Adaptive Co-management: Practical lessons to assess and mitigate cumulative effects in a tropical floodplain

IAIA Conference on Cumulative Effects
Calgary, Alta
November 6-9, 2008

Ronald W. Jones

Canadian-Fisheries, Oceans and Aquaculture Management
Ocean Management Research Network

Ron Jones

Seminar Outline

- Key Definitions
- Introduction to Adaptive Co-management
- Cumulative effects (CEs) in floodplains
- Beel Mail, Bangladesh case study
- Drivers and Impacts at Beel Mail
- Lessons Learned: ACM Process and CEs

Key Definitions

- **Cumulative Effects** *or* **"The tyranny of small decisions"** **(Odum,1982)**

  "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (NEPA)

- **Resilience**

  "as the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks (Walker et al. 2004).

Definitions

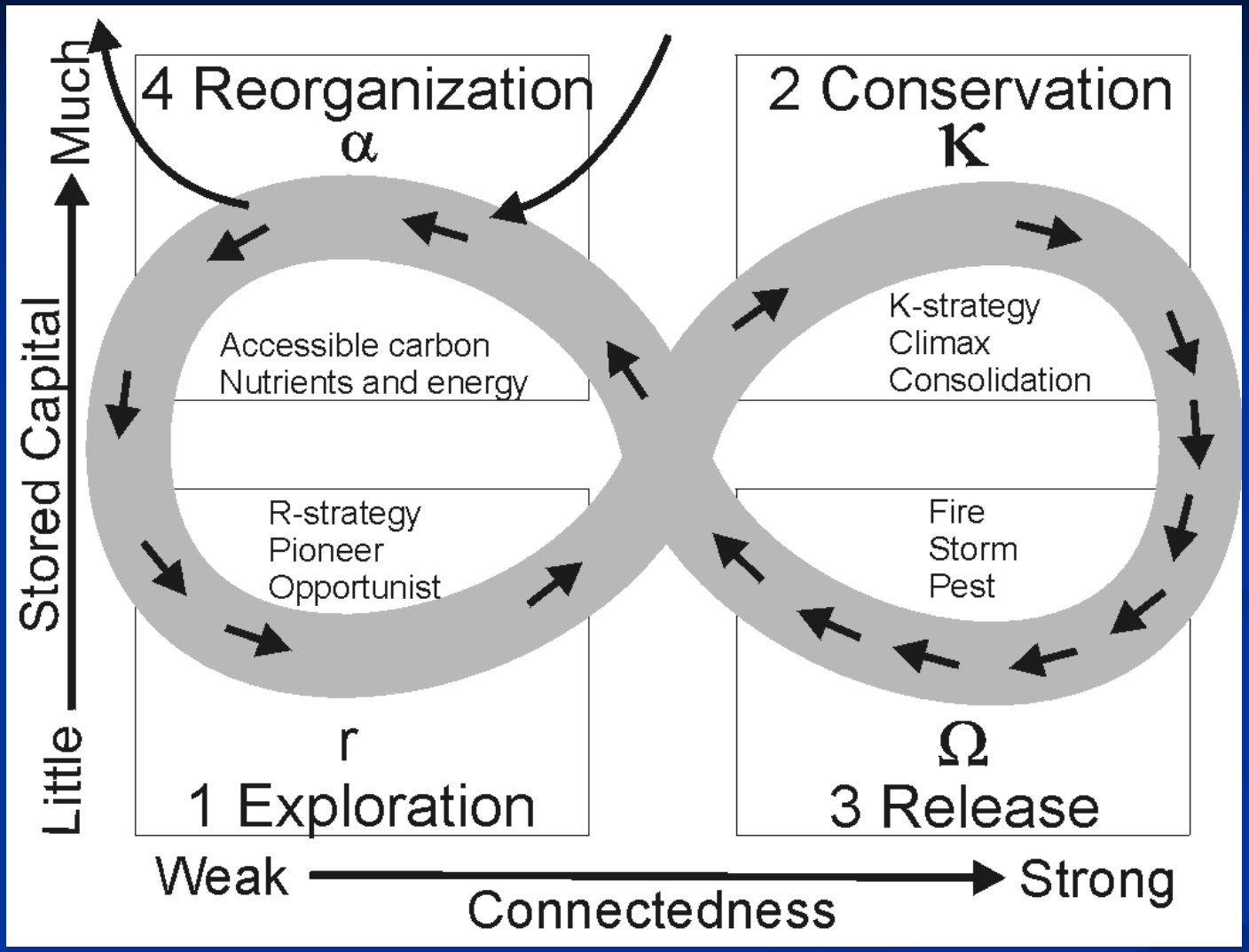
- **Connectivity (in linked social-ecological systems)**

  " the quantitative and qualitative flow of energy, matter and information, including genetic, through a system."

