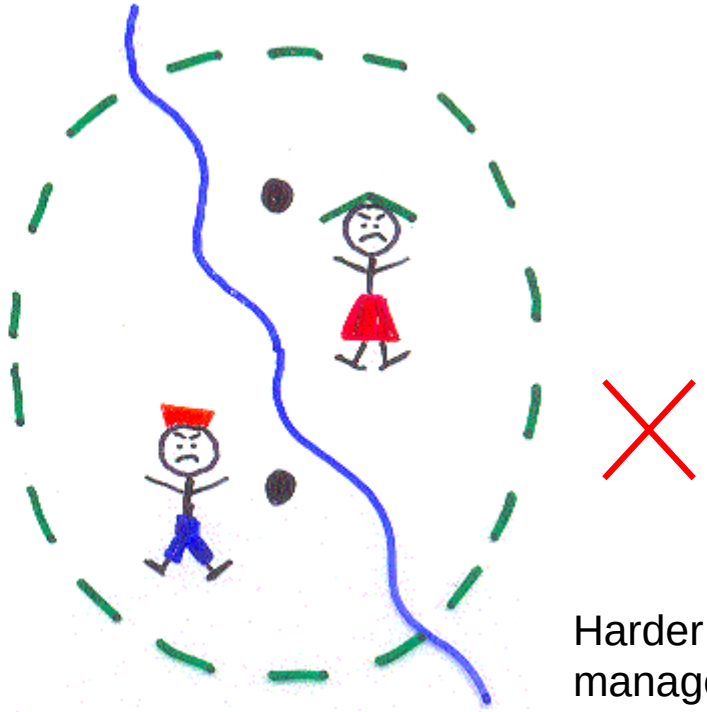


Harder to manage (develop later)

Develop co-management in villages where most people share the same cultures and ideals



Easier to manage (develop this site first)



Harder to manage (develop later)

Criteria for selecting co-management locations (+ others?)

Selection criteria	Site 1	Site 2	etc
Legality of local management actions is recognised both by government and by local people			
Villages have recognised ownership rights of water-bodies in their territory			
Water-bodies to be managed are located completely inside the administrative boundary of a single village (see note below)			
Local people agree there are problems with their fishery resources that they can help to solve			
Community has strong organisations (e.g. a village committee) for enforcing its own management rules and resolving conflicts			
Skilful and respected leaders help people to find solutions to local problems			
Villages are small			
Most fishery stakeholders share the same culture, ideals, and/or religions			

Note that co-management may also be developed in water-bodies that are shared between several villages, but greater efforts will be required for their management and simpler management strategies and tools should therefore be used. See Management Guidelines **Section 2.1**.

Day 2. Reminder of Workshop Programme

Yesterday, we looked at criteria for selecting potentially good water-bodies for reserves (Step 1) and potentially good locations for co-management (Step 2). Sites that meet most of the criteria in both sets offer good prospects for successful co-management of reserves.

Today, we will look at the management needs and options for these reserve sites and consider who might need to be involved and how:

- Step 3. Who are the stakeholders?
- Step 4. What are the management needs?
- Step 5. What spatial management units are needed and how could they be identified and managed?
- Step 6. What reserve management rules should be used?

Note that this will take time to do for real, e.g. involving participatory workshops and consultations with different stakeholder groups.

