

Measurement of Livelihood Assets in Sustainable Forest Governance: A Study in Burdwan Forest Division, West Bengal

Shyamal Dutta and Sanat Kumar Guchhait - Barddhaman, West Bengal

Abstract

Livelihood of people comprises five core types of capitals- human, social, natural, physical and financial capital upon which their way of living are built. Under the framework of sustainable livelihood analysis, the core of the study consists of measuring livelihood assets of communities in and around the forest division with changing forest governance as well as changing economic profile of Burdwan Forest division. The essence of enquiry reveled through specific research questions like how changes in different livelihood assets are measured in spatial scales, how relevant indicators and variables are related to different types of capital for livelihood assets, what is the refection of livelihood assets pentagon, how should livelihood assets be improved in the future in terms of the information we obtained from the livelihood asset pentagon? Present investigation prompts us to the role of location of communities (close to or away from roads) and forest degradation under increasing agriculture in attributing livelihood pentagon. But all these attributes are instinctively guided by social capital where social bond, mutual trust etc. are of fundamental importance in guiding other assets.

Key Words: *sustainable livelihood analysis, livelihood assets, livelihood assets pentagon, forest degradation, social capital*

1. Introduction

Forest are increasingly being recognized as important resources for people's way of living who are in close proximity to forests (Angelsen and Wunder 2003; Yemiru et al. 2010). It is estimated that about 1.6 billion people worldwide are dependent on forests for their livelihoods while some researchers have also suggested that there are approximately 1.2–1.4 billion forest dependent people (Chao 2012; FAO 2014). Scoones (1998) and DFID (1999) defined a livelihood as comprising the capabilities, assets (both material and social resources) and activities required for a means of living. People's livelihoods comprise five core

types of capitals upon which livelihoods are built: human, social, natural, physical and financial capital (Carney 2002; DFID 1999; Scoones 1998). Forests, as a natural capital, play an important role in the livelihood of poor people through provision of food, energy, construction materials, medicine, fodder and agricultural implements (Warner 2000; Adedayo et al. 2010; Tumusiime et al. 2011). In addition, forests serve as a safety net in times of major, unpredictable events and shocks and as a possible route out of poverty through income generating activities (Fisher 2002; Cavendish 2003; Sunderlin et al. 2003; Kamanga et al. 2009; Angelsen et al. 2011).

Considering various assets, strategies, activities and other factors commonly required for living (Chambers and Conway, 1992), the Institute of Development Studies (IDS) and the International Institute for Sustainable Development (IISD) developed the Sustainable Livelihoods Analysis (SLA) approach from the mid- 1980s (DFID, 1999). SLA is defined based on the ability of a social unit to improve its assets under outside impacts (Castaneda, 2000; Stephen et al., 2009). SLA first seeks to identify the important assets (physical, natural, human, financial, and social capital) related to livelihood. Based on SLA, many scholars have studied different topics, such as livelihood diversity in rural development (Ellis, 2000), poverty alleviation (Barrett and Swallow, 2004; Erenstein, 2009), and natural resource management (William, 2003). The majority of the literature on this topic has mainly focused on qualitative analyses of livelihood development addressing specific topics, and few studies have attempted to measure livelihood assets under various study backgrounds at the micro level, as one big challenge is how to measure and quantitatively analyze livelihood assets in particular areas.

Participatory forestry programme is fundamentally a decentralized, grassroots movement for forest resource management. In India, it is popularly known as Joint Forest management (JFM) programme which has been initiated by provincial governments and forest fringe communities to strengthen communities livelihood base and to protect natural forests for further degradation (Das, 2010). JFM is a people-centered, community-oriented, resource-focused and partnership-based management model

(Bond et al., 2006; Chen et al., 2012a,b; Pomeroy, 1995; Robert and Rebecca, 2006). It focuses on the community and emphasizes positive participation and cooperation of different stakeholders in natural resource management and livelihood development (Danida, 2003; Stephen, 2006; Zhu et al., 2011). As a sequel to this programme Arabari experiment of joint forest management (JFM) system in West Bengal (India) has experienced remarkable success during the 1970s', it came to be institutionalized as a supposedly viable programme for forest conservation in the state from 1990 onwards. It is supposed to be tripartite forest management arrangement with coordinated actions between Forest department (FD), forest community and voluntary agencies where the major role is to be played by the first two groups. The lessons from Arabari experience suggest that JFM can be effective and meaningful with the proper involvement of people in forest participation activity, reflection of the interest and claims of the community in the meetings and joint decision, assignment of protection and management responsibilities to the concerned members of FPC, mutual peer monitoring of forest protection activities and other responsibilities, motivation of the members in and outside the FPC etc. However, how to analyze changes in livelihood assets under the impact of JFM is another challenge, as there are two key problems, one of which is temporal, while the other is spatial. Considering the spatial context only and regarding the definition of "participant" in this paper, it indicates all of the households or people who directly participated in the implementation of JFM activities

