

Developing An Adaptive Management Approach for Small Holder Innovation

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Problem: Linked Rural Poverty and Environmental Sustainability

Solution: Adaptive Management for Small Holder Innovation

Mechanism: Provide development agents with knowledge and understanding to assist small holder innovation for adaptive management of complex adaptive systems (CAS)

Objective: Encourage policy makers and donors to support local innovation and adaptive management



Two Scientific Traditions

Farming Systems Research and Extension:

(including its production-oriented ancestors and descendents)

Emphasizing the transformation of natural resources into food and fiber for human health and livelihoods

EcoSystem Analysis and Management:

(including conservation-oriented ancestors and descendents)

Emphasizing the long-term sustainability of environmental resources for global health and future generations



Evolution of the Productionist Orientation

- Green Revolution
 - Researcher/research station developed technologies
 - Raised productivity dramatically
 - Diffused innovations with little regard to local conditions
- Farming Systems Research and Extension
 - On-farm, adaptive research for technology development
 - More limited, but steady productivity increases
 - Successful diffusion of appropriate, adapted innovations
- Farmer First and Farmer Field Schools
 - Technology questions focused on farmers priorities
 - Productivity increases based on local adaptation and learning
 - Diffusion locally successful, but limited



Evolution of the Conservationist Orientation

- Ecology and Ecosystems
 - Formalized functional links between biotic and abiotic elements
 - Estimated major flows of energy and matter
 - Recognized limits to growth
- Environmental Management
 - Conservation and environmental protection are advanced
 - Technological tools and objectives developed
 - Measurement of biophysical changes in the natural environment
- Ecosystem Management and Ecosystem Services
 - Recognition of social, economic and institutional factors
 - Greater efforts at multi-disciplinary analyses of complex systems
 - Measurement of environmental values and trade-offs



Reflecting on Technical Change in Agriculture

How should we think about technical change in agriculture?

What is the role of learning in this process?

- Is learning a matter of information transfer resulting in adoption of innovations?
- Or, is learning a matter of developing capacities for adaptive management?

Whose capacities should be developed?

Where, in fact, does innovation occur?



Adaptive Management

- A structured process of 'learning by doing'
- Local stakeholders innovate management techniques adapted to local conditions
- An iterative process
- Communicating and negotiating knowledge



Barriers to Adaptive Management

- Requires interdisciplinary collaboration
- Scientific and disciplinary opposition to uncontrolled experimentation
- Strong opposition to experimental policies by management bureaucracies
- Value, interest and resource conflicts within local communities



A Social Constructivist Approach

Requires:

- Integrating various scientific disciplines among themselves, and with local sources of knowledge
- Facilitating the experimentation necessary to produce adapted innovations
- Guiding negotiations among stakeholders and identify best ways to manage

Because technological change is a social process, the distinction between research and application is blurring



Complex Adaptive Systems (CAS)

- A holistic approach to understanding of multiple interacting systems
- The apparent order is emergent
- Agents act, re-act, and make adaptations in response to what other actors are doing
- Agent learning is required to maintain adaptability



Complex Adaptive Systems (CAS)

- Interactions cross spatial and temporal scales
- Interactions between parts are often non-linear
- Interactions involve value conflicts and prioritization of interests



