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MEASURING DEPENDENCE ON FOREST RESOURCES AND ITS IMPACT ON BIODIVERSITY CONSERVATION: EVIDENCE FROM KOKRAJHAR, ASSAM.

Ringcher Basumatary

Department of Economics, Bodoland University, Kokrhajhar, BTC, Assam, India

ABSTRACT

Biodiversity conservation is the part of sustainable use of resources. The excessive use of forest resources will impact not only on environment but it also affects all the living beings and nonliving beings on the biosphere. Therefore, the world community is in favour of the biodiversity conservation and support for its conservation, but ultimately it is the perception and attitudes of local community who reside within or near forest areas and depend on forest for their livelihood that will make differences to biodiversity conservation. The study assesses the extent of dependence on forest for various goods and services by the dwellers of forest village. 365 households were surveyed in 16 recognised forest villages of Kokrajhar district of Assam. The study showed that the dwellers of forest village depend more on forest resource. The study also found that the forest villager were aware of biodiversity and was interested to biodiversity conservation.

Keywords: Biodiversity, Mayadi Patta land, Forest village

1. INTRODUCTION

The conservation and maintenance of biological diversity or biodiversity such as gene, species and ecosystems is gaining importance both in the research and policy- making process after the Earth Submit of the United Nations Conference on Environment and Development (UNCED) which was held in Rio de Janeiro, Brazil in 1992. Biodiversity conservation is the part of sustainable use of forest resources. The excessive use of forest resources will impact not only on environment but it also affects all the living beings and nonliving beings on the biosphere. Therefore, the world community is in favour of the biodiversity conservation and support for its conservation, but ultimately it is the perception and attitudes of local community who reside within or near forest areas and depend on forest for their livelihood that will make differences to biodiversity conservation (Mahanta R.,2013). Policy on biodiversity conservation depend upon

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the perceive cost and benefit of biodiversity conservation. Benefit of biodiversity conservation and its assessment take into account of the opportunity cost of biodiversity conservation in terms of benefit forgone as well as external cost of conservation (Nina,2007). Several studies around the world have shown that poor and marginal people were the most dependent on forest for their livelihood (Kantha, 1997, Bista & Webb). Apart from cutting and clearing of forest for agriculture, a large amount of trees have been cut annually for fuel-wood, as firewood is the major source of energy especially in rural areas (De,2012).

In order to curb huge illegal extraction from forest, government of Assam has implemented various forest policies since the Forest Act of 1865 but almost all the policy have failed to protect the forest, as they do not take into account the involvement of people who resides at fringe forest (Mahanta & Das,2013).Therefore, the Forest Right Act, which is known as the Schedule Tribes and Other Traditional Forest Dwellers (Recognisation of Forest Right) Act, 2006 is seen as alternative of earlier forest Acts. This Act argues to provide land ownership to forest dwelling communities and sustainable land use and conservation of biodiversity (Sen, 2006).

To know the extend of dependence on forest for livelihood by the forest dwellers, it is necessary to make a comparative assessment of the benefit earned from conservation and benefit forgone from other land use option such as agriculture, horticulture and plantation. However, perception of forest dwelling communities on conservation of forest is important for the policy formulation.

1.1 Objective

The objective of the study is to assess the extent of dependence on forest resources by the forest dwelling communities. The other aspect of the study is to see the perception of forest dweller on biodiversity conservation.

2. METHODOLOGY

2.1 Study Area

The study has been conducted in Kokrajhar district of Bodoland Territoral Council, Assam. The district is the northern belt of Brahmaputra which lies in between 26^0 07' 36" and $26^0$51' 10" North Latitudes and $89^0$50' 58"and $90^0$25' 15" East Longitudes. It occupies a total geographical area of 3165.44 sq.km. which is accounts for 4.04 percent of the total area of Assam (78,438.00 sq.km). It is bounded in the north by the Kingdom of Bhutan, in the east by the district of Chirang and Bongaigaon, in the south by the Dubri district and in the west by the state of West Bengal.