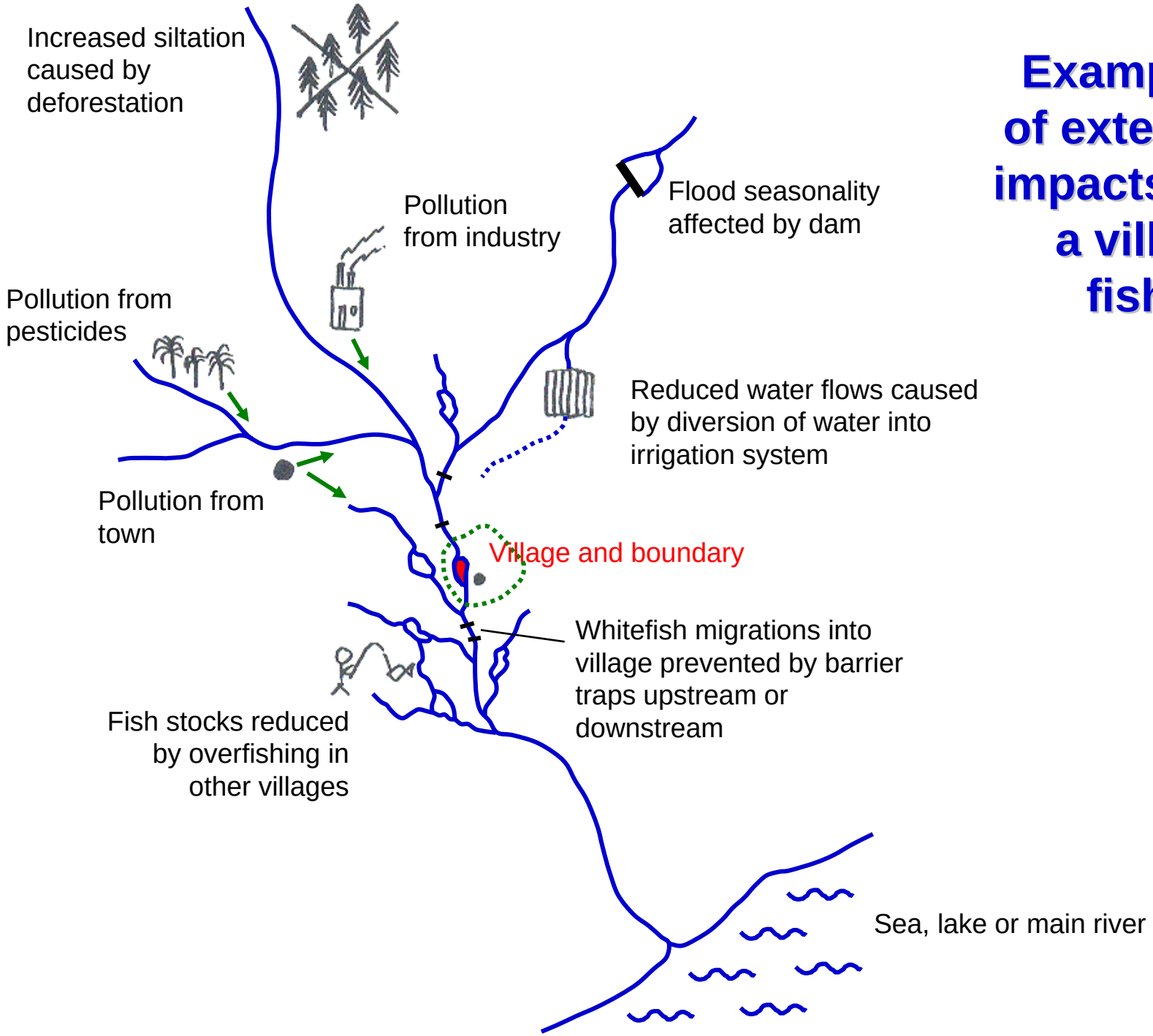
Step 3. Identifying stakeholders in river fisheries

Co-management may be described as a partnership arrangement using the capacities and interests of the local fishers and their community, complemented by the ability of government to provide enabling legislation and other assistance. There is no single blueprint solution for success with co-management. The best combination of partners for each location and the roles they play will depend on the capacities of each stakeholder and the nature of the resources to be managed.

Stakeholders are people, groups or organisations that are likely to *be affected* (either negatively or positively) by a proposed management intervention (e.g. a reserve), and also those that *could influence* the outcome of the intervention (again either negatively or positively).

Stakeholders may either be local or further away – see examples of external impacts caused by upstream stakeholders in next slide…

Examples of external impacts on a village fishery



So who are the stakeholders in your area?
Task: Develop this list to identify your key stakeholders

Stakeholders who may be *affected*:

- Fishers and their households (these are the 'primary' stakeholders of harvest reserves)
- Fish processors and traders
- Boat operators etc

Stakeholders who could help with management or *influence* success:

- Fisheries management agency
- Fishery researchers and scientists
- Local government administrations (planning etc)
- Traditional village leadership organisations
- Non-governmental development organisations (NGOs)
- Agricultural extension service
- Enforcement agencies (e.g. local police)
- Farmers and their employees who farm in the surrounding floodplain or use water for irrigation
- Towns or industries upstream who affect water quality and quantity

