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Full Length Research Paper

An ingenious technique to integrated wetland management in Rupa Lake Area of Nepal

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The common property resource management would be tragedy of common or would lead to better management dependent on the existence of institutions governing access, utilization, managements, exclusion, ownership and transfer of ownership. However, recently the concept of integrated management and environment payment system has emerged as a new paradigm in common property management. The civil society is now working towards bridging gaps between have and have not. With this realization LI-BIRD in financial support of EGP Netherlands applied the integrated wetland management model in managing the Rupa wetland and its watershed. Significant progress has been made in ensuring communities leadership in management of natural resources. The conflicts in resource management has been challenged with innovative ideas of distributing the benefits arising from the use to the communities who are not only recipients but also the communities playing role in conservation and management of ecosystems.

Key words: Common property resource management, integrated wetland management, conflicts and environment payment system.

INTRODUCTION

Paying for the provision of environmental services is a recent policy innovation attracting much attention in both developed and developing countries. The emergence of Payment for Ecosystem Services (PES) has to be seen partly as a response to a need to identify additional sources for financing conservation, partly as a response to the widespread disappointment with more conventional approaches to conservation. These approaches have been based e.g. on command and control or unconditional economic incentives, such as those provided as part of the so-called integrated conservation and development projects promoted during the 1980s and 1990s (Zilberman 2007; McShane and Wells, 2004; Ravnborg et al., 2007) . The PES concept emerged from growing concern about the loss of biodiversity and ecosystem services, combined with inspiration from the early success of the global carbon market and a desire to scale-up experience with PES at local, regional and national levels (UNEP/IUCN, 2007).

PES can be defined as a "voluntary, conditional transaction with at least one seller, one buyer, and a well-defined environmental service" (Wunder, 2005). PES programs can be divided into three categories according to their function: a) Some PES programs pay mostly for pollution control. b) PES may also be payments for the conservation of natural resources and ecosystems, including forest resources and wetlands, wild flora and fauna species, and agricultural crop and livestock species. c) Finally, some PES are used to generate environmental amenities that are public goods (Zilberman, 2007) . One of the most widespread and easily under-stood forms of PES is a transaction between downstream water users and upstream landowners to secure the water - related benefits of a sustainably managed water-shed (e.g. flow regulation, filtration, and erosion control) (UNEP/IUCN, 2007).

The primary objective of PES is to correct market failures that have negative effects on ecosystems. Biodiversity conservation can be considered an implicit objective of this approach. It intends to support sustainable development through biodiversity conservation at local, regio-

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nal, national and global scale. It is important to consider the use of PES not just as an incentive for conservation, but more generally as an incentive for more sustainable land-use in inhabited landscapes. By offering economic incentives for maintaining ecosystem services, PES operates on the basis that market forces can offer an efficient and effective means of supporting sustainable development objectives. One of the key advantages of PES is its potential to tap additional sources of funding by creating new demand for 'environmental' goods and services (UNEP/IUCN. 2007).

Across much of Asia, rapid transitions to market-based economies alongside demographic changes are creating an increasingly high demand for watershed services. In urban Asia alone, an estimated 700 million people lack adequate water supplies emanating from upland areas (Dudley and Stolton, 2003). Traditional approaches to watershed management have largely failed to reverse widespread watershed degradation and protect the hydrological services they provide. Consequently, efficient and effective watershed management approaches are being actively sought and/or introduced (Huang and Upadhyaya, 2007). The conservation and protection approach in the past have, for the most part, not produced the desired conservation outcomes because they shed negative impacts on the livelihoods of communities in upstream areas with ignorance to livelihood requirements of communities; while the communities in the downstream areas, who are users and beneficiaries of the ecosystem services, are enjoying the benefits but not ready to pay for the service they are getting from the ecosystem (Wunder, 2005).

Nepal has several wetland ecosystems of global signiflcance. These wetlands are important for Nepal's sustainable development as they contribute significantly to livelihoods of a large number of communities depending on these resources. While all communities benefit from wetlands, about 17% of the Nepali populations representing 21 ethnic communities have traditionally based their livelihoods on wetlands (fishing, river transport etc.). These communities are some of the most marginalized and poorest people in Nepal.

