

Eco Chain Participatory Biodiversity Management

Introduction

Perennial flows of natural capital such as biological resources, water and clean air are essential for achieving sustainable development for well-being. Disruption of ecosystems and the decline of ES are often caused by over-exploitation of biological resources. Without accountable public governance, compatible with the appropriate social institutions, no 'Scientific Theory' or 'Policy' will be effective (Roy & Mukhopadhyay, 2015). Approaches where the community and government functionaries work together in 'Participatory Biodiversity Monitoring and Management' are more likely to be successful.

Eco Chain is an approach to raise the awareness of local people with respect to the interdependence and relationships between different components of ecosystems in a given landscape which are interconnected like a chain, i.e. it is necessary to maintain biodiversity to preserve its associated ES. The approach aims to motivate people to conserve habitats and biodiversity through the process of Participatory Biodiversity Management. This blends scientific principles with indigenous knowledge and includes participation of the stakeholders in:

1. Identifying the problems;
2. Assessing the available resources and trade-offs;
3. Setting the goals; and
4. Developing action plans to reach the goals.

Keywords

Participatory methodology; Governance; Stakeholder engagement; Local and indigenous knowledge

Why would I chose this approach?

The method effectively involves local communities in finding solutions to arrest ecosystem degradation such as deforestation, which has its primary immediate negative impact on the indigenous local community themselves. It encourages local communities to spontaneously take responsibility to act and to monitor progress. Furthermore, including indigenous knowledge helps to build synergies between different approaches for conservation.

Finally, the approach has been shown to work and the Joint Forest Management program in India shows highly encouraging results in terms of checking deforestation through community participation. Through collaborative work between the community and forest field staff within the Indian Institute of Bio-Social Research and Development (IBRAD), simple yet scientific criteria and indicators were developed, as well as a template and checklist that can be used to diagnose forest degradation. Further work is expected to

illustrate how the data collected are used to take up possible corrective action to improve ES through a cascading effect.

What are the main advantages of the approach?

- The approach provides information to support conservation strategy decision-making jointly between government agencies and the local community;
- The approach helps to prepare participatory plans for sustainable harvesting of biodiversity in a way that balances economic benefits for the community with the conservation of biodiversity and improved flow of ES.

What are the constraints/limitations of the approach?

- It is difficult to make the community aware of the implications of loss of biodiversity and decline of ES and to develop their own social norms to restrict the overharvesting of timber and other forest products;
- It is difficult to have a strategy for long-term community level planning unless they are trained appropriately in Participatory Biodiversity Monitoring and skill development for livelihood improvement based on available natural resources;
- It is difficult to involve the public forest field staff as they have little faith in the application of traditional knowledge.

What types of value can the approach help me understand?

The approach is designed to raise awareness of the multiple values provided by the natural environment. It is particularly good for identifying locally important ecosystem services and socio-cultural values associated with these.

How does the approach address uncertainty?

The approach does not explicitly address uncertainty.

How do I apply the approach?

The key to the entire approach is the identification of proactive leaders and raising awareness and engagement within the community to monitor drivers of degradation by developing effective social institutions. The local community and local government staff need to work together to conserve the ecosystem as a social movement, instead of as a project based on externally directed activities (Roy, 1996). To follow the Eco Chain approach it is necessary to have some trained staff, preferably with a social science background, who would work with the community and the local officials. Before conducting the session at the village level it is necessary to inform local officials and community leaders about the approach. An awareness-raising session is then organised in the village. The inclusion of different stakeholder groups is encouraged for collective social action for conservation. Conscious effort is made to involve women and other groups engaged in livelihoods that are dependent on biological resources.

A large photograph/banner with a map of the local area is created to demonstrate the current status of the forest ecosystem. This is used during the introductory session to facilitate discussion, and to make

people understand the spatial distribution of different ecosystems in the area. It also stimulates the thought processes of the local people to understand the status and forces of degradation and the corrective actions that may need to be taken.

After the first awareness-raising session, the next step is to prepare inventories to assess the status of biodiversity, both species and genetic diversity, as well as their threat status. This is done by laying out quadrats on sample plots (normally 1% of the forest area is covered by laying the grids on the topographic sheet maps) that are georeferenced with GPS readings. This requires quadrats, GPS, measuring tapes, coloured paint and paint brushes.

The criteria to assess the degree of deforestation and biodiversity loss and understand the health of a given habitat, developed by involving the forest community, are the degree of forest cover fragmentation, standing biomass assessments, canopy cover, species richness, and quality of soil and water. The Eco Chain approach was developed for the two forest protection committees of Jamkanali and Jamirdiha of the Bankura district of West Bengal, India to assess their forest status and biodiversity, but the approach can be replicated elsewhere. An overview of the process is as follows:

Stage 1: Initial awareness-raising meeting

The first step is to raise awareness of the benefits the community will derive when their own ecosystem and its habitats are well conserved. A meeting is organised at which the forest staff and the community work together on visualising this and also on delineating their immediate loss, if the ecosystem is not conserved by their own efforts. The following sub-steps are followed during this awareness-raising stage:

- Conduct a meeting with community, local officials and local self-government staff in the village itself.
- After introduction, show them the map and landscape (e.g. using freely available Google Earth images).
- Brainstorm with the participants to identify different components of the ecosystems such as forest, water bodies, agricultural field, grasslands, etc. in the designated landscape.
- Ask the participants about the relationships between these components.
- Make a list of interactions between the different components and ask them to write on the chart about the result of interactions (e.g. what happens when one component, say water, interacts with others like grassland, forest, etc.)
- On the chart write five items: i) Water ii) Forest iii) Agricultural fields iv) Animals and v) Humans and ask them three key questions:
 - i. Which one of the components do the villagers not require for their survival;
 - ii. How are these components inter-related and inter-dependent;
 - iii. How can these components of the ecosystem be protected.
- After writing the answers through group discussion, each group presents their findings and (if appropriate with the particular stakeholder group) the best one can be awarded and recognised.