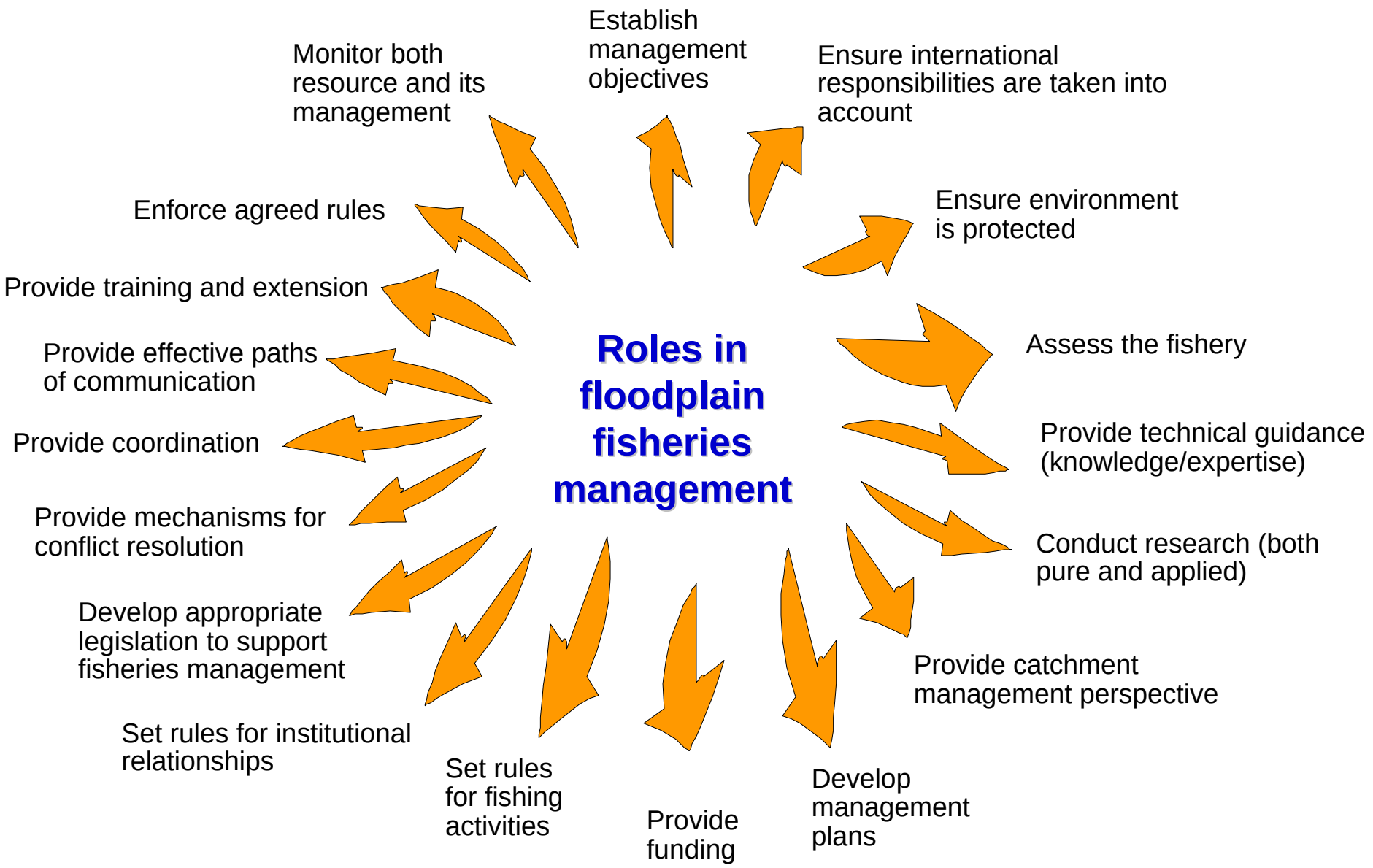
Step 4. Management roles of different stakeholders

Successful management involves a range of different tasks. Some of these are best carried out by local stakeholders, some by government agencies, some by NGOs etc.

Some suggestions of the management needs for harvest reserves or other floodplain fishery management initiatives are given in the following slide. Other roles may be added.

Task

For your fishery, discuss which of these roles are currently carried out by which stakeholder. For any roles that are not currently covered, discuss who could take responsibility?