All of these challenges coalesce into a livelihood asset pentagon. As different study areas and groups are expected to exhibit different livelihood asset pentagons, our starting point is determining how to measure livelihood asset pentagons in selected areas. The core of the study will consist of following a series of questions. How should relevant indicators and variables related to different types of capital in livelihood assets be designed and calculated? How should changes in different livelihood assets be measured at spatial scales? What are the differences of livelihood assets between various scales? What information can the visual livelihood asset pentagon provide for us? How should livelihood assets be improved in the future in terms of the information we obtained from the livelihood asset pentagon?

2. Methodology

Study Area and Sampling

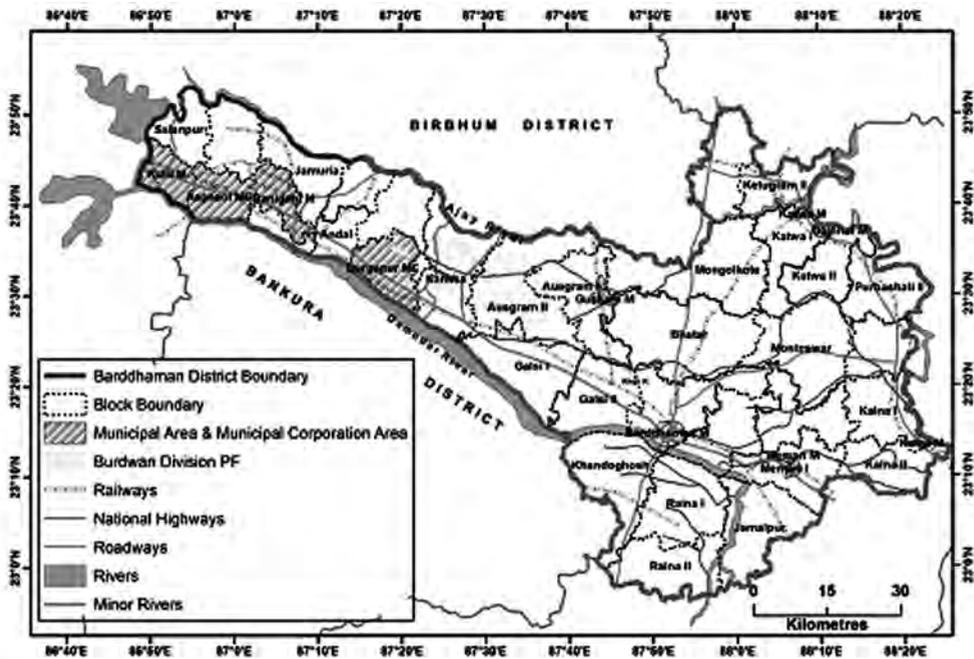
Burdwan Forest Division is located in the Central part of Bardhaman District (undivided) in West Bengal India, covering the blocks of Kanksa, Pandebswar, Aushgram I and II (Census, 2011) There are 3 forest-ranges (Durgapur, Panagarh and Aushgram) and 15 forest beats (which is the smallest unit of forest administration) covering the 277 km² of forest land (3.94% of total district area) and this area remains as forest land in whole district concern (SFR-2014). Since this analysis is mostly based on peoples' intervention and perception of forest resources, most of the data used in this analysis have been collected by using constructed questionnaires for doing the primary field survey in the respective villages under study. Apart from this, field interview with forest Dept staff, villagers and beat level

functionaries have also been carried on to elicit information pertaining to the state of forest extraction. Secondary data have been collected from District Forest Report.

The study is conducted by considering the case of two forest ranges in Burdwan Forest Division. These are Durgapur and Panagar Forest Range. Three villages having Forest Protection Committees (FPCs') form three different forest beat have been chosen for the purpose of this study. These are Dhoabaru from Kanksa forest beat under Panagar range, Hariki from Molandighi forest beat and Telipara from Basudah Forest beat has been selected in this case. From each such village above 10% of the households has been selected by purposive random sampling in accordance to the social status of tribe as well as from non-tribe categories.

Hypothesis and Indicators of Assessment

Based on the objectives of investigation and questionnaire, a research hypothesis can be built up that livelihood assets (physical, natural, human, financial, and social capitals) of people within the forest area and surrounding area are likely to vary over space due to different forest-people interaction conditioned by forest administration and participation of the people in Joint Forest Management. A system of indicators and variables was constructed for Community Based Management and different types of livelihood asset capital (Carney, 2002; Chambers and Conway, 1992; Christopher, 2008). The main reason for the selection of these indicators for each type of capital is associated with the reality of livelihood conditions and the characteristics of Community Based Co-Management performance in selected areas.