The common property resources are undergoing a lot of threats and challenges in recent years. Wetlands are Nepal's most threatened habitats supporting a great diversity of floral and faunal diversity. Increased human pressures have led to alteration and degradation of these ecosystems, causing reduction or loss of biodiversity, ecological functions, and economic, cultural and spiritual values of these wetland resources. Ownership and benefit sharing issues related to wetland management exist in wetland areas of Nepal. There is a challenge to secure the rights of wetland dependent communities over the resources. Benefit sharing mechanism is not well addressed in any of the policy and government action plans. The conflict of interest in resource management is a reality in Nepal. The communities who manage and use catchments and watershed areas are not willing to invest on conservation due to high opportunity costs incurred in conservation. People in the upstream for example, have no incentives to preserve them, as the benefits are enjoyed by many people, while the costs of maintaining them are incurred only by them.

In recent years, the compensation to landholders for the services generated by their land has been advocated as an instrument to ensure that these services are maintained. PES seeks to capture at least part of the benefits derived from environmental services (such as clean water) and channel them to the landholders who generate them: PES provide landholders the right incentives to maintain a healthy ecosystem, they are a new source of income for landholders who can improve their livelihoods (World Bank, 2005), and have the additional advantage of generating funds that can be used to finance conservation projects.

Local Initiatives for Biodiversity, Research and Development (LI-BIRD) with financial support of Ecosystems Grants Programme (EGP) piloted an integrated ecosystem based approach to manage wetlands in Nepal. This pilot project was implemented in Rupa Lake Area of Kaski District in Nepal. This article is based on the approach and findings of the project.

METHODOLOGY

Tradeoff between conservation and livelihoods

There are always gains and losses in common property resource management. These gains and losses are in terms of ecology and livelihoods of communities. The policies and strategies promoted previously by the many governments were more oriented towards hardcore conservation with more focused on ecological gains. These policies implemented measures to control the use of resources of the communities living around. It helped in conservation but did not pay attention to the livelihood of communities. Rather it led to conflicts and negative impact on the ecosystem. Thus, many of this programme and projects were failures. Similarly, focusing on livelihood gains for the community leading to overuse of resources without maintaining the ecosystem also contributed in major environmental problems like land degradation, deforestation and climate change. Thus, the project realized that in order to manage the wetland areas more efficiently and effectively, there must be the balance between ecological conservation and livelyhoods of communities. The project adopted the participatory tools to address the community development and conservation aspect. Formation and empowerment of local conservation groups, revolving fund mobilization, trainings, organic farming, hedgerow and bioengineering technology, green foot trail construction around the lake, cooperative based fishery management and forest conservation were the major activities used for community development. Figure 1 shows Trade off between livelihood and ecological gains.

Integrated approach

An integrated wetland management model was developed and implemented to achieve the project goal. This model includes the management of water body, adjacent marshy lands and watershed in a consolidated, integrated and participatory ways putting emphasis on the role

Figure 1. Trade off between livelihood and ecological gains. Source: Umashaankar et al., 2003.

Figure 2. Payment for Ecosystem Services (PES) Source: Adhikari et al. 2007.

the role of each ecosystem, and inters linkages and interdependence in terms of functioning. The project was entirely community-based and inclusive, involving every section of the community – farmers, fishermen, indigenous groups, traders, students and teachers. Emphasis was given to the conservation of locally available floral and faunal species in the lake and watershed areas by establishing the conservation blocks for White lotus, water birds, wild rice, narkat and local Sahar fish. Bio-engineering and conservation measures were used to rehabilitate the degraded catchment and forests. Organic farming is promoted in the farmlands of watershed areas.

Value chain approach

This project initiative adapted an innovative system approach to explore how the existing knowledge and experiences can be used more effectively to address the issue of poverty. It supported and strengthened scaling up of good practices which can help poor people, especially women and indigenous groups, to create and adopt innovative income generation opportunities. This initiative explored and focused on the value chain, from sustainable production to systematic value addition and marketing of a diverse range of high value wetland and agricultural products in local, regional and national markets. It explored low cost value addition techniques for wetland and agriculture based species that focuses on production of dry meat of fish through drying and packaging, utilization of local wetland species for food (e.g. Water chestnut), handicraft making, decoration and aesthetic purposes.