From Hoggarth et al, 1999, Section 3.3

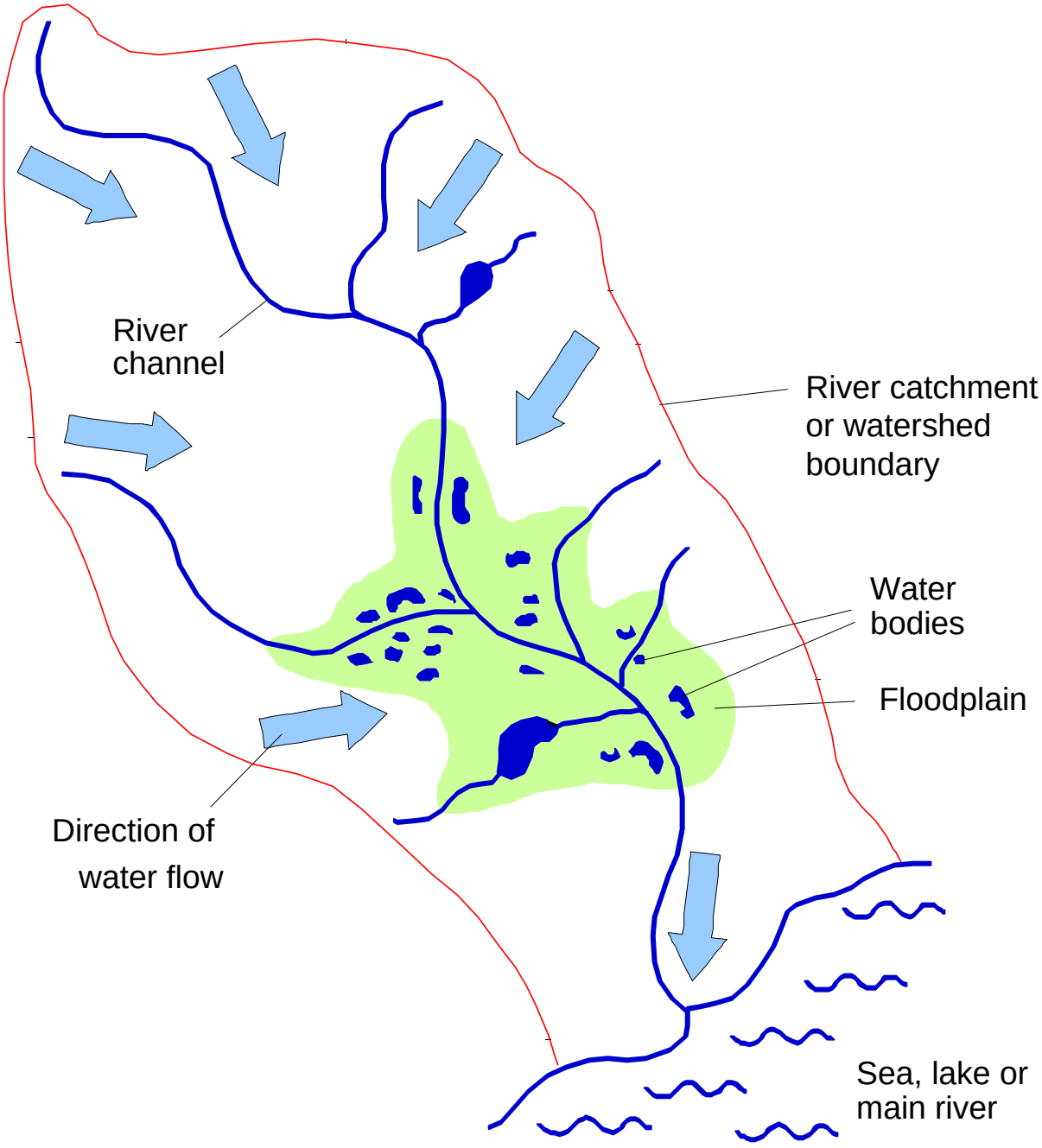
Step 5. Discuss spatial management units and roles - The 'institutional strategy'

An institutional strategy defines who will do what in managing the fishery or reserve. To enable the most effective contributions by each of the co-management partners, a **hierarchical** and **spatial** institutional structure is proposed.

A hierarchical structure enables community members to participate strongly at a **local** level, while government agents and other stakeholders play co-ordinating and supportive roles at intermediate **regional** levels and at the **national** policy level. Such a structure draws on the strengths of both bottom-up and top-down contributions.

A spatial structure enables the floodplain fishery to be sub-divided into **management units**, each with its own fishing waters and associated community members.

A floodplain river catchment



The catchment is a key spatial management unit in a floodplain fishery.