Location of Forest Protection Committees (FPCs) under Panagarh and Durgapur Forest Range

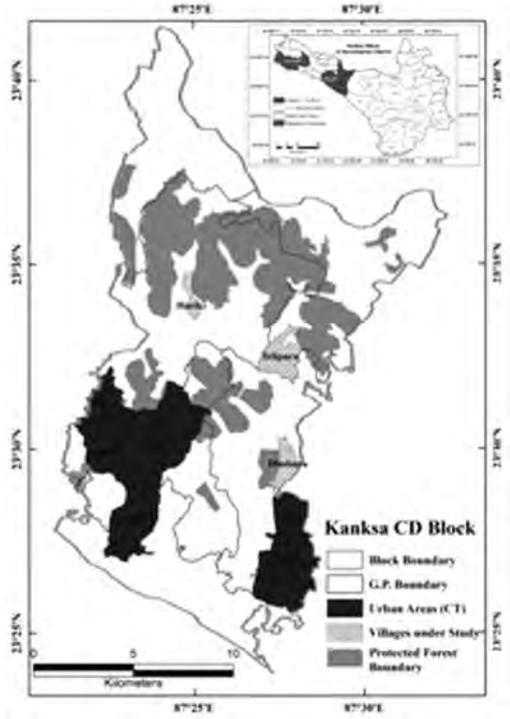
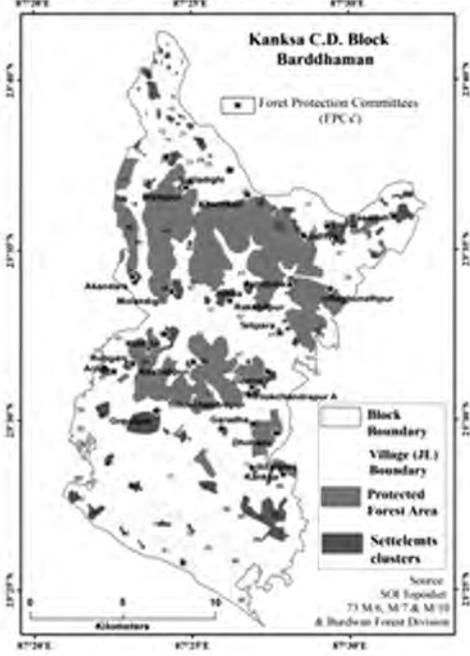


Fig 1: Location of the Study Area in Bardhaman District (undivided)

Table 1: Score Value of Different Component of Each Capital Evaluation

A	Physical Capital	Score
A1	Access to Market	
	0 to 1000m	1.00
	>1000m to <=2000m.	0.75
	>2000m to <=3000m	0.50
	>3000m	0.25
A2	Access to Metalled road	
	0 to 500m.	1.00
	>500m to <=1000m	0.66
	>1000m	0.33
A3	Status of Fuel wood Availability	
	yes	1.00
	no	0.00
B	Natural Capital	Score
B1	Forest Density in Village	
	0-25%	0.25
	25.1-50%	0.5
	50.1-75%	0.75
	>75%	1
B2	Density of Agricultural Land	
	0-25%	0.25
	25.1-50%	0.5
	50.1-75%	0.75
	>75%	1
B3	Number of Livestocks	
	<=5	0.25
	>5 to <=10	0.5
	>10 to <=20	0.75
	>20	1
B4	Nature of Forest degradation(Perception)	
	not at all	0
	Mild degradation	0.5
	Severe degradation	1

C	Human Capital	Score
C1	HH Work Participation (%)	
	0 to 20%	0.25
	20.1 to 50%	0.5
	50.1-75%	0.75
	>75%	1
C2	Family Size	
	0 to 4	0.33
	5 to 6	0.66
	> 6	0.99
C3	Health status	
Toilet	Natural Site	0.33
	Kutchu/Semi Pucca	0.66
	Pucca	1
Source of Water	Internal	1
	External	0
House type	Kutchu	0.33
	Pucca	0.66
	Semi Pucca	1
D	Financial Capital	Score
D1	Saving Account	
	Yes	1
	No	0
D2	Loan (any Type)	
	Yes	1
	No	0
D3	Insurance (any type)	
	Yes	1
	No	0
D4	Household Asset Records	
Electrical	Yes	1
Conveyance	No	0
Ornaments		
D5	Total Family Income (Rs.)	
	0 to 40000	0.25
	40001 to 80000	0.5
	80001 to 120000	0.75
	>120000	1

