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Social Sustainability of Natural Resource Management Activities: A Research in Dry Zone of West Bengal

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ABSTRACT Watershed-based development and management of natural resources has been the strategy for growth and sustainability of agriculture in arid, semi-arid and dry regions in India. Large public investments have made for the purpose in the last 40 years with little tangible results. In view of the importance of natural resources management programs for development of dry regions in India, a research was undertaken to assess the social sustainability of project. Indicators were constructed to assess the social sustainability in treated watershed TSJ/7 located in Bankura district of west Bengal. Majority of the farmers (69.15 percent) showed medium level of participation. Non-participation was higher in monitoring evaluation and post project maintenance phase. Farmers from a medium socio-economic status showed a slightly better involvement in decision-making (index score 61.64) than lower socio-economic category farmers (index score 56.98). Overall, the project was able to achieve a medium level of social sustainability (index score 49.17).

INTRODUCTION

For several decades, integrated and sustainable management of natural resources on watershed basis has been suggested and tried in several countries in the world, as an effective way to address complex water and land resource degradation challenges.Various studies undertaken in India as well as in other countries of the world indicate that effective and sustainable natural resources management can take place through participation of local community from the beginning, ownership of communal lands into private or association holdings, changing the livelihood of the community within the short-run by generating income from on-farm and off-farm activities, establishing community-based management institutions, especially by involving disadvantaged sections of society and giving legislative support for it (Farrington et al. 1999; Rao 2000; Kerr et al. 2002; Sreedevi et al. 2004; Joshi et al. 2005; Ramachandran et al. 2007).Natural resources (land, water, biodiversity and genetic resources, biomass resources, forests, livestock and fisheries), the very foundation of human survival, progress and prosperity, have been degrading fast, and the unprecedented pace of their erosion is one of the root causes of the agrarian crisis that India is facing (Planning Commission 2007). About fifty-one percent of India's geographical area (329 million ha) is categorized as degraded, most of which occurs in rain-fed agroecosystems. About seventy percent of the population is dependent on agriculture, and two-thirds of the cropped area is dependent on rainfall without any protective irrigation (Wani et al. 2001). On other hand, India accounts for only about 2.4 percent of the world's geographical area, four percent of its water resources and 1.5 percent of forest and pasture land, but has to support about seventeen percent of the world's human population and fifteen percent of the livestock (Reddy et al. 2014). Taking into consideration the declining trend of natural resources, especially after the green revolution and for development of degraded land, the government adopted amelioration measures. The Integrated Wastelands Development Programme (IWDP) launched in 1989 for development of wastelands, brought under the guidelines for Watershed Development with Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP) from 1995. The integrated management of natural resources on watershed-basis has emerged as a logical and the most effective holistic approach for sustainable production and overall development (Wani et al. 2003). Sustainability is broad multifocal agenda. Social sustainability, one of the three pillars of sustainability, can be defined in a variety of ways and

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as indicators: equity of access to key services, equity between generations (that is, future generations will not be disadvantaged by the activities of the current generation), widespread participation of citizens in areas of decision-making activity, particularly at alocal level, a sense of community responsibility, mechanisms for a community to collectively identify its strengths and needs and mechanisms for a community to fulfill its own needs where possiblethrough community actions, are studied (McKenzie 2004).

