



Assessing Attitude towards Activities of Rangamati Watershed Development Project in Cooch Behar District of West Bengal, India

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Authors' contributions

This work was carried out in collaboration between all authors. Author BG conceptualized the paper, designed the methodology, collected and processed the information. Authors AH and YLD managed the literature searches. Authors DR and SM wrote the first draft of the paper. Author PKP performed the statistical analysis and revised the paper after review. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Assessing the level of favourable attitude towards the activities of watershed development project and impact of attitude on extracting benefits from the project.

Study Design: Before-after study design.

Place and Duration of Study: The study was conducted in Rangamati watershed development project in Cooch Behar district of West Bengal, India. The geographical location of this watershed is 26°26'28" N to 26°29'21" N latitude and 89°11'17" E to 89°13'47" E longitude.

Methodology: 60 households (30 each from project beneficiary and non-beneficiary) were selected for the study. The attitude was assessed based on an attitude measurement scale. Value on the scale varies from '-2' (most unfavourable attitude) through '+2' (most favourable attitude).

Results: Persons having moderately favourable attitude dominated both the beneficiaries (70%) and non-beneficiaries (86.67%) of the watershed area with a mean attitude score of 1.38 and 1.22 respectively. Although both had favourable attitude towards the activities of watershed, but Fisher Exact test value was significant at $p = .009$ level; which implies that the beneficiary respondents had significantly more favourable attitude than the non-beneficiaries.

It is also seen from the study that the level of favourableness of attitude directly varies with the level of adoption of crop production technology [correlation coefficient (r)=0.288; $p = .05$] and watershed development technology (r =0.269; $p = .05$), change in cropped area in dry season (r =0.249; $p = .10$), change in crop diversity (r =0.291; $p = .05$), and change in occupation diversity (r =0.320; $p = .05$), which implies that more the attitude was favourable, more they gained the benefits.

Conclusion: The watershed development project has a positive effect in changing peoples' attitude towards its activity. Favourable attitude helps to reap more benefit from the project.

Keywords: Adoption; crop production; watershed technology; crop diversity; occupation diversity.

1. INTRODUCTION

As a consequence of global population increase, water for food production is becoming an increasingly scarce resource [1] aggravating to severe land degradation, food & water insecurity and poor social and institutional infrastructure [2,3]; and needs a holistic approach to look upon it. Watershed development approach is considered as an effective tool for addressing many of these problems and recognized as a potential engine for growth and development in fragile and marginal areas [4,5]. Watershed is an area of land that contributes run-off to a common point and is separated from adjoining areas by a natural ridgeline. The size of a watershed may vary from a few sqm to thousands of square kilometres. Watershed management approach as a paradigm is not, however, restricted to the water sector only, but it offers a chance to deal holistically with a range of resource issues viz. Land, water, crop & vegetation, animal and human [1].

In India, watershed development projects were initiated under the programme of National Watershed Development Project in Rain-fed Areas (NWDPPRA) in late 90s' with the core objectives of soil & water conservation; generate employment by altering cropping pattern [6,7]; enhancing livelihoods of rural poor by increasing crop yield [8] etc. It also aimed to improve the peoples' action through development of grass-root institutions and build cooperation [9]. Whereas improvement of natural resource conditions and livelihood development are the direct impacts of these projects [10,11,12] the indirect impact may be the behaviour modification through motivational and skill training [13].

Attitude, being one of the components of behavior, is generally viewed as one's relatively enduring affective cognitive and behavioral dispositions toward various aspects of the world including persons, events and aspects. The understanding of attitudes is one of the central concerns in social life and is vital for bringing desired changes in the behavior [14]. Social actions of people are directed by their attitudes. By knowing the attitudes, it may be possible to do something about the prediction and control of their behavior, which may be ultimately useful for more successful implementation of watershed management programmes [15]. As many studies have shown relationship between attitude and participation [16] or successful implementation [15] with respect to development programmes; it is imperative to trace out the attitude in relation to different activities of watershed management project and benefits reaped out of it. Hence, the present study tried to assess people's attitude towards watershed development activities and analyze the relationship between the attitude of the respondents and its impact on benefit of watershed project.