E	SOCIAL CAPITAL	Score
Mutual Trust (MT)	Yes/No	1/0
Cooperation (CO)	Yes/No	1/0
Voluntary Contribution (Vco)	Yes/No	1/0
Conflict (Ncon)	Yes/No	1/0
Animosity (NoA)	Yes/No	1/0
Free Riding (NoFR)	Yes/No	1/0
Social Ostracisation (NoSO)	Yes/No	1/0
Individualism (NoI)	Yes/No	1/0

Measuring Index Value

To develop a particular livelihood pentagon in our study area, we need to address relevant data using special methods. It is necessary to note that all of the methods used in the process of livelihood pentagon design is based on the reality of the study area and data characteristics. It may not be possible to use some methods directly in other places, but these methods will be matched with other regional features after relevant adjustment.

Five types of livelihood asset capital and relevant indicators have been designed and presented in Table 1. Therefore, various scaling and indexing methods is adopted to make them comparable and to allow meaningful interpretation. Most of the indicators will be determined using rating scale methods in terms of different Weightage with three critical values of 0.33,

0.66 and 1 interpreted as Poor, Average and good, respectively. On other case four critical values 0.25, 0.50, 0.75 and 1 is taken into consideration reflecting Poor, Average, Good and Very Good respectively (Muangkaew and Shivakoti, 2005). The weighting methods are mainly plotted in fifth ways, all of which are based on the design features of the questionnaire and available data.

Procedure for calculating the above consideration is furnished below:

The first involves questions in the form of including three answer choices: Good, Average, and Poor.

$$I = \text{Good}\% \times 1 + \text{Average}\% \times 0.66 + \text{Poor}\% \times 0.33$$

The second involves questions in the form of including four answer choices: Good, Average, and Poor.

$$I = \text{Very Good}\% \times 1 + \text{Good}\% \times 0.75 + \text{Average}\% \times 0.66 + \text{Poor}\% \times 0.33$$

The third addresses questions in the form of perception including two choices: Yes and No.

$$I = \text{Yes}\% \times 1 + \text{No}\% \times 0$$

The fourth and fifth is related to database in the form of between some ranges (e.g, forest density, density of agricultural land, access to market and metalled road) as well as score based on quality of availability (e.g., health status facility and forest degradation status)

After weight calculation, we will calculate the value of each type of capital (C). The integrated measurement equation will be developed as follows:

$$C = \sum_{n=0}^n \left(\frac{I_n}{T_n} \right)$$

Where C is the criteria score for each asset or capital ($0 \leq C \leq 1$), n denotes nth indicator of criteria ($n = 1, 2, 3, \dots, n$); I denotes indicator; T denotes the total number of indicators.

3. Results and Discussions

From the analysis, it is clear that livelihood assets changed significantly from one village to another. Hariki has the maximum index value of 0.67 comparing to other two villages. However, the changes in different types of capital are associated with different results and features.

Table 2: Different Livelihood Capital Index Values in Three villages

Assets/Capital	Village: Telipara	Village: Dhobaru	Village: Hariki
Human Capital Index	0.53	0.5	0.55
Natural Capital Index	0.63	0.63	0.62
Financial Capital Index	0.39	0.33	0.43
Physical Capital Index	0.72	0.82	0.80
Social Capital Index	0.68	0.13	0.98
Total Capital Value	2.95	2.41	3.38
Livelihood Index Value	0.59	0.482	0.676

With respect to physical capital, in addition to the two common indicators access to market and access to metalled road for connectivity in term of distance form households, one more indicator i.e., household energy structure is considered. Firewood is the main energy source in the selected area, and all of the firewood comes from local forest areas. Here the intension is to know the perception how firewood availability has changed during last 10-15 years. Physical capital value in ranging between 0.72-0.82 which is always in 'Good' condition (i.e., > 0.66). So in all villages this capital does not play so much significant role in controlling overall livelihood status.

For natural capital, theoretically designed indicators such as forest density for timber storage as well as NTFP dependency are taken. Here forest density and density of Agricultural area to total village area is considered. Livestock records and the perception of forest degradation (e.g., not at all, mild and severe degradation) are also valid factors. So, empirically selected indicators of natural capital based on the perception of local community residents come into consideration. Natural capital value in three villages is always near about 0.60, which shows that there is an 'Average' (i.e., > 0.50) base of natural capital in study area.

Regarding human capital, in addition to the common indicator work participation in household level and size of family, “health status” is taken important indicator for participation and livelihood development. This last variable has been assessed on the basis of trio i.e., toilet facility, Source of drinking water and housing condition. It has been assumed that health status of household has been increased with better (e.g., Pucca) toilet, internal water source and pucca housing condition and vice versa.