Natural Resource Management Programs were initiated in India over 40 years ago. Some of those early projects showed visible and astonishing success with increased livelihoods and incomes along with reduction of drudgery. Therefore, such programs gained popularity and soon became livelihood programs actively encouraged by government. Studies on these programs identified several issues that contributed to sustainability and success of the activities undertaken in these and their impact on livelihood of participating farmers. The soil and water conservation activities in the fields provided additional job opportunities to the small and marginal farmers. Introduction of afforestation has become an important source of income, especially for marginal and small farmers, and it provides at least 24 man-day's employment in a year (Pathak et al. 2013). The eleventh Plan Mid Term Appraisal (MTA) by the Planning Commission indicated beneficial effects of this type of program like a reversing trend of declining natural resources and employment generation, but also revealed the astonishing picture of failure of such programs in many areas of the country. It emphasized on urgent need for special allocation for institution building at grassroots level and a radically new approach to social mobilization that has been absent in most watershed projects so far (Planning Commission 2011). Local assessments and national indicators suggest that Indian natural resource management programs also lacked sustainability and equity. Many projects had no strategy for maintaining assets after project support ended.The only benefit that many farmers derived from watershed projects was the possibility of short-term paid work. Communities saw few long-term benefits from projects, so had little interest in operating and maintaining project assets (Sharma et al. 2011). In a review (Joshi et al. 2000; Kerr et al. 2000) on the watershed projects in India, it was observed that most watershed projects did not address the equity issues of benefits, community participation, scaling up approaches, monitoring and evaluation. A study in the arid tracts of Rajasthan revealed that there was lack of equity in the benefits to small holders and landless, lack of sustainability in the management of projects after cessation of the project, lack of knowledge and community participation in watershed projects, lack of scaling up methods and models and lack of holistic approaches in the technical support to most conservation and management activities by non-government organizations (Wani et al. 2002). In 1983, FAO issued a conservation guide on community participation in upland management. Some of the aspects mentioned in that guide are still relevant today: (1) natural resource management cannot be successful and sustainable without the support and participation of natural resource users; (2) participants should have decision-making capacity and responsibility; and (3) the promotion of participation in watershed management is a long and time-consuming process and it should address the specific needs of the vulnerable sections by setting up appropriate institutions at the local level.

To encounter these problems, which negatively affect the sustainability and livelihood issues, the central and state governments had revised the guidelines and structure of the program several times. In West Bengal from 2003, IWDP has been implemented following the guidelines of Hariyali in Burdwan, Birbhum, Bankura and Paschim Medinapur district. On the line of these findings to find out the real picture of sustainability of the project, especially social sustainability, this research was conducted in Bankura district of West Bengal with following objectives.

Objectives

1. To study the socio-economic characteristics of the beneficiary farmers of Integrated Wastelands Development Programme.
2. To assess the level of social sustainability of natural resource management activities taken under the Integrated Wastelands Development Programme.

MATERIAL AND METHODS

The research was conducted in Bankura district of West Bengal, which was purposively selected, as it is the second most drought affected district of the state where agriculture is

the main occupation with fairly good production and productivity but facing a decreasing trend and also severely affected by soil erosion and water scarcity during summer season (Mishra 2012). The Taldangra block was randomly selected from four IWDP project-implementing blocks in which Project VI of IWDP (watershed TSJ/7) was under implementation. A total of 107 respondents were sleeted from project VI of IWDP on a random basis as the beneficiaries of the project. A sustainability index wasdeveloped to get a standard score of level of social sustainability. 'Students t test' was used to confirm the correlation between the socio-economic status and the social sustainability score of different category of beneficiary farmers.

RESULTS AND DISCUSSION

Socio-economic Status

The socio-economic status was measured by assessing the following thirteen areas using a scale, which was developed by Singh and Vinay (2012):

1. Type of house
2. Family possessions/material possessions
3. Possession of agriculture land for cultivation
4. Farm implementation
5. Livestock/animal
6. Possession vehicle or conveyance facility
7. Education of head of the family
8. Occupation of head of the family
9. Monthly farm income from all sources
10. Drinking water facility
11. Sanitation facility
12. Social participation of family members
13. Type of newspaper/magazine they purchase

Majority of the farmers (69.15%) belonged to the lower socio-economic status category whereas rest 38.4 percent belonged to the middle socio-economic status category with no one in the upper socio-economic status category. This is because of the priority given to target economically disadvantaged farmers under the IWDP according to the policy structure, which is why most of the beneficiary farmers were from lower socio-economic status.