Complex Adaptive Systems Themes

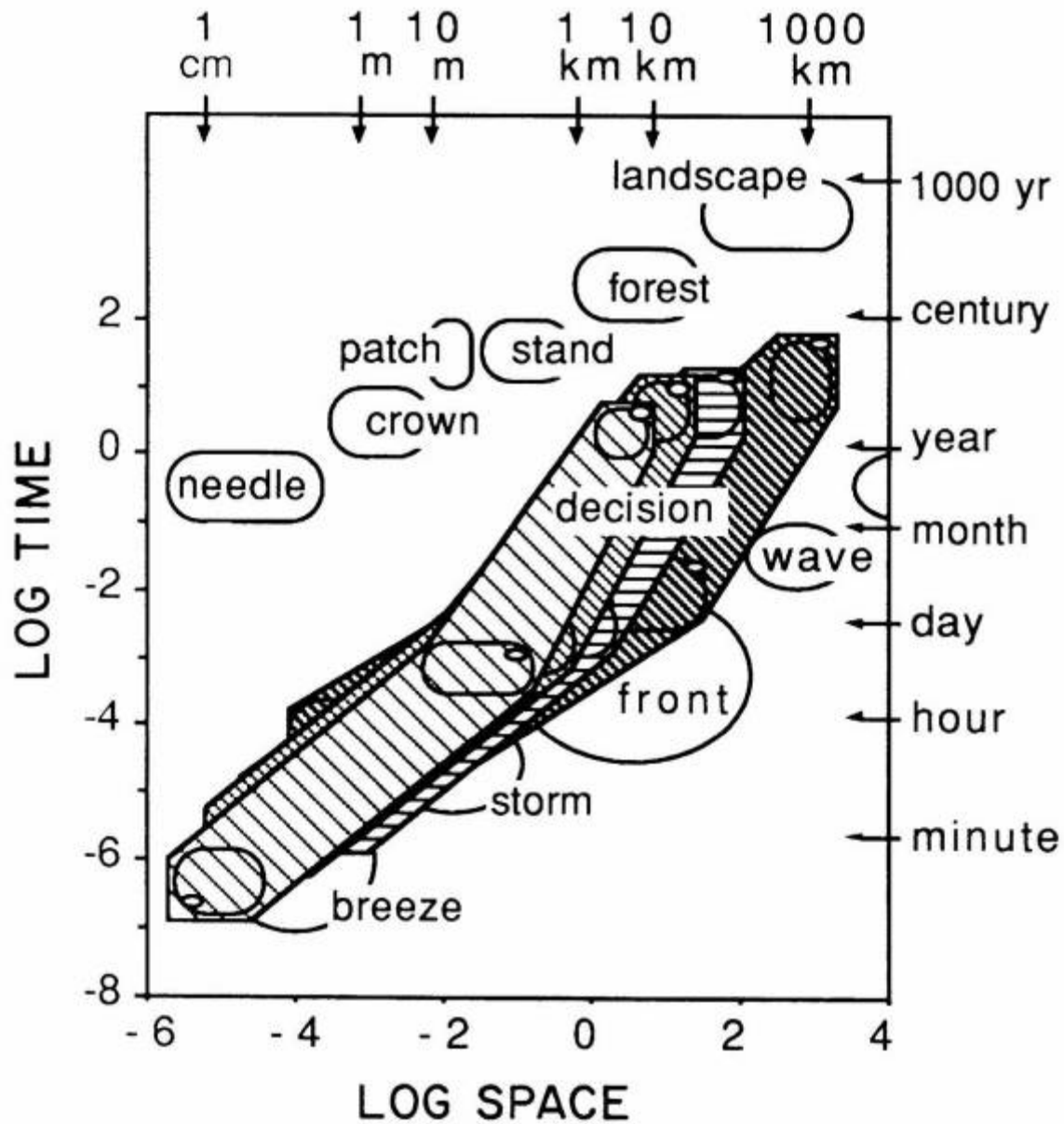
- **Scale**
 - From soil fertility to the global political economy
- **Multi/Inter/Trans-disciplinarity**
 - Multiple disciplines facilitate complex adaptive management
- **Social Learning**
 - Developing and using knowledge together
- **Negotiation**
 - Balancing interests and power relations



Scale

- Different disciplines operate on different scales :
 - Geography – spatial
 - History – temporal
 - Decision-making – networks
- The most significant implication of scale is that many processes of change are non-linear





From: Hollings, 1992



Nested Systems

For adaptive management of Complex Adaptive Systems we have compartmentalized systems according to the lumpiness of decision making and conventional system structures.