For financial capital, two core indicators are income and expenditure. The main sources of local household income are farming, wage labour, working outside, and non-timber forest products. Therefore, sum of these entire income source have been employed to assess the total household income. Total household income annually has been quantified but due to paucity of direct expenditure records household assets has been recorded. In this context availability of electrical, non-electrical conveyance and ornament records has been evaluated. Although in some publications, indicators such as “household bank deposits” are used, here it is difficult for us to collect these relevant data in the study area. So indirect measure is taken considering perception of availability of bank account, insurance and loan. Another indicator, “household expenditure”, includes two main variables: “living expenditures” and “production expenditures”. Human capital value also depict average value (>0.50) in all villages. Financial capital value in each village below 0.50 belong to the “Average” category As we all know, financial capital is a key aspect of livelihood assets, and it also directly reflects livelihood development and changes.

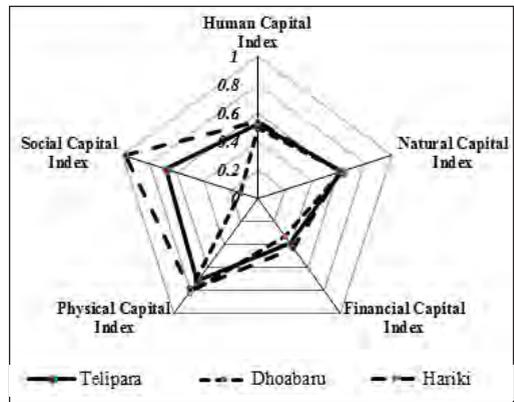


Fig 2: Different Livelihood Capital Index Values in Three villages

With respect to social capital, to study the social relationships of local community residents under the participation in Joint Forest Management, the most important indicators mutual trust, cooperation, voluntary contribution, conflict, social ostraciation, animosity free riding, individualism among the group members. Most diversified features in livelihood pentagon are shown in Social capital. There is a wide range found in the index value that is from 0.13 (poor condition) to 0.98 (optimum condition). At the same time, except the four indicators, social capital show remarkable influence, especially for the indicators based on the mutual trust, social cohesion, cooperation social ostraciation, voluntary contribution to Joint Forest management by the members of Forest Protection Committees (FPC’s).

Issue of Social Capital

Regarding the management of localized natural resources in the context of developing economies in recent years, it is argued that local level institutions have been more

successful than others in managing localized natural resources because of existence of higher level of social capital in the society (Mukherjee, 2002; D'Silva and Pai, 2003; Chopra, 2002; Jayal, 2001). Social capital is the network that helps create linkages that in turn forge rules, conventions and norms governing the development process at different levels in all societies. It is the network of relationships between the agents within an economy. The greater is the stock of social capital, the more developed is the network (Barr, 2000). By facilitating coordinated actions, the features of social organization like trust, norms and networks can improve the efficiency of society by making institutions more democratic and efficient (Putnam et al, 1993; Woolcock, 1998). Empirical evidences are indicative of the fact that social capital formation at the local decentralized level is crucial for natural resource management and protection and social capital is best conceptualized as an input into the process by which institutions for development are created. (Chopra 2002). An evolving and increasing stock of social capital is a necessary input into a sustained process of development. Social capital constitutes an input into development that needs to be accumulated and strengthened over time. Local decentralized natural resource management programmes are often rooted in livelihoods and intended to strengthen the livelihood base to provide improved level of well-being and enable people realizing their expectations with respect to the quality of life to make development more comprehensive and more sustainable. The higher is the possibility of sustaining development institutions, when there is active involvement from local

communities for organizing themselves based on their knowledge and experience in planning and implementation of their natural resource management programmes (Mukherjee, 2002).

Extent of peoples' participation in participatory forest management is also supposed to be influenced by the level of peoples' involvement, dedication and coordination in forest protection activities. This is again often shaped by the level of social capital. Social Capital refers to the norms and networks that enable collective action. It encompasses institutions, relationships, and customs that shape the quality and quantity of a society's social interactions. The nurturing and continuity of a social capital building process, impacted positively, can improve forest participation and sustainability by building the community's capacity to work together to address their common needs, fostering better trust, cooperation and voluntary contribution of labour, while engendering mutually sympathetic outlook among the participants by avoiding conflicts, free riding and proclivity to act individualistically. In order to apply the concept of social capital at a practical and operational level, it can be factored out by considering components like community cohesion, evinced in the degree of mutual trust, cooperation, perceived absence of conflict and animosity, participation in voluntary contribution etc. These are likely to intensify peoples' participation towards joint action and coordinated efforts. However this is supposed to be most effective in the event of adequate institutionalized effort towards social mobilization and group formation within