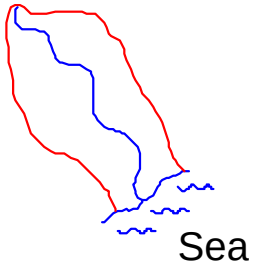
Upstream impacts such as pollution only flow downstream and do not cross catchment boundaries

Whitefish stocks are also limited within catchment boundaries

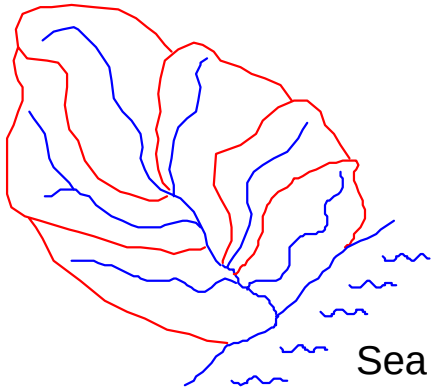
Note that a country may have several rivers, each in separate catchments, or be a part of one very large river catchment (e.g. Mekong, Ganges)

Catchment Management Areas (CMAs) for different rivers

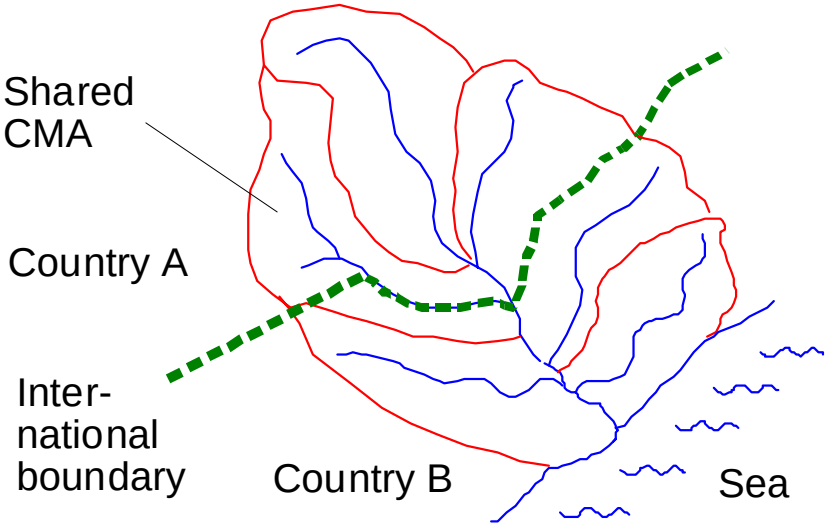
Small river
Single CMA



Large river
Six (Sub-) CMAs



International river
2 CMAs in Country A,
3 CMAs in Country B,
1 CMA shared between countries