- **Complex Adaptive System**

  "A system composed of a heterogeneous assemblage of types in which structure and function emerge from the balance between diversity production and the winnowing of diversity via locally mediated selection processes" (sensu Levin, S. 1998, Fragile Dominion)

The Holling Adaptive/Renewal Cycle



From: Able, T. 1998. *Georgia Journal of Ecological Anthropology*, **2:** 6-29.

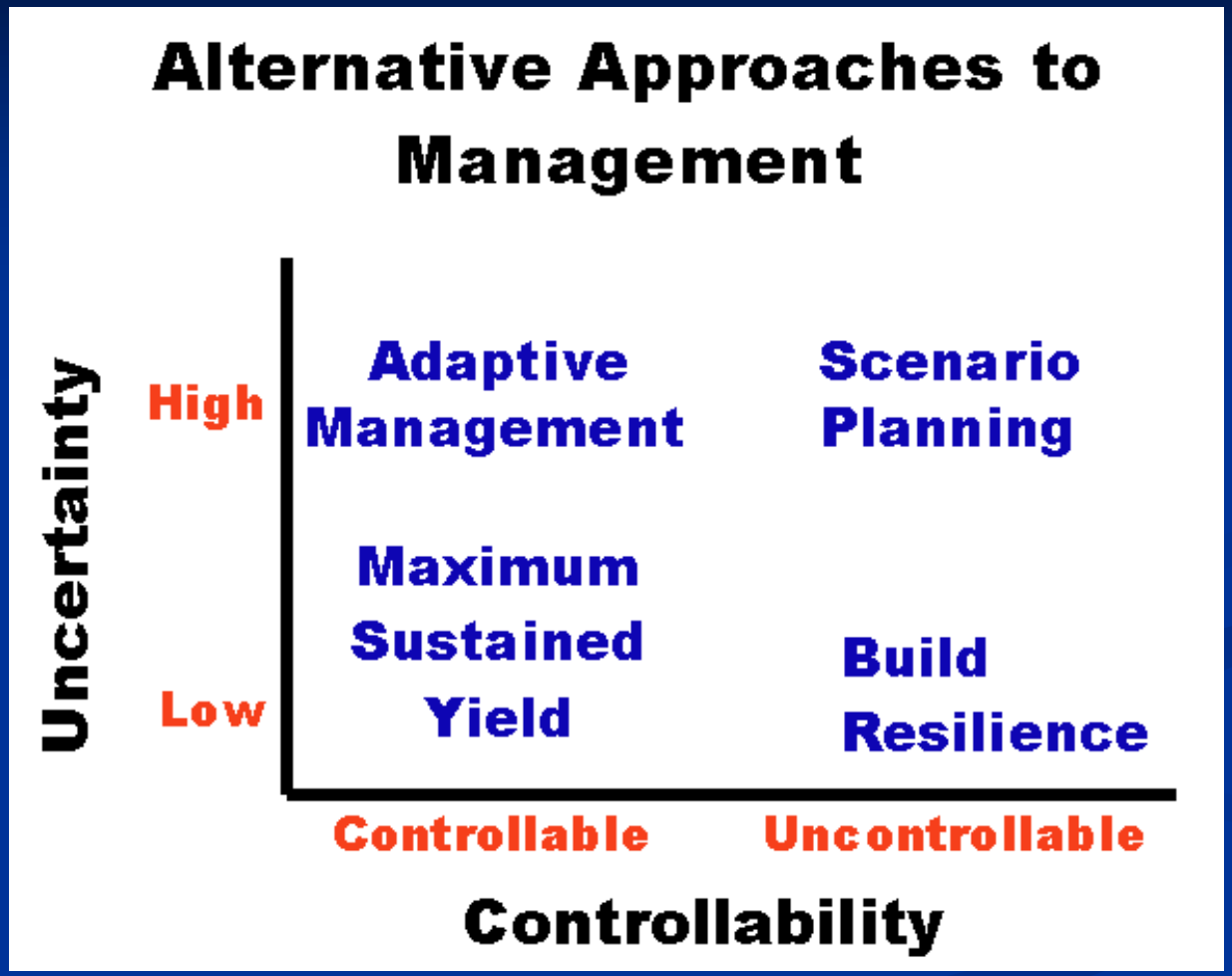
Adaptive Co-management

Adaptive co-management*; *a combination that promotes multilevel institutional linkages, shared responsibility between a diversity of actors, combination of knowledge sources, as well as learning. **(Olsson et. al. 2004, Berkes et. al. 2003)**