Payment for ecosystem services (PES)

Preliminary study on the PES was carried out to explore the ecosystem services in the area and ways for the delivery of the ecosystem and economic benefits to up and down stream communities. Figure 2 shows Payment for Ecosystem Services (PES).The cooperative based fishery management is an innovative mechanism for benefit sharing to upstream as well as downstream users from the sale of the fish. The cooperative pays to the upstream users for their role in conserving upland forest and catchment for healthy lake. This money is used for conservation and community development activities in the upstream areas. Wetland based ecotourism was proposed and preliminary activities have already been initiated to promote this approach. A green foot trail was constructed around the lake for easy access to most of the natural places by the visitors. A wetland information centre has been established in the vicinity of the lake where aquarium with local variety of fishes, wetland products, architects and biodiversity information is systematically arranged. The visitors will have a holistic knowledge and overview of the lake and associated resources by a single visit to this information centre. The centre is preparing an electronic database on wetland resources, aquarium of indigenous fish diversity, living garden of floral diversity, specimen of wetland resources, photographs, paintings, posters, video documentary and traditional museum of fishing technology by indigenous fisher communities around the lake. The centre is laying a venue for public awareness on the importance of wetland biodiversity and also for promoting wetland eco-tourism.

RESULTS AND DISCUSSION

Towards conservation of biodiversity

The conservation blocks have provided wilderness areas as well as community-managed gene banks for the water birds, white lotus, narkat, wild rice and local sahar fish species which has also helped to protect marsh/swamp ecosystem. These blocks have been protected by local community. Inventories and community biodiversity registration have documented 69 species of wetland dependant plants, 22 species of indigenous fishes, 11 species of improved variety of fishes, 36 species of waterbirds (Kafle et al., 2008), and 24 species of wetland de-

pendant reptiles in Rupa lake area. The lake and adjacent marshes are good habitats for migratory bird species. The main water body of the lake area is now free from invasive Water hyacinth *(Eichhornia crassipes)* due to periodic removal by the local conservation groups. Plantation in the bare and degraded lands has helped to promote succession, maintaining the floral diversity. Fire and hunting is controlled in community forests around the lake. There are several reports of increased sightings of common leopard in the area by the local people. The habitat of the otters has been conserved within the community forest. Otters are confined to only in Rupa Lake in Pokhara valley. In the 1990s, otters were killed considering them as predators of the fish. But with increased awareness, local people have understood the importance of otters in wetland ecosystem and their killings have completely stopped now. Species diversity is maintained in the home gardens around the lake.

A pocket guide to water birds of Rupa Lake has been published in Nepali which serves as a useful reference for local community and visitors towards water bird conservation.

Communities participation in conservation and management

In Rupa Lake area, the Rupa Lake Rehabilitation and Fisheries Cooperative (RLRFC) was established with the initiation of wetland dependent communities with an agreement with local District Development Committee to manage the lake. There are some positive outcomes resulted from the effective functioning of the RLRFC.

Women groups of the cooperative are actively involved in conserving biodiversity at Rupa Lake. Unnatisil Women Group and other vicinity women groups are involved in conservation of water bird habitat and breeding place in Sathiko Jalo by restricting cutting of grass and aquatic plants in breeding season of migratory and residential species. Similarly, they have developed regulations for harvesting and utilization of wetland resources and are charging NRs 10-20 for grasses per *bhari*. Similarly, the green belt zone of different fodder trees, grasses, fruit and ornamental plants around the lake is a buffer area managed by local youth club and women group to check direct siltation in the lake and other human interference e.g. encroachment. Therefore, physical and biological threats to the lake have been minimized at the local level with community participation.

The forest resources are being managed by local community within local institutional framework. These activeties have helped to reduce the soil erosion and sedimenttation in the lake. Organic farming in the upstream farm lands has reduced the use of chemical fertilizers and pesticides.

Value addition and marketing of wetland species

LI-BIRD has piloted value addition and marketing activities in Rupa Lake area. The project has already identified different products from wetland based plant resources such as *Kamlagotti* (seeds) and *Kokre* (stolen part) of White lotus (*Nelumbo nucifera*) as alternative income generating sources to local communities which retain medicinal values. Local conservation groups have collected and utilized more than 25 kg of lotus seed in 2007. The project has been exploring local, regional as well as national market for marketing of this product. LI- BIRD through the project is looking for ways to carry out commercial marketing of lotus. Similarly, Simalkande (*Trapa* sp.) was identified for marketing. When CBR information was shared with communities, they came to know that fruits of Simalkande were eaten by some community members and children with simple debarking process. To promote marketing of this product, a pilot market survey was done in Pokhara City. The survey showed that consumers are willing to pay NRs 20 per kg for the Simalkande fruits. After this, already 30 kg of fruits have been sold only in two days of interval from a single market point. Previously, communities considered this plant as unwanted weeds and the cooperative was investing their resources for removing the plant from lake. But, now the unwanted weeds of Rupa Lake have become a profitable income generating source for local community. The cooperative is now preparing community based sustainable harvesting plan for Simalkande with the good experience of White lotus management plan. Recently the Rupa cooperative has used the solar drying techniques to dry the local fish, package it and sell to the local market. They have earned around $ 1500 in 2007.