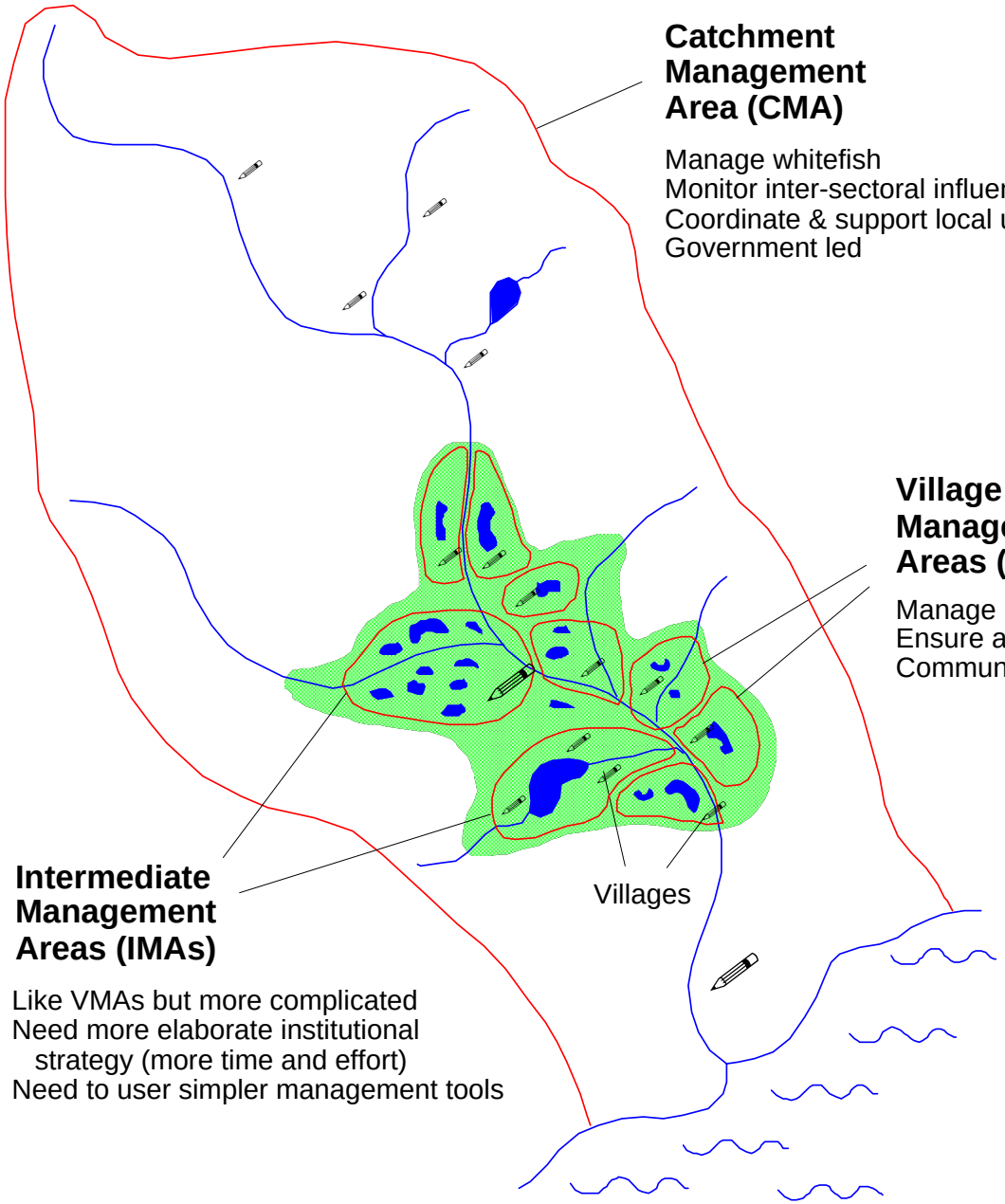
Establishment of river fishery co-management units

Section 2.2 of the Management Guidelines describes how an institutional strategy could be designed defining who should be involved in the management process, and how they should interact and operate.

The guidelines suggest that each catchment management area (CMA) should be divided up for management into separate local units. Where administrative authority is delegated to village level, each local unit may be a village management area (VMA) as illustrated in the following slide. As suggested in the selection criteria slides, good management will be easiest to achieve where a village (or other administrative unit) has one or more water-bodies within its own boundary. Larger lakes or towns that share several nearby fishing water-bodies may be harder to manage and are indicated as 'intermediate management areas' or IMAs.

A process for working with stakeholders in sub-dividing a catchment into such management units and allocating management responsibilities is suggested in Section 2.2 of the Management Guidelines.

2.2 (see also Hoggarth et al, 1999, Section 4.1)