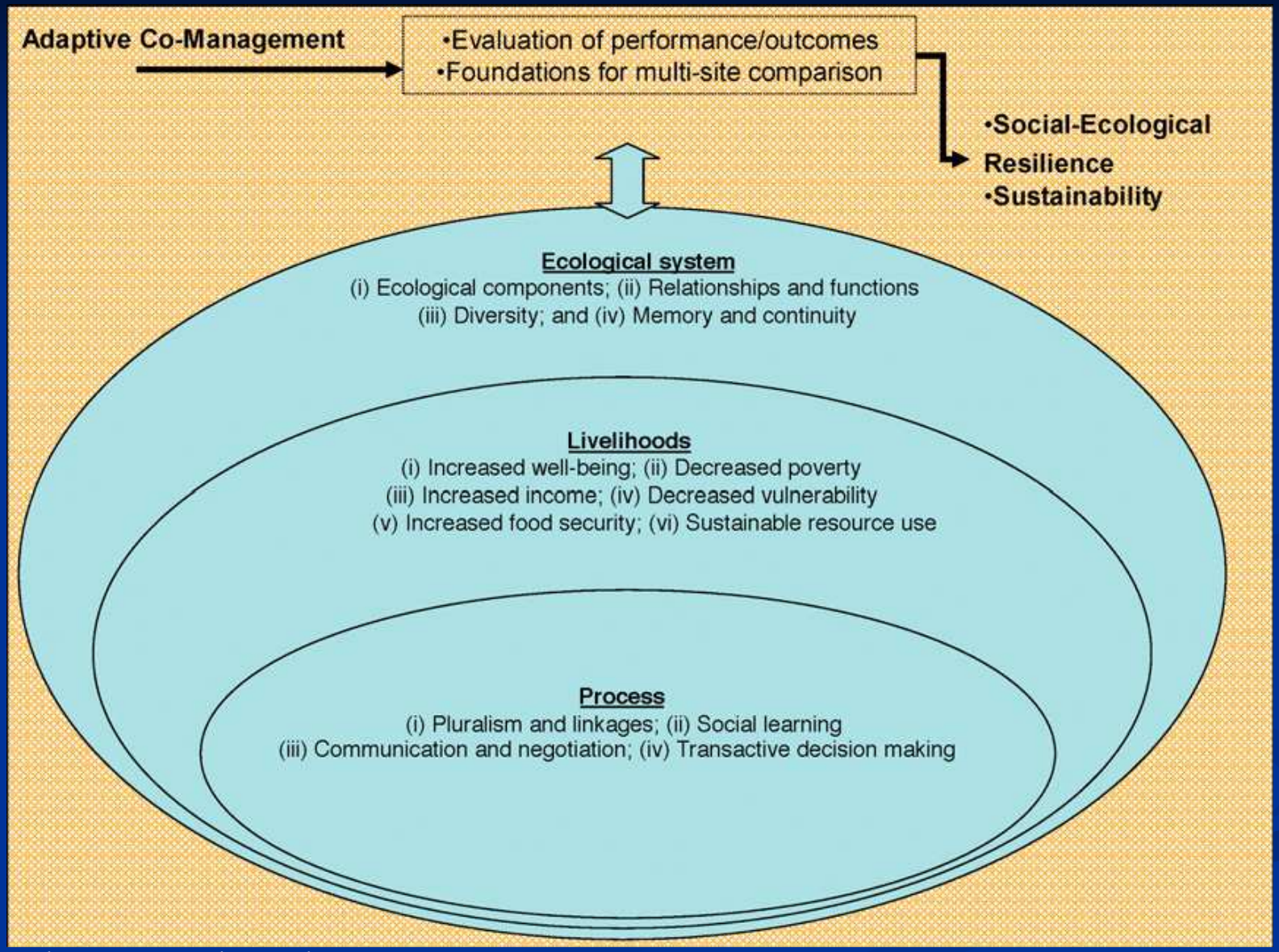
- Combines ***adaptive management*** and ***co-management***
- Integrates, ecology, economics, society (governance)
- Involves the concepts of shared responsibilities for *using and allocating* resources among multiple parties.