Social Sustainability

The concept of social sustainability encompasses topics such as, social equity, livability, health equity, community development, social capital, social support, human rights, labor rights, social responsibility, social justice, cultural competence, community resilience, and human adaptation. In this research, social sustainability was conceptualized as the extent to which the natural resource management activities were socio-culturally acceptable, equitable in making decisions as well as sharing benefits and locally adoptable.Thus, social sustainability of the natural resource management activities were measured by considering three indicators namely, beneficiaries' participation in overall activities of project management, equity for providing benefit and involving vulnerable sections of society and decision-making process about various aspects of natural resource management activities under the Integrated Wastelands Development Programme.

Beneficiaries' Participation

The degree of participation by different stakeholders is a major determinant of success or failure in watershed development programs (Johnson et al. 2001). Beneficiaries' participation was measured by considering their extent of participation in natural resource management under the project on a three-point continuum. Majority of the farmers (69.15%) showed medium level of participation in natural resource management activities under IWDP followed by high (19.63 percent) and low (11.21 percent) level of participation (Table 1). From the findings it can be concluded that though the project was not fully successful in evoking full participation among farmers, it was a quite satisfactory condition where low level of participation was prevailing only among the11.21percent of the beneficiaries.

Table 1: Distribution of respondents on the basis of extent of participation (n=107)

Category	*Frequency*	*Percentage*
Low	12	11.21
Medium	74	69.15
High	21	19.63

Participation in Planning Stage Activities

A bird's eye view into extent of participation in the planning stage from Table 2 reveals that in

Table 2: Distribution of farmers according to their extent of participation at planning stage of project management (n=107)

Activities	*Extent of participation*						*WMS*
	Full participation		*Partial participation*		*Non participation*		
	F	*%*	*F*	*%*	*F*	*%*	
Participation in providing benchmark information	25	23.36	39	36.45	43	40.18	32.68
Participation in deciding treatment in private land	29	27.10	39	36.45	39	36.45	34
Participation in deciding treatment in common land	20	18.69	33	30.84	54	50.46	30.07
Participation in *gramsabha*	25	23.36	78	72.89	4	3.74	38.92
Participation in mobilizing contributions	16	14.95	31	28.97	60	56.07	28.43
Overall participation in planning stage	15	14.01	90	84.11	2	1.86	37.54

the planning stage, a vast majority of the farmers (84.11 percent) only participated partially where as 14.01 percent participated fully and 1.86 never participated. Non-participation was high in mobilizing contribution in which more than half of the farmers (56.07%) never participated followed by participating in deciding treatment in private land in which almost half of farmers (50.46%) never participated. A vast majority of farmers used to participate in *gramsabha* on occasional (72.89%) or regular (23.36%) basis. From the weighted mean score (WMS) it is evident that participation at *gramsabha* was of highest priority to the farmers for proper planning of the project.

Participation in Implementation Stage Activities

In implementation stage also a vast majority of farmers (98.13%) exhibited partial participation as presented in Table 3. In most of the activities in the implementation stage almost forty to sixty percent farmers only participated partially. In case of supervision of activity in private land, full participation of farmers was slightly more (24.29%) than in case of supervision of activities in common land (16.82%). Only 9.34 percent of farmers participated regularly in all *shramdan* activities. From WMS it can be concluded that farmers given highest priority to the supervision of project activities in their own land rather than on community owned land and rest of the activities of implementation stage taken as overall of same importance by farmers.