- **Field**
- **Farm/Enterprise**
- **Governance/Community**
- **Watershed**
- **Ecosystem**
- **Policy**





Inter / Multi / Trans - Disciplinarity

To facilitate interdisciplinary relations, boundaries between knowledge and action need to be managed

Three functions contribute to boundary management:

1. **Communication:** between experts and local stakeholders; frequent and bi-directional
2. **Translation:** mutual understanding hindered by disciplinary jargon and local idiom; identify what is significant
3. **Mediation:** common goals & transparency



Social Learning

- No longer changing an input (Green Revolution), but creating a new *process* (e.g. Integrated Pest Management in Farmer Field Schools)
- Local involvement increases innovation and ultimately rates of adoption
- “Learning by doing”



Research on
slow variables

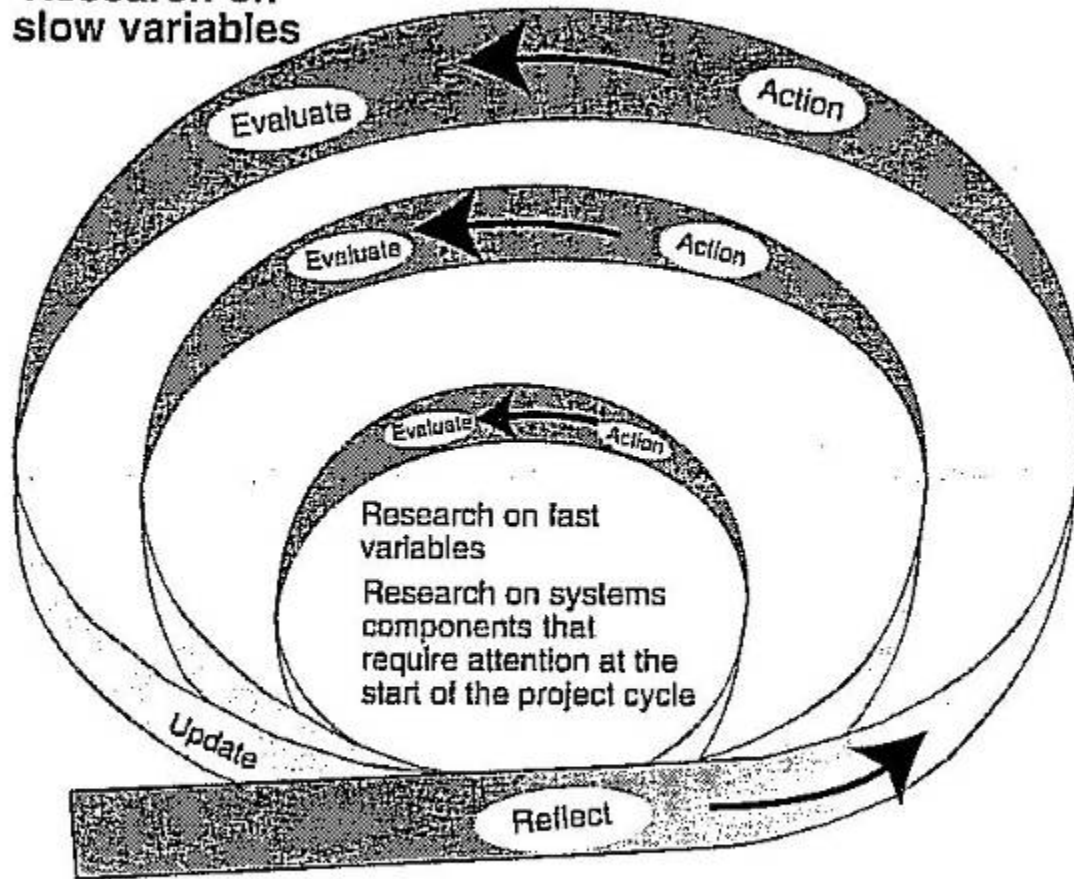


Fig. 4.1. Overlapping learning cycles for processes with different temporal characteristics.

From:
Sayer and Campbell, 2004

Negotiation

- Negotiation takes place at several levels:
 - within science;
 - among locals and extra-local stakeholders;
 - between science and local knowledge;
 - between the state and science and/or locals, etc.
- Decision making information needs to have the following characteristics to influence stakeholders:
 - **Credible:** scientific adequacy for technical evidence & arguments
 - **Salient:** relevance of assessment to needs of decision makers
 - **Legitimate:** perception that information has been respectful of stakeholder divergent values & beliefs



Adaptive Management Action Principles

- **Support partnership building among all stakeholders around a mutually agreed agenda for action.**
- **Balance biophysical and social components in the design of adaptive management programs for complex adaptive systems.**
- **Use triangulation to validate the diverse sources and forms of knowledge and learning generated by the iterative process.**