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2.2 Data Collection and Method

The study is based on both the primary and secondary source of data. The secondary data regarding geographical location and demographic pattern were collected from Indian State Forest Report (ISFR,2015), District Census Handbooks of Assam, 2011 and other important documents prepared by the Government of Assam. Primary data has been collected from the recognized forest villages of Kokrajhar district. Forest villages established before the enactment of Forest Conservation Act of 1980s were recognized by the forest Department as forest villages and allotted limited land without patta. Even though, still they were waiting for the implantation of Forest Right Act., which is known as the Schedule Tribes and Other Traditional Forest Dwellers (Recognisation of Forest Right) Act,2006. Till the collection of primary data on June and July 2017, the status of forest village of the study area is remained as it is. Multi stage sampling has been applied in this study. In stage I, three forest divisions namely Kachugaon, Haltugaon and Parbathjora of Kokrajhar District has been selected. In stage II, 16 villages has been selected out of 145 recognized forest villages of the district. Criteria for the selection of sample village are:; distance from subdivision /district town and distance from national highway (37C). In Stage III, slovins formula has been used for the collection of sample household. The Slovins formula is shown as:

$$n = \frac{N}{1 + Ne^2}$$

Where n= Number of sample, N =Total number of population and e = margin of error or probability of committing an error in sample selection. Unit of the survey is household and only one respondent or preferably head of the family is taken. The structured questionnaire has been used for data collection.

Primary data has been collected from the sample household obtained by applying Slovins formula as shown above. In Kachugaon forest division, 258 households from Ripu-reserve forest and Kachugaon reserve forest were selected for the interview, out of which 20 household were from Bongaon village,15 from Nandipur, 31 from Bollamjhora, 19 are from Raimona,23 from Dumbazar, 32 from Nabinagar, 15 houhehold from Bijoynagar, 57 are from Thakampur,10 from Islampur and 36 household from Athiabari were selected. Similarly, for Haltugaon forest division, 95 household from Chirang reserve forest, Bental(part) reserve forest and Manas(part) reserve forest were selected, out of which 60 household were from Saralpara,13 from Ultapani, 4 from Bhur and 18 household from Kungring villages were taken respectively. Lastly, in Parbatjhora forest Division, 12 household were selected as sample from Guma Reserve Forest. Amongst these, 3 household are from Singimari and 9 are from Gugujhora were selected as

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sample respectively. Thus, primary data has been collected from 365 household of three forest division of Kokrajhar district.

The information on socio-economic and demographic variables namely, caste, sex, age, family size, occupation, land holding and educational qualification will be collect to see the status of forest villages. Simple percentage and frequencies were calculated for socio-economic and demographic condition.

To see the forest dependence, revenue from forest product and non timber forest product (NTFP) will be calculate. Timber product includes all type of valuable trees and non-timber product (NTFP) includes firewood, honey, wild edible green leaves, medicinal herbs and grazing. The data on collection of timber product is not reveal by the forest dwellers so value for timber product is not calculate for the study. To calculate revenue from the forest product, total quantity collected by household was multiplied by the ongoing market prices. The grazing benefit is calculated in the following ways: initially the total number of cattle of each household have been collected and converted into standardized animal units. As per the guidelines fodder and grass report Government of India, an adult cattle consume10-16 kg of green fodder and 5-6 kg of dry fodder per day. So, in an average 13 kg of green fodder is required for an adult cattle.

The revenue from non-forest product (NFP) includes earning from agriculture, horticulture and sericulture and other allied activities. This revenue included value of self employed laboures. For example, if a person work for some days in his or her field to cultivate then his or her earnings were also included by multiplying his or her labour day with ongoing market prices in that locality (Mahanta,R 2014).