the community. The current micro-planning processes offer insufficient attention towards such necessity. In the study region it has been observed that there is great absence of institutional effort in social capital building process. It is constrained due to limited staff, lack of adequate degree of motivational and institutional training and limited financial resources. Mere positive attitude of villagers pertaining to the existence of mutual trust and understanding may not be sufficient to ensure a strong correlative status with participation efforts conducive to forest conservation. It is most important that through joint forest management institution partnered with community support organizations, these village people are roped in a continuous social capital building process. This may be in the form of organizing frequent village meeting, door to door counseling by FD staff, dissemination of forest conservation related information through various medium and allowing all people to ventilate their views, suggestions and thus enabling interclass communion. This should also be made robust by ensuring systematic mutual monitoring

of participatory efforts susceptible to adequate provision of penal measures in cases of defection. In the villages across the study region it has been observed that a good degree of peoples' responses supportive of the existence of social bond of friendship, trust, amity etc. But in most of these villages, that has not been initiated any coherent programmes for bringing the people under social capital building process by imparting them awareness, training and motivation necessary for ensuring strong participatory efforts oriented towards conservation. Further community capacity in forest conservation programmes have often been weak, due to their high level of illiteracy, poverty and mutual support and trust that often leads to connivance of forest degradation activity undertaken by members of FPC themselves. In this context table 3 reveals village-wise percentage responses of interviewed villagers regarding their perception about the existence of different components of social capital like Mutual Trust, Cooperation, Voluntary Contribution, No Conflict, No Animosity, No Free Riding, No Social Ostracisation, And No Individualism.

Table 3: Village wise percentages of responses about perceived Social Capital components

Name of the Village	Social Capital Components							
	MT	CO	VC	No COF	No ANI	No FRR	No SO	No IN
Telipara	100	97.3	100	100	97.3	45.95	94.59	97.3
Hariki	100	100	100	100	100	75	100	100
Dhoabaru	97.14	97.14	80.00	88.57	68.57	80.00	88.57	71.43

[Mutual Trust-MT, Cooperation-CO, Voluntary Contribution-VC, No Conflict-No COF, No Animosity-No ANI, No Free Riding- No FRR, No Social Ostracisation-No SO, No Individualism-No IN]

Source: Field Survey and Author's Calculation 2015

Table 4: Village wise Indices of Social Capital

Name of the Village	Social Capital Individual Index Values								Sum	Social Capital Index
	MT	CO	VC	No COF	No ANI	No FRR	No SO	No IN		
Telipara	1	0.06	1	1	0.91	0	0.53	0.9	5.4	0.68
Hariki	1	1	1	1	1	0.85	1	1	7.85	0.98
Dhobaru	0	0	0	0	0	1	0	0	1	0.13

Source: Field Survey and Author's Calculation 2015

In this context the table 4 reflects the individual index values of each of the components of social capital viz. MT, CO, VC, no COF, no ANI, etc. Further each of the component index values for each respective village in the considered beats have been summed up and divided by the number of such components to result in the corresponding social capital index. In order to derive each component index, it is desirable to express the respective percentage responses for any village j in terms of attainment of that village. This attainment aspect is reflective of how well social capital has been developed. in village j relative to others.

We now express social capital index S_j in terms of attainment level X_{ij}

This is done by using the formula:

$$S_j = 1/8 \times \sum S_{ij}$$

Where, $S_{ij} = (X_{ij} - \text{Min } X_{ik}) / (\text{Max } X_{ik} - \text{Min } X_{ik})$ is the i th component's contribution to social capital index for village j.

If we define social capital index in this form for village j is defined, it will turn out to be invariant to positive affine transformation of underlying variables X_i ($i = 1, 2, 3, 4, 5, 6, 7, 8$). Therefore if one substitutes for each $i = 1, 2, 3, 4, 5, 6, 7, 8$, $Y_i = a X_i + b_i$ where

$a > 0$, the absolute value of each S_{ij} and hence S_i would remain in unaltered state.