2. MATERIALS AND METHODS

2.1 Study Area, Selection of Respondents and Study Design

The National Watershed Development Project in Rainfed Areas (NWDPPRA) after initiation spread over to the whole country and the state of West Bengal implemented 48 nos. of micro watershed (a micro-watershed had an area of around 500 ha [17]) projects during the financial year 2007-08 to 2011-12 [18].

Rangamati is one of such micro watershed [Soil and Land Use Survey of India (SLUSI) Micro Watershed Code: 3A1C6-r] situated in Mathabhanga-II block in the catchment basin of *Mansai (Jaldhaka)* river (Fig. 1) in Cooch Behar district of West Bengal. Geographic position of the watershed is 26°26'28" N to 26°29'21" N latitude and 89°11'17" E to 89°13'47" E longitude. The effective project area of the micro watershed is 640 ha. Only three villages namely *Rangamati* [Jurisdiction List (JL) No.-74], *Ramthenga* (JL No.-64) and *Mukuldanga* (JL No.-61) fall under this micro watershed having respectively 805, 1394 and 852 numbers of families. Around 10% of families were registered as Beneficiaries of the project who were the members of Water Users' Groups (WUGs). Among these Beneficiaries, 30 families (10 from each village) were randomly selected as study units. 30 non-beneficiary families were also selected as control group.

Informal research design 'After with Control' was employed for assessing impact of project. Information was collected using a pre-tested structured interview schedule.

2.2 Development of Attitude Scale

For measurement of the attitude of the villagers, an attitude scale was developed following the

methodology proposed by Likert [19]. The following steps were followed:

1. Lists of statements which reflect the attitude towards the watershed development were collected covering all the domains of watershed development. Care had been taken to make the list exhaustive and include positive and negative statements to make the scale appropriate.
2. After a preliminary processing of the statements based on the indicators proposed by Edwards [20], the statements were sent to the experts for relevancy test. Relevancy test is one type of validity test (content validity) regarding the relevancy of the statements in relation to the attitude to be measured. Those statements having a relevancy score of 0.70 were selected for item analysis.
3. Item analysis is assessing each statement regarding its discriminatory power between peoples having favourable and unfavourable attitudes over test domains. The statements were exposed to 30 non-sample respondents for item analysis. Among the relevant statements those statements were finally selected which had significant (based on t-test value) discriminatory power over the respondents.