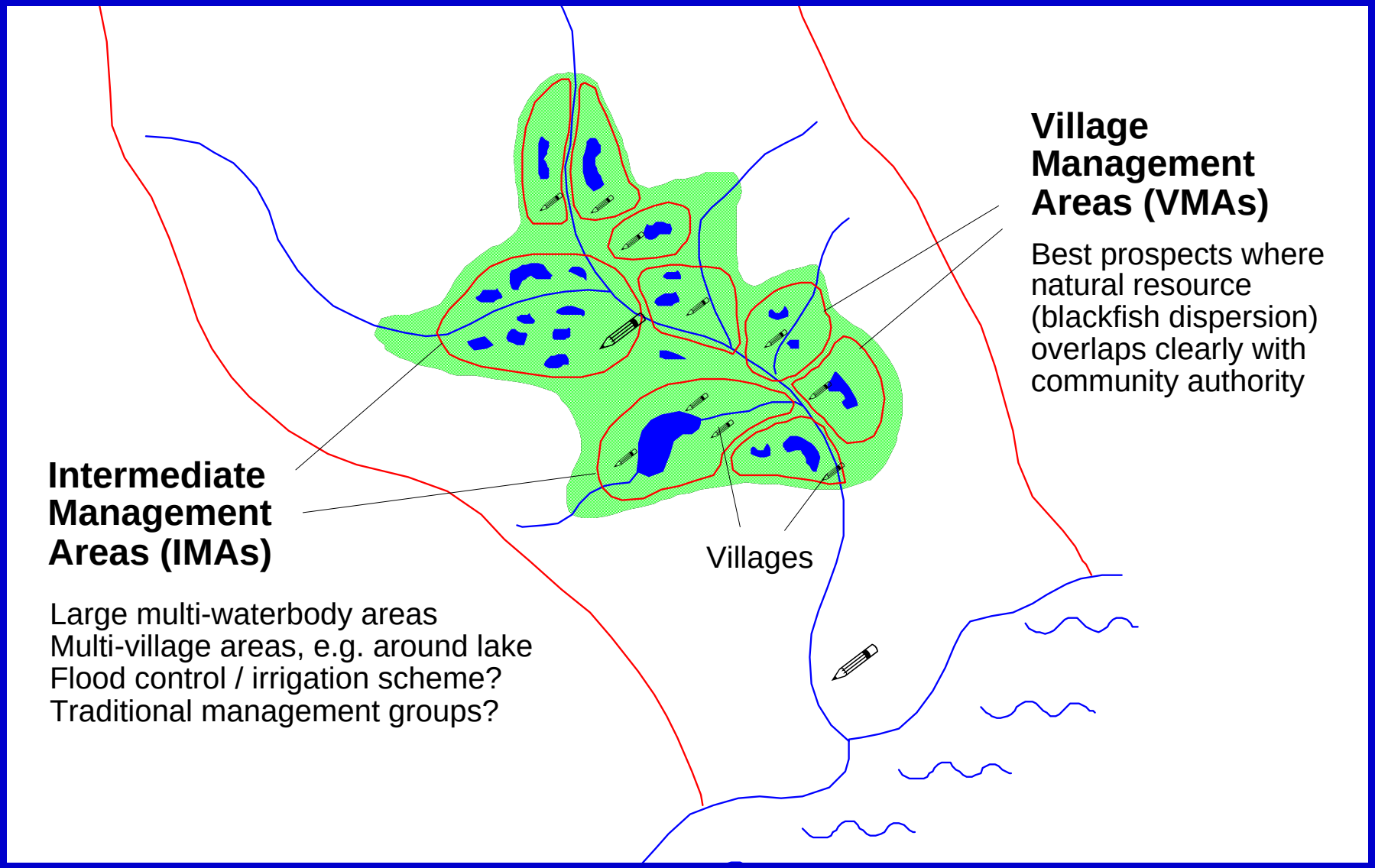


Suggested division of a floodplain river catchment into separate management units

Harvest reserves may be adopted as management tools in some of these units, but not necessarily in all

See also Hoggarth et al, 1999

Examples of local management units (VMAs and IMAs)



2.2 (see also Hoggarth et al, 1999, Section 4.1)

What spatial co-management units would be needed in your area?

Tasks

For the existing or candidate sites discussed in Steps 1 and 2, identify the catchment management area (CMA) and identify local units as either VMAs or IMAs. Harvest reserves and co-management may best be promoted first in the simpler VMA sites.

Which districts (or other administrative levels) fall within the CMA? Key government agency stakeholders (e.g. Fisheries Department, Water Resource Managers) within these districts would need to participate in the co-management of this CMA.

Step 6. Discuss options for management measures - The 'technical strategy'

As described in Section 2.3 of the Management Guidelines, harvest reserves are NOT the only option for management of floodplain river fisheries.

Other management tools include:

- closed seasons (covering all areas, not just inside a reserve);
- permanent bans on damaging gear types (e.g. poison, dewatering);
- minimum legal size limits on gear meshes or fish;
- access rules (e.g. lease systems, lotteries or gear licensing);
- environmental management (e.g. dredging silted channels);
- fish stock management (e.g. by stocking depleted species).

The best combination of rules for each place will depend on its hydrological, physical and social characteristics.

In each VMA or IMA, a fishery assessment should be undertaken combining the local knowledge of the fishing community and the scientific knowledge of government agencies, NGOs, academics etc. The following slide suggests a summary template for such assessment.

