Ocean & Coastal Management 134 (2016) 1–10

Contents lists available at ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Coastal people and mangroves ecosystem resources vis-à-vis management strategies in Indian Sundarban

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ARTICLE INFO

Article history:
Received 18 March 2016
Received in revised form
25 September 2016
Accepted 27 September 2016

Keywords:
Mangroves
Resources
Coastal people
Livelihood
Management

ABSTRACT

This study assessed the status of coastal communities living in a fringe of mangroves forest, Samshernagar in the Indian Sundarban. Demographics of the area were surveyed with questionnaires which also collated their pattern of livelihood related to coastal resources. A total number of respondents were 1404 out of 1560 households. The study identified 14 primary occupations (A) with consideration of both earning and time engagement, along with other two occupations as Secondary (B) and Tertiary (C). Different occupants were made into four broad groups viz., (i) Resource dependent (RD), (ii) Wage earner (WE), (iii) Self resilient (SR) and (iv) Government servant (GS). Resource dependent shared 63.9% among others. A Relative Occupational Priority Index (ROPI) was developed, assessing the degree of strength among primary occupations. Fin fish, shell fish and crab (Af) scored 60.97 numbers, followed by agricultural activities (Aal) with 21.38 numbers. The venture of coastal people for resources collection into forest ecosystem as part of livelihood encountered very often wildlife conflict, including both tiger and crocodile attacks. To reduce resources dependency among coastal inhabitants, management of mangroves ecosystem was undertaken through Focus Group Discussion (FGD) among Forest Development Committees (FDCs) for creating awareness among forest dwellers. Provision of JFM was initiated as an alternative livelihood approach through co-management, though limited success was achieved.

1. Introduction

The Sundarban mangroves forest has a long history of its degradation (Hunter, 1875), much of which occurred during British colonial period (1757–1947). It (both India and Bangladesh) lost approximately double area than what exits (Naskar and GuhaBakshi, 1987; Chaudhury and Chaudhuri, 1994; Islam et al., 1997; Giri et al., 2007). Post-independence of India witnessed two phases of its distinct degradation due to political reason. Nevertheless, excessive degradation occurred for human settlement before Indian independence, 1947. Also, the similar trend of mangroves destruction happened in worldwide during that time (Walters et al., 2008). In colonial period, Claude Russel, 1771, the British administrator in Bengal province of India reduced mangroves forest for human inhabitation as part of reclamation. The term 'Reclamation' was used then in view of getting back areas as if it was occupied by dense mangroves forest. Following the footstep of his predecessor, Tilmen Henckell, 1782, expedited reclamation of mangroves, clearing a large area (Mukherjee, 1996). The major part of reclaimed areas was utilized for rehabilitation, along with agriculture, aquaculture, fisheries and related activities required for livelihood of locals. He engaged a number of labourers for the reclamation activities, for which people were brought from Bihar, Chhotanagpur and Odisha states nearby as per District gazetteer, 1914. They belonged to aborigines i.e., tribal communities christened as 'Adibasi' in respect of Indian culture. Poor and hard-working, they migrated with the entire family in search of wage works for livelihood. Later, those people were settled, with each occupying a part of reclaimed land. In the course of time they became habitual forest dwellers who were traditionally acquainted with collection of resources emanating from forest for livelihood. This is considered as the 1st phase of mangroves degradation.

The Sundarban forest faced the 2nd phases of degradation during the Indian independence in 1947 and again 3rd phase of it during liberation of Bangladesh from Pakistan in 1971. The Sundarban was parted between India and Pakistan in 1947. A large number of Hindu populations, considered as 'Refugees', preferred

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http://dx.doi.org/10.1016/j.ocecoaman.2016.09.025
0964-5691/

entering India from Bangladesh (Erstwhile East Pakistan), who were sent for rehabilitation in mangroves cleared areas of the Indian Sundarban for avoiding confrontation with local people established in other areas. Most of the people rehabilitated in this region belonged to SC (scheduled caste), ST (scheduled tribe) and OBC (other backward classes) communities as per Indian constitution. The uprooted people who were traditionally familiar with natural resources of mangroves forest exploited forest for collection of resources: (i) food, fodder, honey, leafy vegetable, Tannin, wax, wood, thatching materials, timber for construction of house, boat, fence, (ii) firewood for fuel; and (iii) fish, prawn, crabs, mollusks and other resources from water bodies.

The ecosystem services that the Sundarban mangroves render is phenomenal, which benefit coastal inhabitants in both direct and indirect ways. Direct benefits that include mitigation of natural calamities are visible to common people, whereas indirect benefits that make ecosystem functioning vibrant through nutrients release is considered to be latent (Mandal et al., 2010). However, the cumulative effect of different factors like rehabilitation, encroachment of land for agriculture and aquaculture, collection of resources, poaching, and political interference led to exploitation of mangroves, with human interference prevalent (Naskar and Mandal, 1999). It is in tune with degradation pattern of worldwide occurrence (Valiela et al., 2001; Wilkie and Fortuna, 2003; Duke et al., 2007), as was analyzed with a variety of methods to quantify the diverse values of mangroves forests and to prove cause-effect relationship between people and mangroves (Dewalt et al., 1996; Ellison and Farnsworth, 1996; Ewel et al., 1998; Ronnback et al., 1999; Vandergeest et al., 1999; Kovacs, 2000; Barnes, 2001; Walters, 2005; Dahdouh-Guebas et al., 2006; Lopez-Hoffman et al., 2006).