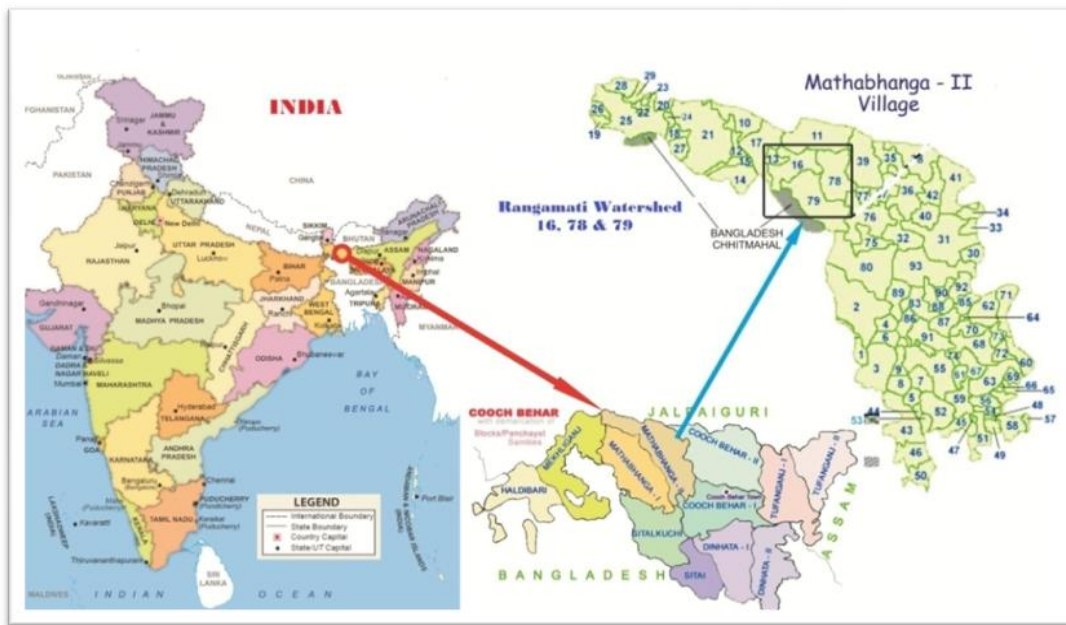


Fig. 1. Location map of *Rangamati* micro watershed

4. The finally selected statements were included in the final attitude scale (Table 3) and Cronbach Alpha was calculated for reliability test (Cronbach Alpha value was 0.708 including all the statements which is acceptable for an attitude scale).
5. Finally fourteen attitude statements were selected for the study.

Each attitude statement was assessed on a five-point ordinal scale continuum with "strongly agree", "agree", "undecided", "disagree" and "strongly disagree" with 2, 1, 0, -1 and -2 scores respectively. The scores were opposite [viz. -2 for "strongly agree" through 2 for "strongly disagree"] for negative statements. The mean score was calculated for each attitude statement by simple arithmetic mean.

Attitude level of an individual (beneficiary and non-beneficiary) was the sum of scores attained by the individual from all these statements. So, individual attitude score may vary from -28 (having most unfavourable attitude) to +28 (having most favourable attitude) for 14 attitude statements.

2.3 Measurement of Variables

To get an idea regarding the socio-economic and personal characteristics, the study compared between beneficiaries and non-beneficiaries in respect of variables like:

- Age: Years in nearest integer.
- Education: Year of formal education.
- Outside contact: Number of visits to outer important places in specified period.
- Mass media exposure: Extent of usage of mass media channels in specified period.
- Land holding: Amount of land possession in ha.
- Organisational participation: Membership of number of grass-root organisations other than WUGs.

Impact of positive attitude was measured on the following variables:

- Level of adoption of technology: Measured by the number of technology used by the respondent (crop production technology like improved variety, nutritional techniques, plant protection techniques and irrigation or watershed development technology like making open wells and use

of earthen bunds, stone bunds, deep tillage, mulching etc.).

- Change in cropped area in dry season: Measured by the acreage under all crops in dry season.
- Change in cropping intensity: It is the ratio of 'gross cropped area' over 'net cropping area' multiplied by 100.
- Change in crop diversity: Measured by the number of crops cultivated in a year
- Change in occupation diversity: Measured by the number of occupation in a family.

Attitude was measured as described in Sec. 2.2.

Inferential statistics like t-test, Fisher Exact test and simple correlation were used for comparison and generalisation of results.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Beneficiaries of Watershed Development Project

The data in Table 1 depicts the personal and socio-economic characteristics of the respondent. From the table, it is found that most of the respondents (beneficiary and non-beneficiary) belonged to middle age group; and were from low-medium education status (6.07 years and 7.50 years of formal education for beneficiary and non-beneficiary respondents respectively). Beneficiary respondent had significantly higher levels of outside contact and organizational participation on an average on $p = .01$ level of significance. It may be due to the fact that the watershed development programme created an opportunity of mass exposure to different awareness programme through local television channel or group meeting. Different workers and officers of watershed project had also visited time to time to the watershed areas and distributed mass media literature for awareness generation. Watershed programme has an inbuilt objective of creating different grass root organization like Self-Help Group (SHG), farmers club etc. including WUG which enhanced the overall average score of organizational participation. But in case of land holding non-beneficiary farmers had more occupancy than the farmers of beneficiary farmers on an average. As per the project objective, emphasis was given on selection of beneficiaries from resource poor farmers. The findings are in agreement with Pal et al. [13].