3. RESULT AND DISCUSSION

3.1 Socio–Economic status of forest villages

The data from field study showed that 80 percent respondent depend on cultivation and only 20 percent were engage in Services, business and labour . It has been observed that in an average land holding of per households is measured as 13.06 bigha. Out of this land, 67.07 percent of lands including title land and homestead lands were recognized as title land without Mayadi patta. While, remaining 32.93 percent land were illegally occupied from forest area as khash land or encroach forest land. Again it has been observed that above 90 percent respondent is male due to male headed family of the households. The literacy rate of the forest villages is 58.26 percent and illiteracy rate is above 40 percent. As a result of that may be 14.25 percent respondents are engage as wage earner by working in others households.

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Table 1: Socio-economic pattern of respondents (in percentage)

Village	Occupation				Land use pattern		
	Cultivator	Service	Business	Labour (wage earner)	Forest land	Title land	Homestead land
	80.00	3.84	2.74	14.25	32.93	52.49	14.55
Village	Average total land holding (in bigha)			Sex		Educational qualification	
				Male	Female	Literate	Illiterate
	13.06			98.90	1.09	58.35	41.64

Source: Calculated by author from field data

Majority of households is above 49 years of age and have family members of 5 and mores.

Dependence on forest product can be calculated by summing up of the benefit of forest and non forest product.

3.2 Benefit from forest product

It has been observed from the table 2 that for the collection forest product, villagers has to travel more than 2 km for firewood and 1 to 1.50 km for other forest products. The collection of firewood by dwellers of forest villages were 140 bundles in per annum. To calculate the value of firewood the existing local market price of Rs.30 was multiplied with the numbers of bundle. The average 2.4 Kg of honey bee were collected by the forest dwellers and to calculate money value it was multiplied with existing local market price of Rs. 350 per kg. In the same way, 10kg of wild edible green leaves were collected by the forest villagers and multiplied with its local market price of Rs 60 per kg.

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Table 2: Benefit from Forest Product.

Villages	Average time taken for collection (hrs per week)	Average distance to travel (km)	Average quantity of collection (per annum)	Value (Rs. Per annum)
Firewood (in bundle)	2.92	2.16	140.00	4200.00
Honey (in kg)	1.50	1.40	2.40(350)	840.00
Wild edible green leaves (in kg)	1.20	1.40	10.00(60)	600.00
Medicinal herbs (in kg)	1.50	1.70	1.50(400)	600.00

Source: Calculated by author from field data

Medicinal herbs are important for the rural community for various uses. It has been observed that in an average 1.5 kg of medicinal herbs were collected by the forest villagers and value has been put by multiplying its local market price of Rs. 400 per kg.

3.2.1 Grazing Benefit

Fodder for livestock's has been classified into two categories (i) Green fodder and (ii) Dry fodder. Forest is the important sources of green fodder and processing fodder is called dry fodder. Grazing benefit from forest is obtained by the villagers in two ways- one by small and marginal farmers and secondly by the cattle ranchers in forest . As an open access of forest resources, the excessive grazing will affect the biodiversity of plants, animals and species.

Table 3: Benefits from fodder use/collection

Village	Total number of livestock (average in total numbers)	Value of green fodder (Rs. Per annum)
Forest Village	6.80	16133.00

Source: Author's calculation from field data

It has been observed from table 3 that average number of cattle of forest villages were 6.80.To have an estimation of the value of green fodder use by the forest villagers for grazing their animals in the forest , local market price Rs. 0.80 per kg was multiplied with the total amount of green fodder required by the standardized animals unit per day. The forest dwellers earn from the grazing benefit is Rs.16133.00 per annum.

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3.3 Benefit from non-forest product

From the table number 4, it has been observed that the benefit of non forest product mainly comes from three activities like agriculture, horticulture and plantation. Rice production is the main activities of the agriculture followed by the horticulture and plantation. The average value of per moon (40 kg) of rice was estimated as Rs. 400.00 and accordingly average revenue of rice was estimated. It has been clear from table 4, that in term of area, quantity and calculation of value, rice production were highest which was followed by plantation and then horticulture.