Stage 2: Institution building

After the presentation, volunteers are identified from among the group as proactive leaders who recognise the value of conserving the benefits from biodiversity. These leaders are tasked with forming a group of volunteers of like-minded people to work with the local government functionaries on

Participatory Biodiversity Management. The drivers of degradation are then identified through participatory rural appraisal. The drivers are then ranked and the community are asked to identify solutions.

Stage 3: Diagnosis of status of health of the habitat and recording of baseline data by developing participatory criteria and indicators by involving the community

To assess the status of the habitat and develop a baseline, participatory transect walks and baseline surveys are performed for each unit of sub-ecosystems (e.g. freshwater, agricultural ecosystem, and the forest and its varied components). Baseline data should be collected on the nature and degree of degradation based on the following six criteria:

- (i) The **degree of fragmentation**: This can be assessed by drawing a transect line on the map in the forest and walking the transect with the community. Community discussion about the degree of fragmentation is encouraged. Remote sensing maps can also be used to quantify the degree of fragmentation. Fragmentation of the forest can also be marked by community members using GPS.
- (ii) **Canopy openness in the forest understorey is minimised**: Identify the canopy density of the forest by involving the community.
- (iii) **Species guild structure**: Identify terrestrial, avifauna and aquatic species within the forest quadrat by involving the community following the quadrat method and laying sample plots. The community oversees how the abundance of insects, avian guilds and fruiting intensity in well-pollinated tree species is maintained.
- (iv) Identification of **REET¹ and keystone Species**: Identification of flagship species and keystone species of the area are identified by consulting the community. They are also asked (a) which species are becoming rare, extinct, threatened at the local level and (b) how those species can best be restored (i.e. what kind of corrective plan of action is needed). Species abundance data can be collected for use as an indicator for monitoring the effects and effectiveness of forest management. The process helps members of the community appreciate the diminishing rate of provisioning ES.
- (v) **Soil structure, quality, moisture and rate of decomposition**: Discuss with the community about the status of soil, soil health and status of soil degradation and prepare plan of action on how to reduce overuse of chemical fertilisers to restore the soil health.
- (vi) **Water condition**: Identify the water bodies and their status of degradation and plan for conservation through rainwater harvesting and other measures. All-season water levels in rivers and streams are a key indicator in this context and may indicate if sufficient forest cover remains to regulate flows, especially in dry seasons.

Stage 4: Develop conservation action plans

Action plans for conservation, eco-restoration and enhancing productivity are developed in consultation with the teams. These may include:

- Scientific management of land and rainwater such as in-situ moisture conservation, introduction of scientific production systems, network of run-off management structures;
- Developing a strategy for recharging of groundwater;
- Considering mechanisms for in-situ and ex-situ conservation of biodiversity;
- Organise trait-based training for livelihood development.

¹ Rare, extinct, endangered or threatened

Stage 5: Equitable benefit sharing plans

The final stage involves working with the community to plan actions for equitable benefit sharing and building this into the conservation action plans.

Requirements

<i>Data</i>	<input checked="" type="checkbox"/> Data is available <input checked="" type="checkbox"/> Need to collect some new data <input type="checkbox"/> Need to collect lots of new data	Maps can be downloaded from Google Earth, threat can be assessed following Red Lists.
<i>Type of data</i>	<input checked="" type="checkbox"/> Qualitative <input checked="" type="checkbox"/> Quantitative	Forest density and diversity, fragmentation status, water and soil condition, people's institutional mechanisms.
<i>Expertise and production of knowledge</i>	<input checked="" type="checkbox"/> Work with researchers within your own field <input checked="" type="checkbox"/> Work with researchers from other fields <input checked="" type="checkbox"/> Work with non-academic stakeholders	Different stakeholders would discuss the interdependence of ecosystems following the map and transect walk. Other methods such as group discussions are integrated to involve the people in understanding the interdependence between social and psycho-cultural aspects.
<i>Software</i>	<input checked="" type="checkbox"/> Freely available <input type="checkbox"/> Software licence required <input type="checkbox"/> Advanced software knowledge required	
<i>Time resources</i>	<input type="checkbox"/> Short-term (< 1 year) <input type="checkbox"/> Medium-term (1-2 years) <input checked="" type="checkbox"/> Long-term (more than 2 years)	
<i>Economic resources</i>	<input checked="" type="checkbox"/> < 6 person-months <input type="checkbox"/> 6-12 person-months <input type="checkbox"/> > 12 person-months	
<i>Other requirements</i>		

Where do I go for more information?

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