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Economic valuation of Indirect benefits of Ashtamudi estuary in south India

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Introduction

Ecosystems, especially the wetland ecosystems, are boon to humanity given the manifold services provided by them. The direct use benefits refer to the tangible benefits accruing to the local community. In addition to many direct use benefits, these wetland ecosystems provide quiet a number of indirect benefits in the form of various ecological services which may not be tangible as in case of direct benefits. People seldom understand such kind of benefits due to lack of knowledge and inadequate awareness about it.

Ashtamudi estuary in Kerala, covering an area of around 6400 hectares, is a RAMSAR site designated as the "wetland of international importance". It is located in the Kollam district of Kerala state in south India and provides for fishing, coir production and tourism activities.

Indirect benefits

The estuary provides many indirect use benefits to the local community in terms of flood protection, protection of the marine shrimp larvae during the juvenile stage, carbon sequestration, etc. However, the role of Ashtamudi estuary as a nursery for the marine shrimp larvae is of utmost economic value because of its effect on marine shrimp catch and the livelihood of fishermen associated with shrimp fishery. The adult shrimps enter the estuary from sea for laying eggs and the juveniles hatching out of these eggs spend their juvenile phase in the estuary and later swim back to the marine environment.

Carbon sequestration, by the mangrove vegetation in the estuary, is yet another major indirect use value provided by it and is often neglected by the people as well as policy makers while considering conservation efforts.

Data

There was no data or study available regarding the concentration of shrimp post larvae in Ashtamudi estuary. Therefore the data from a study conducted in Goa (Goswami and Goswami, 1992) was taken as proxy for the concentration of shrimp post larvae in Ashtamudi estuary. This data can be compared with the Ashtamudi estuary considering the fact that both the areas lie in the west coast of India and in close proximity.

Discussion with the scientific experts and local people revealed that Ashtamudi estuary supports 25 hectares of mangrove vegetation consisting of the species *Avicennia officinalis* and *Bruguiera gymnorrhiza*.

Methodology

The value of shrimp larvae protection was estimated using replacement cost method. The cost of rearing larvae in hatcheries was used as the value of estuary in providing the service.

In case of carbon sequestration,

The average carbon content per hectare of mangroves = average biomass x 0.5

The biomass content of the above described mangrove species were already estimated in scientific studies (Nameer *etal*, 1992) and was used in this study to value the carbon sequestration benefit provided by the estuary.

Results

Out of the total area of the estuary only 2141 hectares contribute for the function of shrimp larvae protection. The cost of producing shrimp larvae in hatcheries was estimated to be Rs. 7.80 per larva. Details of estimation can be inferred from table 1. the total value of shrimp larvae protection service offered by the estuary was found to be Rs. 10.19 lakhs per annum.

Table 1 Value of estuary in shrimp larvae protection

Particulars	Value
Number of larvae protected by estuary (per m^2)	5.45
Average post larval content per hectare	54500
Cost of producing shrimp larvae (Rs. per larva)	7.80
Expected number of matured larvae harvestable (per hectare)	6100
Value of larval protection service (Rs. / Ha)	475.8
Potential area of protecting the shrimp larvae in the estuary (Ha)	2141
Total value of shrimp larvae protection (Rs. / annum)	1,018,846

Total biomass content per hectare of the 2 mangrove species accounted for 22.22 tonnes. The carbon content per hectare is 11.11 tonnes (50 percent) . Price of carbon was assigned as Rs.820 (equivalent of US $20 per tone) as estimated by Frankhauser (1994). Total value of carbon sequestered by Ashtamudi estuary was estimated to be Rs. 2.27 lakhs

Table 2 Option value of Ashtamudi estuary (Rs. lakhs)

Important species	Biomass content (t / ha) Stem wood and branch wood	Foliage	Total
Avicennia officinalis	17.67	3.96	21.62
Bruguiera gymnorrhiza	0.45	0.15	0.60
Total biomass (t/ha)			22.22
Total carbon content (t / ha)			11.11
Value of carbon sequestration (Rs. / ha)			9110.20
Total value of carbon sequestration for Ashtamudi estuary (Rs.)			2,27,755

Note: Price of carbon was taken as $ 20 (Rs. 820) per tonne (Fankhauser, 1994)

Conclusion

The indirect benefits offered by the estuary are of particular relevance and often neglected in the conservation efforts. The value of indirect services provided by Ashtamudi estuary are found to be significant and needs to be conserved in a sustainable manner with the effort of local government as well as people's action in a coordinated way.

Reference

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