References in Plummer and Armitage 2007; Armitage *et al.* 2008 .

Management Approaches



Adaptive Co-management

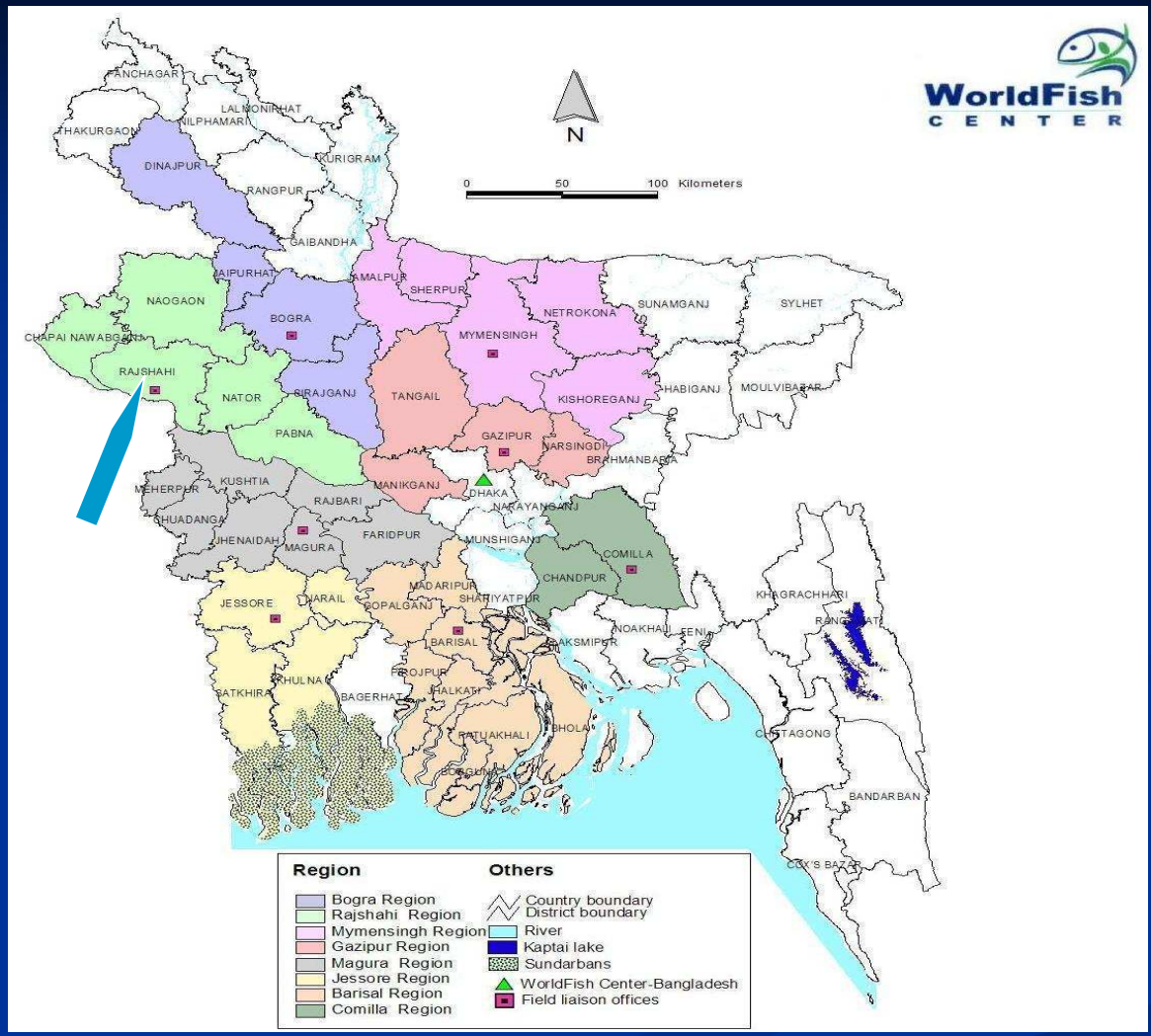


Plummer and Armitage 2007

Beel Mail Location

Rajshahi District

- Max 200ha (wet).
- Culture-based fishery
- Floodplain rice-fish
- Absentee landowners
- Diverse social and ecological impacts
- 20+ yeas as co-management
- Many local market outlets