Participation in Post Implementation Stage Activities

In the post implementation stage, a majority of farmers (60.75%) partially participated followed by 30.84 percent farmers in the non-participation category and 8.41 percent in full participation category as presented in Table 4. It also reveals that a very small portion of farmers participated fully in activities like contribution to take up maintenance work (11.21%), supervision of maintenance work (12.14%) and suggesting about maintenance activities (19.62 %). In

Table 3: Distribution of farmers according to their extent of participation at implementation stage of project management (n=107)

Activities	*Extent of participation*						*WMS*
	Full participation		*Partial participation*		*Non participation*		
	F	*%*	*F*	*%*	*F*	*%*	
Supervision of the activity in private land	26	24.29	64	59.81	17	15.88	37.01
Supervision of the activity in common land and drainage line	18	16.82	45	42.05	44	41.12	31.33
Suggesting availability of main resources	18	16.82	43	40.18	46	42.99	31.01
Development of community assets in common land	12	11.21	65	60.75	30	28.03	32.55
Participation in shramdan	10	9.34	69	64.48	28	26.16	32.53
Overall participation in implementation stage	1	0.93	105	98.13	2	1.86	35.49

Table 4: Distribution of farmers according to their extent of participation at post implementation stage of project management (n=107)

Activities	*Extent of participation*						*WMS*
	Full participation		*Partial participation*		*Non participation*		
	F	*%*	*F*	*%*	*F*	*%*	
Suggesting about maintenance of activities	21	19.62	41	38.32	45	42.05	31.68
Supervision of maintenance work	13	12.14	37	34.58	57	53.27	28.4
Contribution to take up maintenance work	12	11.21	29	27.10	66	61.68	26.79
Overall participation in Post implementation stage	9	8.41	65	60.75	33	30.84	31.56

case of contribution to take up maintenance work, non-participation was high (61.68%). WMS score denotes that farmers were more interested in suggesting about maintenance of project intervention rather than actual supervision or contribution to maintenance work.

Participation in Monitoring and Evaluation Stage Activities

In the monitoring and evaluation stage, a majority (60.75%) of farmers never participated followed by 21.49 percent with medium level of participation and seventeen point seven six percent with high level of participation as presented in Table 5. It also reveals that in all the activities of this stage non-participation was quite high as in case of evaluation of activities 79.44 percent farmers never participated followed by development of participatory indicators (69.16%) and monitoring (68.22%). Farmers were very less interested in participation in all monitoring and evaluation related activities as is evident from the low WMS than the activities of other project management phases.

A possible reason behind low level of participation in both the planning and monitoring evaluation stage may be due to the fact that still in the villages the traditional structure of community has a strong influence in which such jobs regarding intellectual activities is regarded as the prerogative of people of higher socio-economic status and farmers are still ignoring the fact that they need to participate in planning and essentially in monitoring evaluation stage. Though it seems to them that it's not much profitable for them, given the time required but inthe long-term it will dictate the success of effort made by them as well as of IWDP in their status. Rao and Reddy (2010) in their study on systematic evaluation of Integrated Wastelands Development Programme and Drought Prone Area Programme in Andhra Pradesh also reported that the involvement of people in planning the works was not up to the desired extent, in general, in most of the watersheds. The micro plans prepared were stereotypical in nature in most of the watersheds pointing to the absence of involvement of people. In case of post implementation

Table 5: Distribution of farmers according to their extent of participation at monitoring and evaluation stage of project management (n=107)

Stages	*Extent of participation*						*WMS*
	Full participation		*Partial participation*		*Non participation*		
	F	*%*	*F*	*%*	*F*	*%*	
Participation in developing participatory indicators	21	19.62	12	11.21	74	69.16	27.04
Participation in monitoring	20	18.69	14	13.08	73	68.22	27.03
Participation in evaluation of the activities	20	18.69	2	1.87	85	79.44	25.11
Overall participation in monitoring and evaluation stage	19	17.76	23	21.49	65	60.75	28.14