The social capital indices (SI) may broadly be divided into three segments high value index, moderate value index and comparatively low value indices relative to the extant forest resources. For example, Hariki in Molandighi beat have high level of SI despite the fact that village have no forest cover in its administrative boundary but depend on the forest of Bistupur adjacent to their homesteads. Villagers here are very poor and they maintain all sorts of amity amongst themselves. Economic condition for all are more or less similar and strong bond of trust and mutual sympathy among the villagers drive them to neglect mutual illegal felling and consequent thinning of the forest. In Telipara, the computed indices are found moderate. Amount of forest land in these regions is rather high while number of households comparatively low. Pressure on forest depletion is therefore not much perceptively felt. So people here do not feel much of heterogeneity, animosity, conflict of interest and free riding tendency amongst the FPC members and abstain from showing individualistic behavior towards fellow forest dwellers. In Dhobaru village, SI is observed to be rather low. This is possibly

due to scant amount of forest resources around these villages relative to number of households dwelling here. The negative externality effect of harvesting forest resources by some households on other groups exacerbates lack of trust, conflict of interest and attitude, free-riding behaviour and lack of cooperation amongst the village dwellers here.

4. Conclusion

The results of the study will consist of following a series of outcomes. Different indicators and variable-based analysis regarding different types of capital in livelihood assets significantly explored the differences in various scales which provide us the major lacuna in the issues of social capital formation. Being a laterite tract interspersed with old alluvium along the valley sides of rivers and streams the area is characterized by low amount of agricultural production with rich indigenous forest coverage. The intrinsic value of forest and some forest resources has engraved in the minds of the people living close to the forest, especially the tribal group, but the forest people including non-tribal group are unable to avail the extrinsic value of forest and forest resources. Under such a backdrop joint Forest Management (JFM) has been implemented from 1990s in search of tripartite forest management with coordinated action between forest department, forest community and voluntary agencies. The design is not only similar throughout the state but also in India. But the irony of fate is that, spatial design of success of varies from one forest beat to another due to variation of inhabitants and differences of planning implementation of

forest department and also variable nature of involvement of forest communities. More specifically, intra-village variation is more strategic reflected through the present query due to variation in social capital building processes like mutual trust, co-operation, voluntary contribution and social ostraciation etc. All these variations cannot be ruled out only with the functional perspective and management. Social structure, belief and to some extent changing livelihood are the basic factors for the variation in the success of JFM at inter-village level. So, unless and until social lacuna is removed by appropriate bond between forest department and forest community the desirable success will be a far cry. Sustainable JFM will thus be an illusion in relation to sustainable use of forest resources and community development. Therefore the social capital building by mutual trust, co-operation, social ostracisation, voluntary contribution etc., if accords positively lead to the sustainable Joint Forest Management.

References

- Adedayo AG, Oyun MB, Kadeba O (2010) Access of rural women to forest resources and its impact on rural household welfare in North Central Nigeria. For Policy Econ 12(6):439–450. doi:10.1016/j.forpol.2010.04.001
- Angelsen A, Wunder S (2003) Exploring the poverty-forest link: key concepts, issues and research implications. CIFOR Occasional Paper No. 40
- Angelsen A, Larsen HO, Lund JF, Smith-Hall C, Wunder S (eds)(2011) Measuring livelihoods and environmental dependence. Methods for research and fieldwork. Earthscan, London

- Bond, A., Davis, C.N., Nott, K., Stuart, G., 2006. Community Based Natural Resource Management Manual. WWF-World Wide Fund, pp. 24–52.
- Barr, A., 2000. Social capital and technical information flows in the Ghanaian manufacturing sector. *Oxford Economic Papers*, 52(3), pp.539-559.
- Barrett, C.B., Swallow, B.M., 2004. Dynamic poverty traps and rural livelihoods. In: Ellis, F., Freeman, A. (Eds.), *Rural Livelihoods and Poverty Reduction Policies*. Routledge, London, pp. 103–165.
- Carney D (2002) Sustainable livelihood approaches: progress and possibilities for change. DFID, London
- Cavendish W (2003). How do forests Support, insure and improve livelihoods of the rural poor? A research note. CIFOR
- Castaneda, F., 2000. Criteria and indicators for sustainable forest management: international processes, current status and the way ahead. *Unasylva* 203, 34–40.
- Chao S (2012) Forest people's: numbers across the world. Forests People Program
- Chambers, R., Conway, G.R., 1992. Sustainable Rural Livelihoods: Practical Concepts for the 21st Century. IDS Discussion Paper No. 296. IDS, Brighton, pp. 5–21.
- Chen, H.Y., Shivakoti, G.P., Zhu, T., Maddox, D., 2012a. Livelihood sustainability and community based co-management of forest resources in China: Changes and improvement. *Environmental Management* 49, 219–228.
- Chen, H.Y., Zhu, T., Krott, M., Maddox, D., 2012b. Community forestry management and livelihood development: integration of governance, project design and community participation. *Regional Environmental Change*, <http://dx.doi.org/10.1007/s10113-012-0316-3>
- Chopra, K., 2002. Social capital and development processes: Role of formal and informal institutions. *Economic and Political Weekly*, pp.2911-2916.
- Das, N., 2010. Incidence of forest income on reduction of inequality: Evidence from forest dependent households in milieu of joint forest management. *Ecological Economics*, 69(8), pp.1617-1625
- D'Silva, E. and Pai, S., 2003. Social capital and collective action: Development outcomes in forest protection and watershed development. *Economic and political weekly*, pp.1404-1415.
- Danida, 2006. Monitoring and Indicators in the Sector of Environment and Natural Resource Management. Technical Note. Ministry of Foreign Affairs, pp. 7–28.
- DFID, 1999. Sustainable Livelihoods Guidance Sheets, No. 1–8. Department for International Development, London, UK, pp. 1–8.
- District Census Handbook (2011), Barddhaman District, West Bengal, Govt. of India
- Ellis, F., 2000. *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press, Oxford, pp. 135–176.
- Erenstein, O., 2009. Livelihood assets as a multidimensional inverse proxy for poverty: a district level analysis of the Indian Indo-Gangetic Plains. Working Paper. New Delhi, India.
- FAO (2014) State of the world's forests: enhancing the socioeconomic benefits from forests. Food and Agriculture Organization of the United Nations
- Fisher MG (2002) Explaining forest degradation in Malawi: asset poverty, income Shocks and activity Choice. PhD Thesis. Purdue University
- Jayal, N.G., 2001. Democracy and social capital in central Himalaya: Tale of two