2.3 (see also Hoggarth et al, 1999, Chapter 4)

Key fishery assessment questions

- Are fish stocks relatively stable or in decline (i.e. becoming smaller, or harder to catch, or extinct)?
- Which stocks are declining - are they blackfish or whitefish? Where do such fish survive over the dry season? Where do they breed? Where are they badly affected by fishing practices or other activities? How could such negative impacts be reduced?
- How could the local blackfish species be protected over the dry season? Are there any permanent local water-bodies that blackfish could survive in, but which are heavily fished instead?
- Can migrant whitefish species access local fishing grounds from the main rivers? Could access be improved by dredging channels or limiting barrier gears?
- How do the different fishing gears interact or compete with each other? Which gears catch the same fish, either at the same time or in different seasons? How would different rules affect these gears?
- Could a proposed management tool be effectively monitored and enforced, given the resources and skills available?

Where harvest reserves are adopted, how should they be managed?

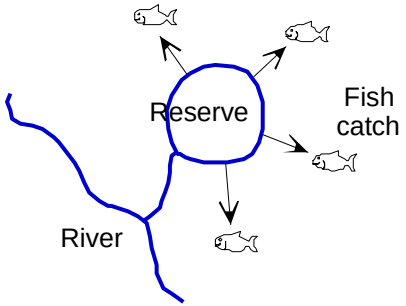
- For blackfish reserves, restrict the use of dangerous dry-season gears (e.g. poison, electric fishing, de-watering, fish drives) to ensure that some fish can survive to spawn at the start of the flood.
- Use either permanent or seasonal closures to protect critical life cycle phases (especially dry season survival and spawning).
- Make the location of the reserve as clear as possible, by defining boundaries at well-known local features, such as bridges, large buildings (mosques, schools etc) etc.
- Maintain connections to fished areas by removing silt or vegetation, when necessary.
- If reserves are silting up, excavate to maintain a sufficient depth of water.
- To increase the acceptability of a new reserve, use additional measures to improve its perceived benefit to the village (e.g. by stocking fish).
- Use adaptive management to determine the best size and numbers of reserves, the best months for closed seasons, which gears to ban etc.

See Management Guidelines Sections 2.3, 1.6 and 2.4 for further details

Should reserves be fully closed?

FULLY CLOSED RESERVE

(No fishing inside reserve)



Trade-off in costs / benefits:

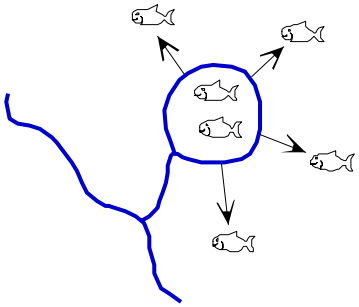
Increased catch outside reserve

versus

Lost catch inside reserve

PARTIALLY CLOSED RESERVE

(Some catch inside reserve,
but no 'dangerous' fishing)



Comparison with Full Reserve:

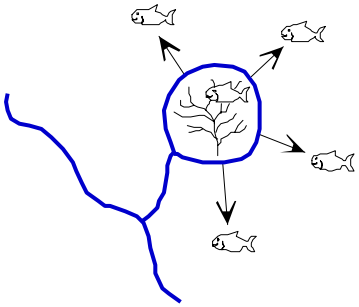
Same ecological benefits for stock inside reserve ?

Same social benefits in increased overall catch (inside + outside) ?

More difficult to manage ?

NATURAL RESERVE

(Difficult to fish out)



'Natural reserves' prevent use of highly exploitive dry season gears

Include very deep or large waterbodies, or those with many natural snags such as sunken trees

No need for technical restrictions, except ban on poisons / electricity ?

Step 6 - Working Group questions

- Apply the ‘key fishery assessment’ questions at a catchment level, or for the sites examined in Steps 1 and 2. Note that this assessment should be reapplied in each local management unit when reserves or other co-management activities are being established.

- From this brief analysis, would reserves provide benefits in this catchment or site? To whom? How? What additional measures might also be needed (e.g. to further protect whitefish, or to reduced external impacts from other sectors)?

- Discuss the question, ‘should reserves be fully closed’? What are the pros and cons?

Next steps

Further guidance on a series of practical steps for developing co-management systems including harvest reserves is given in Chapter 4 of the Management Guidelines. The following topics are covered

4.1 Choosing village co-management units
4.2 Building the skills required for co-management
4.3 Activities in each village co-management unit
4.4 Catchment management and coordination

Following this introductory workshop, this process may be followed (or adapted as preferred) to develop co-management arrangements and set up harvest reserves in your area.

Task

Discuss your next steps towards co-management and harvest reserves

Chapter 4 (and see also Hoggarth et al, 1999, Section 5)

Disclaimer

This presentation is an output from a project funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of the DFID.

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