*F denotes frequency ** WMS denotes Weighted Mean Score

stage, the pattern of participation is against the findings of Badal et al. (2006) who reported a higher percent (78 percent) of involvement in post implementation stage activities in watershed development programs in Rajasthan and frequency of visits of extension workers, institutional effectiveness and training more influenced participation rather than education. Patil et al. (2013) in an evaluative study of two watershed development projects in Karnataka reported a greater Participation Paradigm Index value for preparation of strategic action plan (86%) and structure of Watershed Development Treatment (100%) in both watersheds. Level of participation was higher in the Kalvi watershed (87%) compared to Lottinekere watershed (47%). But both watersheds were poor in terms of monitoring activities and management of common property resources. This greater level of participation in Kalvi watershed area was attributed to good rapport of NGO with watershed community and existing groups (SHGs), which was surprisingly poor in government organizations implemented in the Lottinekere watershed. Reddy et al. (2004) opined people's participation in watershed activities was poor except in case of wage earners/subsidy beneficiaries and it is expected based on the provision of direct benefits to farmers. Similarly in this research also lack of participation in monitoring, evaluation and post implementation stage and medium level of participation in all the stages was mainly due to the failure on the part of the government or local administration to make the people aware about the benefits of the program, lack of training, lack of efforts by the government extension agency to make the farmers aware and provide related information, or failure on the part of the people to understand the importance of managing natural resources which will generate more economic returns only in future and thus will create a more sustainable livelihood for them.

Equity

Equity in involving disadvantaged sections of the society by making special arrangements for them to make them active and responsible stakeholders of overall efforts of natural resource management under IWDP was measured by considering the sub-indicators namely, structural arrangement and specific activities.

Structural arrangement was measured in terms of adjustments made by the project to ensure participation of vulnerable sections of society namely, landless, women, schedule caste/schedule tribe and others. Findings revealed that special provisions were made under the project to involve above-mentioned sections. Specific activities were measured in terms of vulnerable sections targeted activities that the project had undertaken to create better livelihood opportunities and in this way empowered them to have a better quality of life. Results regarding specific activities revealed that the groups' targeted activities were undertaken for vulnerable groups and achieved an index score of 100. But these activities were undertaken only for women by involving or encouraging them to form Self Help Groups and thus, cause economic betterment of their lives and also of their families.

Ray (2014) in a study on watershed project in Punjab reported that the participation of the landless, *dalits*, women and left-out landowning families was totally missing in the program. The program only benefited a limited group of direct beneficiary families (27 percent) leaving other families out. The participation of women was reported low by all the categories in the village society despite the fact that more than seventy percent of the women reported a strong desire to participate in the management of natural resources if they are given a chance. 27.5 percent of women showed their inability to participate on account of tradition and custom followed by illiteracy and male domination. Though findings in this research represented quite a satisfactory condition theoretically but informal discussion with beneficiary farmers and watershed development office staff of the district revealed that such arrangements were only made for the women and other vulnerable groups were completely ignored in this regard though in the project guidelines there were specific instructions for involving all disadvantaged sections. Though specific reasons for this type of disarrangement cannot be said unambiguously but lack of political will on behalf of local government bodies was perceived as the foremost barrier in this way by the respondents, along with caste disaggregation, lack of own land particularly prevailing among people of disadvantaged

section and women, lack of proper awareness about the program and illiteracy.

Decision-Making

It was measured in terms of decision-making patterns followed in identification and execution of different project activities and access to information related to natural resource management activities under IWDP by accounting on two sub-indicators namely, decision-making patterns and access to information.

Decision-Making Pattern

It was assessed through an involvement index which was measured from the involvement level of various stakeholders namely, concerned beneficiaries, executive committee, general assembly, village leaders and project staff in decisions related to various activities, selection of beneficiaries.For farmers of lower socio-economic status, the index was 56.98 and for the farmers of medium socioeconomic status, the index was slightly better 61.64 (Table 6). Reasons behind slightly lower index score in decision-making for the farmers of lower socio-economic status may be attributed to their low involvement in IWDP, which was more in case of farmers with medium socio-economic status. However, wide participation in decision-making does not always lead towards more social sustainability because sometimes the program in which communities participate in decision-making may be more susceptible to the 'capture' of the project benefits by elite or influential community members (Mansuri and Rao 2013) as happened in here also.