- villages. *Economic and Political Weekly*, pp.655-664.
- Kamanga P, Vedeld P, Sjaastad E (2009) Forest incomes and rural livelihoods in Chiradzulu District, Malawi. *Ecol Econ* 68:613–624
- Muangkaew, T., Shivakoti, G.P., 2005. Effect of livelihood assets on rice productivity: case study of rice-based farming in Southern Thailand. *ISSAAS Journal* 11, 63–83.
- Mukherjee, N., 2002. Measuring social capital: Forest protection committees in West Bengal. *Economic and Political Weekly*, pp.2994-2997.
- Pomeroy, R.S., 1995. Community-based and co-management institutions for Sustainable coastal fisheries management in Southeast Asia. *Ocean and Coastal Management* 127, 143–162.
- Putnam, R.D., Leonardi, R. and Nanetti, R.Y., 1994. *Making democracy work: Civic traditions in modern Italy*. Princeton university press.
- Robert, S.P., Rebecca, R.G., 2006. *Fishery Co-management: A Practical Handbook*. International Development Research Centre, Ottawa, Canada, pp. 8–22.
- Stephen, T., 2006. *Communities, Livelihoods, and Natural Resources: Action Research and Policy Change in Asia*. International Development Research Centre, Ottawa, Canada, pp. 38–55.
- Stephen, M., Nora, M., Moses, A., 2009. *Sustainable Livelihood Approach: A critical analysis of theory and practice*. Geographical Paper No. 189. University of Reading, UK, pp. 4–23.
- Scoones I (1998) *Sustainable rural livelihoods: a framework for analysis*. IDS Working Paper 72
- State Forest Report (2014) West Bengal, Directorate of Forest, Govt. of West Bengal, Kolkata
- Sunderlin WD, Angelsen A, Wunder S (2003) *Forests and poverty alleviation. State of the world's forests*. FAO, Rome, pp 61–73
- Tumusiime DM, Vedeld P, Gombya-Ssembajjwe W (2011) Breaking the law? Illegal livelihoods from a protected area in Uganda. *For Policy Econ* 13(4):273–283. <http://linkinghub.elsevier.com/retrieve/pii/S1389934111000049> [Accessed June 30, 2011]
- Woolcock, M., 1998. Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and society*, 27(2), pp.151-208.
- William, S., 2003. *Sustainable Livelihoods: A Case Study of the Evolution of DFID Policy*. Overseas Development Institute, London, pp. 7–16.
- Warner K (2000) *Forestry and sustainable livelihoods: What part can forests and forestry play in reducing poverty?* *Unasyilva*, 202, 51:3–12
- Yemiru T, Roos A, Campbell BM, Bohlin F (2010) *Forest incomes and poverty alleviation under participatory forest management in the Bale Highlands, Southern Ethiopia*. *Int For Rev* 12(1):6677
- Zhu, T., Chen, H.Y., Shivakoti, G.P., Cochard, R., Homcha-aim, K., 2011. Revisit to community forest in northeast of Thailand: changes in status and utilization. *Environment, Development and Sustainability* 13, 385–402.

Shyamal Dutta
Research Scholar,

Prof. Sanat Kumar Guchhait
Professor,
Post graduate Department of Geography,
The University of Burdwan,
Barddhaman (W.B.)