Local level benefit sharing mechanism (managing PES)

In Rupa Lake area, environment payment system was initiated in 2002. The RLRFC pays 10% of its income from fishery management to the upstream communities. Including cash, the other payment mechanisms were in the form of community contribution, capacity building and collaborative activities. The realization among the users of the Rupa Lake about the potential role of upstream and downstream communities in management of the lake has led to expansion of members within the cooperative. The 360 membership in the cooperative in 2006 is now more than 600 members. Most of the new members are represented from the watershed areas. This has opened avenues for greater cohesion, sense of ownership and sharing of benefits.

From this payment from RLRFC, the following major activities have been carried out under the PES scheme:

- 19 schools around the wetland and watershed areas of Rupa Lake are receiving conservation grants from the cooperative to conduct awareness raising and environmenttal education activities for the students.
- 52 students from the displaced communities particularly the fisherman “Jalaharis” who used to depend on traditio-

nal fishing living around the lake, wetland and watershed areas are getting Rs 250 scholarship for their education.

- 17 Community forestry user groups in the watershed areas are receiving Rs 4000 support from the year 2006 for conservation and sustainable use of forest resources. This support is given based on agreement between CFUGs and Cooperative.
- Rupa watershed conservation fund is established by the cooperatives with support from LI-BIRD and EGP. The fund is given to groups functional in watershed areas: Kahure Community Development Group-Hansapur 9, Betyani Community Development Group-Majhthana-8, and Jyamire Community Development Group- Majthana 4 for the conservation and management of natural resources in the watershed areas. From the fund poor, marginalized and farmers can get access to start conservation oriented income generation activities like plantation, beek keeping, forage/fodder plantation for livestock improvement, Broom grass cultivation, organic farming and coffee production, zero tillage sustainable agriculture farming like permaculture etc. Around 5000 household have directly benefited from these schemes.
- The cooperative is also providing 5000 napier seedlings and Nrs 9000 to the road construction project
- In order to go for bioengineering in areas of landslides and road degradation.
- Nrs 100,000 is allocated by the cooperatives every year to manage the conservation blocks established in the Rupa Lake area.
- Cooperative is providing Rs 5000 every year to celebrate awareness raising and sensitizing activities on the importance of ecosystem health and services in the watershed areas during World Environment Day.
- Support is also given to organize diversity fair, environment campaign and school level activities.

The PES is targeted to poor, resource dependent, vulnerable communities around the lake, wetland and watershed areas. Most attention is given to support the conservation and income generation activities in the watershed areas. Beneficiaries include near about 15000 households and among them 2000 have directly benefited. The cooperative has now extended its membership from 319-630 including communities residing around lake, wetland and watershed areas. This is the solid examples of inclusion of real users of the common property.

CONCLUSIONS AND WAYS FORWARD

Community property resource management has always been challenging and debatable in recent days. The conflict of interest among the users is due to unequal distribution of benefits arising from the ecosystem services. This issue of equity and justice in common property management is growing concern in Nepal. However, recently the concept of integrated management and environment payment system has emerged as a new paradigm in common property management. The civil society is now working towards bridging gaps between have and have not. It is now realized that the role of communities in conservation of wetland ecosystem is vital for deriving the services from it. The users are enjoying the benefits because the communities in elsewhere have invested in conservation and better management. With this realization LI-BIRD in financial support of EGP Netherlands applied the integrated wetland management model in managing the Rupa wetland and its watershed.

The short term project intervention not only comes up with encouraging results but provides an innovative and integrated wetland management model with potentiality for wider replication. The watershed comprises all water bodies, wetlands, forest and agro ecosystem with distinct socio-economic, environment and political dimension. Conservation should be integrated with the livelihood of poor and marginalized communities who are totally resource dependent. The upland communities are not fully aware about the impacts of their farming technology leading to the degradation of Rupa Lake environment. Likewise, the lowland communities solely take most of the benefits from lake resources and simultaneously suffer from the impacts of unsustainable practices at upland watershed area. The benefit accrued from downstream community must be shared with the upstream community in wetland conservation initiatives. The equitable share of benefits arising from the sustainable management of wetland resources will thus create harmony between the upstream and downstream communities.

There is a great potential to replicate this model in other wetland areas not only around the Pokhara valley but also in other parts of Nepal. This innovative approach to integrated wetland management is expected to be an effective model for ensuring environmental payment service around the lakes throughout Nepal.

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