Access to Information

Majority of the farmers (70.09 percent) had a medium level of access to project related information followed by 23.36 percent with high level of access and six point five four percent with low level of access (Table 6). This was maybe due to lack of approach on the part of the farmers or maybe on the part of the project staff. There was an acute shortage of project staff in the whole program as told by the watershed development authorities of the district office.A view from another angle into extent of access to project related information according to the socio-economic status of farmers as presented in Table 6 revealed that in case of medium socio-economic category farmers, average access index score was 70.83 whereas for the farmers of lower socio-economic status, it was 42.06. Farmers of better socio-economic status were more educated and media participation of them were also higher as compared to farmers from lower socio-economic status which eventually led them toward more awareness and more access to project related information. As well as this can be attributed to better representation of farmers of higher socio-economic status in various project related institutions (like watershed committee and user group, and to the failure of government or local bodies to make people active stakeholders of the overall activities who were from disadvantaged sections.

Variation of Social Sustainability with Socio-economic Status of the Farmers

In case of farmers of lower socio-economic status, social sustainability index (44.81) was lower than those of who were having medium socio-economic status (social sustainability index 59.93). Correlation analysis shows that social sustainability and socio-economic status of people yield a correlation coefficient of 0.52, which indicates a medium level of positive relationship between above-mentioned variables which was confirmed by t-test. Result was significant at one percent level of significance.

Table 6: Index score for involvement in decision making, access to information and overall social sustainability of various categories of farmers

Category of farmers according to socio- economic status	*Percentage representation in overall population*	*Involvement in decision making index*	*Average access to information index*	*Average social sustainability index*
Lower	30.84	56.98	42.06	44.81
Medium	69.15	61.64	70.83	59.93
Overall social sustainability index of NRM activities under IWDP			49.17	

The overall social sustainability of natural resource management activities under IWDP was calculated as 49.17 which leads to the conclusion that the project or activities taken under the project were able to achieve a medium level of social sustainability (Table 7). Ray (2014) also indicated that social sustainability was higher in villages characterized by both, caste homogeneity and economic equity. The commitment, dedication and participatory approach of the project staff were identified as one of the important variables and also one of the necessary conditions for generating people's participation and social sustainability.

Table 7: Distribution of respondents according to their access to required project information

Category	*Frequency*	*Percentage*
Lower	7	6.54
Medium	75	70.09
Higher	25	23.36

CONCLUSION

The findings of the present research clearly indicated that overall social sustainability of the project activities were medium and from the perspectives of vulnerable and disadvantaged sections of the society it was quite lower comparatively. Lower participation of beneficiaries in planning, post implementation and monitoring and evaluation stages activities and deficient access to information led to this scenario. Inadequate policy and institutional structure of these projects also further stimulated the already existed socio-economic inequity and thus affected the social sustainability. At a time when all natural resource management programs are gradually being replaced by a more optimistic, promising Integrated Watershed Management Programme throughout the nation, the findings of this study is meant to throw some light on the pattern of farmers participation, decision-making pattern, access to information and how these are influenced by their socio-economic status and thus, hope to provide a useful insight to the policymaker for suitable manipulation in their policy to make these programs more successful and sustainable.

RECOMMENDATIONS

In light of findings of the present research, it can be certainly said that implementing agencies need to pay more attention to get more people's involvement in activities of planning as well as post implementation and monitoring evaluation stage by providing better access to resources as well as information, by promoting setting up of more grass root level organization and thereby helping people to better realize the long-term benefit of sustainably managing the natural resources. Essential elements and mechanisms of village community participation in the development and management of natural resources and socio-economic and policy issues to promote the equitable sharing of costs and benefits of improved natural resources management should be investigated thoroughly before taking up a new project. In case of lacking of social sustainability within a watershed project, central and state agencies need to recognize that significant efforts may be required to build social capacity to compensate for this intrinsic limitation.

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