Beel Mail, wet season flood

Multiple Use Floodplains

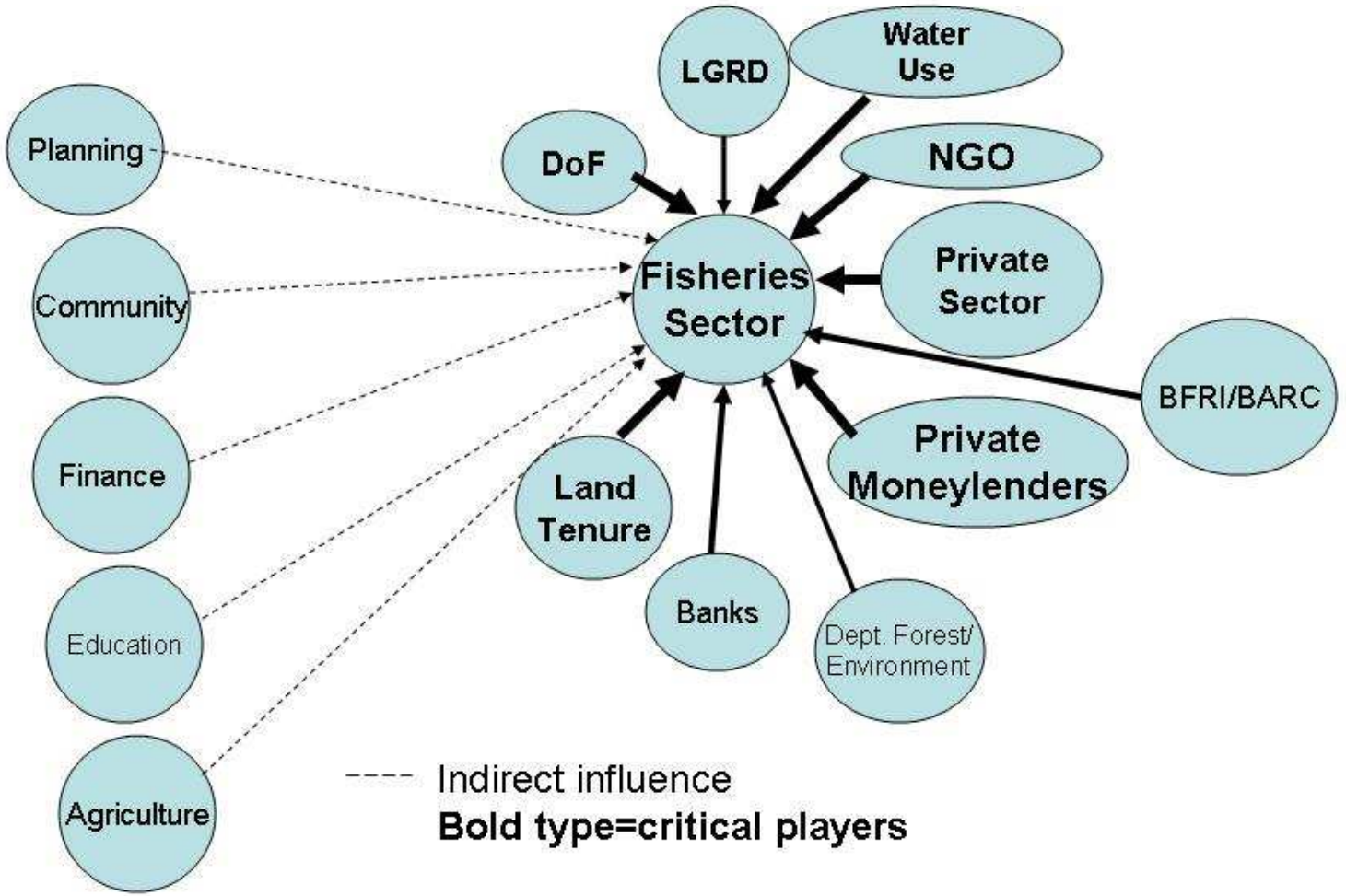
- Fishing/aquaculture
- Rice agriculture
- Animal husbandry
- Aquatic plants
- Transportation
- Domestic uses

<u>Key Players</u>

- Melandi Fisherman's Coop
- Coalition of landowners
- Department of Fisheries
- WorldFish Center-CGIAR *Challenge Program: Water and Food*
- Civil Society NGOs