In the Indian Sundarban, limited works have been done, particularly in socio-economic aspects (Mitra, 1952; Nandi and Pramaniik, 1986, 1994; Gayen, 1999; Pramaniik and Nandi, 1999). All the previous works documented only the involvement of people in resources collection, but did not consider their knowledge for particular resource collection and skills involved for collecting such resources. The collection of mangroves resources occurs indiscriminately by locals who are marginal in society and poor in economic condition to manage their livelihoods. So they are compelled to exploit mangroves resources as well as ecosystems. Consequently, they happen to be in conflict with wildlife in the forest during resources collection. All the facts that led to the degradation of mangroves are considered to be the cause-effect relationships between people and mangroves, not addressed previously in view of mangroves degradation in the Sundarban, though there were evidences of such works in different mangroves ecosystems in the world (Kovacs, 2000; Barnes, 2001; Valiela et al., 2001; Wilkie and Fortuna, 2003; Walters, 2005; Dahdouh-Guebas et al., 2006; Lopez-Hoffman et al., 2006; Duke et al., 2007). More and above, reducing forest dependency among locals, many agencies were involved in developing the provision of livelihoods to forest dwellers to conserve mangroves resources, which were also not addressed in respect of forest management issues for restoration of mangroves ecosystem. In this context, this article highlights (i) how the socioeconomic conditions of forest-users are related to exploitation of mangroves resources in view of their livelihoods, and (ii) how different organizations are involved in the viable management of mangrove ecosystem through co-management approach.

2. Materials and methods

2.1. 1Study area

The present study was conducted at the fringe *mouza*, Samshernagar of the Indian Sundarban, covering an area of 18.75 sq km. (Fig. 1). The location of study area falls under the jurisdiction of India, and is bordering mangroves forest of Bangladesh in one side and that of India in other. Very often, people of one country enter into another's land in collection of resources, in spite of strict vigilance of both countries. Incidentally, the Sundarban (Indian and Bangladesh together) is the largest single block of mangroves forest in the world, apart from a rare distinction as World Heritage Site bestowed by UNESCO.

2.2. Survey and questionnaire

Initially, cadastral or *mouza* map was collected from the Directorate of Land Records and Surveys office to identify the land use pattern of the study area. The area had a total of 5465 populations from 1560 households, each with average 5 persons. The total population encompassed 54.4% SC (Scheduled caste), 27.3% ST (Scheduled tribe), 7% OBC (Other Backward Class) and the rest belonging to general categories, with 11.95% growth rate, sex ratio counted 944 numbers of female per 1000 male, and 75% male and 72% female being literate.

The study was conducted through door-to-door household survey with three steps involved. First step: it was the general survey covering population structure, age, sex, occupation, and status of forest users, with one questionnaire (Table 1aa). A total number of respondents were 1405 out of 1560 households; members of some households declined to respond. The eldest respondent was 92 years when the mean age was 42.31 years. Female respondents were 525, accounting for 37.4%. Second step: the survey was restricted to 138 respondents representing 72 households, who were exclusively dependent on forest and their primary occupation was collecting forest resources. So, the survey identified the reason of forest entry, frequency of entry, collection and utilization of resources, with another questionnaire (Table 1bb) conducted simultaneously. Third step: this survey was based on only one question to many respondents at random ($n = 1122$): What were the measures or alternate arrangements required minimizing the human exposure to wildlife?

The survey also studied who were the ‘Active’ ‘Sub-active’ and ‘Passive’ earners among respondents in respect of livelihood. The study enquired about any compensation scheme declared by department of forest for unwilling forest entrants. Two criteria were used in the selection of the households: first, at least one member directly involved in collection of resources from forest as part of primary occupation. Second, respondents should be spontaneous to share information in view of data collection (Table 2).

2.3. Category of occupation and resources

The present study listed 14 primary occupations (A), which constitute further six occupational types (Table 3). Each primary occupation was distinct from another based on its activity and tools used, though resources might be similar as biological perspective. The term ‘primary occupation’ referred to the activities which supported major livelihood of forest dwellers and maximum time spent. The ‘secondary occupation’ (B) referred to those activities which were usually performed during lean phase of primary occupation and was treated as the supplementary revenue generation. The ‘tertiary occupation’ (C) happened very rarely and was not much supportive for livelihood. However, the concept of primary, secondary and tertiary occupations was relative to respective dwellers. The study considered collection of aquatic resources (collection of fin fish, shell fish, prawn seed, and crab) as primary occupation to those having major earning for livelihood and maximum time spent. When the same occupants took agriculture