Table 4: Benefit from non-forest product

Villages	Activities	Quantity in average	Value in Rs
FV	Agriculture(moon per household)	43.02	17208.00
	Horticulture (moon per household)	5.32	2660.00
	Plantation (in quintals)	6.92	5536.00

Source: Calculated by author from field data

3.4 Cost of forest product

The total costs of production includes both from Forest and Non-Forest Products. The costs of collecting forest products has been calculated by multiplying ongoing local wage rate (Rs. 120 for male and 100 for female) and time taken to fetch it. Thus, it has been estimate that Rs 3206.40 as cost of forest products.

Total production cost of Non-Forest Products – include costs of own family, actual cost and external cost. Costs of own family include costs of man days spend and actual cost includes hired human labour days, hired animal or own animal labour days, seeds for both agriculture and horticultures, fertilizers, pesticides and others. On the other hand, external costs comprise torchlight, jute stalks and cost of building huts on tree. From the field studies it has been observed that an average cultivation or processing for the agriculture and allied activities required 180 hrs and 58 hrs for both male and females respectively. Therefore, to calculate the families own revenue, the labour hour spends on each production activities has been transformed into days by dividing it by 8 and then were multiplied by the prevailing local market wage rate. Accordingly, it has been calculated that total cost of non forest products including cost of own family, actual cost and external cost was Rs.8020.00.

3.5 Extend of dependence on forest

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The extend of dependence on forest can be see from the table 6 . It has been observed that dwellers of forest village earned Rs. 36670.60 per annum from both forest and non forest product. The forest dwellers earned Rs. 19286.60 only from forest product, which is 52.59 percent of the total net revenue. In other way, if we include the cost of production, the same pattern of result will be obtained.

Table 6: Extend of Dependence on Forest:

Total Revenue	Total Costs	Net Benefit	Revenue from forest products	Costs of Collecting forests products	% share of 4/1	Net Revenue from forest products	%share of 7/3
1	2	3	4	5	6	7	8
47,897.00	11,226.40	36670.60	22,493.00	3206.40	46.96	19286.60	52.59

Source: Authors calculation

From this table, it has been noticed that more than 50 percent of revenue shared is coming from forest product. This showed that forest dwellers were more dependent on forest product than non forest product.

3.6 People's perception on biodiversity conservation

The dwellers of forest village belonging to tribal and non tribal community were express interest on biodiversity conservation. They were ready to co-operate with the authority for conservation of forest. Again, dwellers of forest villagers came to know the *Forest Right Act of, 2006* and still waiting for its implementation. Forest villagers expressed that they have been denied from obtaining bank loans and other facilities due to absence of proper land documents.

Both tribal an non tribal forest dwellers perceived that Forest Right Act, 2006 was merely an instruments to give land pattas. As a result, people overlooked other important environmental and conservation issues of the Act such as conservation of forest and role of biodiversity conservation (Mahata, R. and Das, 2013)

4. CONCLUSION

The findings of the study showed that the dwellers of forest village depend more on forest resource. For efficient management and conservation of biodiversity, several Acts has been introduced since the independence of India. More or less all these Acts had highlighted on equal participation from forest dwelling community for conservation. The study reveals that Forest Act, 2006, if implement in good spirit with precaution, then in some extend it can help for

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conservation of forest and biodiversity. For these all the stakeholders of conservation such as researchers, policy makers, NGOs and Government and social and political organization have to come forward and to have joint hands for successful implementation of the Act.

The other important point the study finds that socio-economic condition of the forest village is very low. So, to enhance their socio-economic conditions, community specific targeted and multi pronged livelihood policy has to be implemented by the government and non-government organizations. Through this, forest dwelling communities' participation in conservation will increase and on the other side reduce the extensive extraction on forest resources.

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