Beel Mail

Institutions in the Bangladesh Fisheries Sector



Impacts on floodplains

Pangasius catfish (*Pangasius hypophthalmus*) ponds on rice-fish floodplain

Drivers of Change at Beel Mail

Driver	Beel Mail
Annual flood patterns	+
Agricultural land use	+
Fragmentation of floodplain	+
Increasing fisher population	+
Fishers are more mobile	- - (resident population)
Availability and the increasing price of fish	+ +
Use of short term leasing for short term gains	+
Support for government CBFM policy	+ +
Government policy for aquaculture development	+ +
Political influences on management decisions	+ + +
Pressures to convert to cash economy; developing export income	+ +

Co-management has reduced these 3 ubiquitous rural impacts

Cumulative Effects Assessment

Management of pervasive environmental problems

Multiple projects and/or no proponents

Multiple projects and/or activities

Transdisciplinary and, to a lesser extent, interdisciplinary

- Past, present, and future activities

ALL compatible with ACM approaches

- **Broad spatial patterns**
  - Wide geographic areas (e.g., cross-boundary impacts)
- **Multiple ecological system**
  - Multiple socio-economic systems
- Also **interactions among projects and other activities**
  - Also interactions among environmental systems
  - Also interactions between activities and environmental systems
  - Expectation that some interactions are non-additive (e.g., synergistic, antagonistic)
- **Significance of multiple activities interpreted**
  - Expectation that combined impacts may be significant even though individual impacts may be insignificant
- **Inter-organizational**
- Explicit links to comprehensive environmental objectives
- **Proactive; anticipates future actions**
- **Comprehensive impact monitoring and management system**

[Conducting Environmental Impact Assessment in Developing Countries (UNU, 1999.]

Cumulative Effects in Floodplains

- Political pressure on DoF to restore fish production
  - CBFM Model pushed by Government/WorldFish
  - Enclosure/privatization of commons
- Increased uncertainty in hydrology, especially for dry season refugia
- Loss of fish species diversity and reduced aquatic productivity from drastic agri-landscape alterations
- Potential non-point source pollution both organic/inorganic
- Poaching/illegal fishing as livelihoods

Participatory and Community-based Processes

Melandi Villagers, Coop Members,
DoF, Researchers

Village level discussions

WorldFish Center/Landowners
Discussion-Leasing

Some Lessons Learned

- ACM takes time, requires the long view, context specific
- Cumulative effects on SES have complex, multiple and cross-scale origins and impacts
- Diverse, legitimate and willing participation is crucial to address CEs in aquatic ecosystems
- Social/cultural and livelihoods issues cannot be separated from ecosystem monitoring and assessment
- Willing and legitimate institutional commitment to CB-Monitoring
- Combine bottom-up/top-down , stakeholder-led indicator development process to learn from feedback loops

Thank you for your attention

Acknowledgements for financial support

- ***Ocean Management Research Network*, Adaptive Co-Management Working Group**
- **C-FOAM (Canadian Fisheries Oceans and Aquaculture Management)**
- **Telfer School of Management University of Ottawa**
- **Canada Research Chair CBNRM, The Natural Resources Institute, University of Manitoba**

Ron Jones

Beel Mail, Rajshahi

Key References

- **Armitage, D. *et al.* 2008.** Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment* e-View.
- **Berkes, F., J. Colding and C. Folke** (eds.), **2003**, Navigating Social-Ecological Systems: Building Resilience for Complexity and Change, Cambridge University Press.
- **Gunderson, L.H., C.S. Holling and S.S. Light**, **1995**, *Barriers and Bridges in the Renewal of Ecosystems and Institutions*, Columbia University Press, New York.
- **Gunderson, L.H. and C.S. Holling (**eds.), **2002,** *Panarchy: Understanding Transformations in Human and Natural Systems*, Island Press, London.
- **Levin, S. 1998. .** Ecosystems and the biosphere as complex adaptive systems. *Ecosystems* **1**(5): 431-436.
- **Olsson, P., C. Folke and F. Berkes. 2004.** Adaptive co-management for building resilience in social-ecological systems. *Environmental Management* **34**:75-90.
- **Plummer, R. and D. Armitage. 2007**. A resilience-based framework for evaluating adaptive co-management: Linking ecology, economics and society in a complex world. *Ecological Economics* **61**(1): 62-74.
- **Walker B, Holling CS, Carpenter SR, Kinzig A 2004** Resilience, adaptability and transformability in social–ecological systems. *Ecology and society* **9**(2):5. [online] URL: http://www.ecologyandsociety.org/vol9/iss2/art5/