3.2 Attitude towards Activities of Watershed Development Project

Table 2 distributes the beneficiaries and non-beneficiaries according to the attitude towards watershed development programme. It reveals that majority of the respondents had moderate level of attitude towards the project (70% of beneficiaries and 86.67% of non-beneficiaries). Although 25% beneficiaries expressed high favourableness towards watershed project, but none from the non-beneficiaries expressed higher favourableness. The impact of watershed development takes time for its fullest manifestation. One's attitude is developed seeing the positive impact of any activity. The farmers were gaining moderate levels of benefits at the time of study and this may be the cause that moderately favourable attitude is dominating the scenario.

However, Fisher Exact test ($p = .009$) concludes that the Beneficiaries of the projects had higher levels of positive attitude towards watershed development project; and it indirectly admits that the project had a positive impact on livelihood of the watershed area.

Muni Kishore [21] found that most of the respondents had higher level of favourable attitude towards watershed development project.

Table 3 represents the distribution of respondents (both Beneficiaries and Non-Beneficiaries) according to the favourableness towards activities of watershed development project (WDP). A negative mean score for a negative statement indicates the favorable attitude towards that particular statement.

The result reveals that 65% of the respondents strongly believed that over use of water definitely would be more and 55% believed that livestock and crop production would reduce drastically if there was no watershed project in that area. 51.67% agreed that WDP was a boon to the farmers of that area. Table also reveals that group approach was the key to the success of the project by involving every farmer of that area (which is believed by 50% of the respondents). 71.67% reported that WDP not only improved the livelihood of resource rich farmers but also helped small, marginal, and even landless farmers by taking up different viable income generation activities both from agriculture and non-agricultural sectors (strongly agreed by 23.33% farmers). Such activities, thus ensured its accountability and transparency. WDP also ensured efficient mobilization of people to participate different watershed activities, which was reflected by opinions of the respondents, viz. 83.33% mentioned that trainings provided by WDP were not monotonous and impractical;

Table 1. Comparative socio-economic characteristics

Respondents' characteristics	Expressed as mean values		
	Beneficiary (n=30)	Non-beneficiary (n=30)	t-value
Age	42.12	42.03	0.04
Education	6.07	7.5	1.52
Outside contact	9.25	6.57	5.49**
Mass media exposure	1.45	1.3	0.43
Land holding	0.50	0.70	2.28*
Organisational participation	0.45	0.13	2.95**

* $p = .05$; ** $p = .01$

Table 2. Distribution of beneficiaries and non-beneficiaries according to attitude towards watershed development project

Attitudinal class	Expressed in percentage	
	Beneficiary (n=30)	Non-beneficiary (n=30)
Less favourable (having attitude score<15)	5.00	13.33
Moderately favourable (having attitude score 15 to 21)	70.00	86.67
Highly favourable (having attitude score>21)	25.00	0
Mean attitude score	19.32	17.08
Statistical implication	Fisher Exact test value=10.56; $p = .009$	

Table 3. Attitude of respondents towards the watershed development project

Attitude statements	Strongly agree	Agree	Undefined	Disagree	Strongly disagree	Mean score	Rank
Watershed Development Project (WDP) is a boon to farmers in watershed area (+)	31 (51.67)	29 (48.33)	0 (0.00)	0 (0.00)	0 (0.00)	1.52	III
WDP helps to increase income both from agriculture and non-agriculture activities in the area (+)	14 (23.33)	46 (76.67)	0 (0.00)	0 (0.00)	0 (0.00)	1.23	VII
Cost sharing with beneficiaries by watershed project ensures respect and responsibility to the farmers participating in watershed development (+)	14 (23.33)	36 (60.00)	10 (16.67)	0 (0.00)	0 (0.00)	1.07	XIII
Management of resources can be effectively done through community based organizations in WDP (+)	8 (13.33)	50 (83.33)	2 (3.33)	0 (0.00)	0 (0.00)	1.10	XI
Trainings provided by WDP are monotonous and not practical (-)	0 (0.00)	0 (0.00)	1 (1.67)	50 (83.33)	9 (15.00)	-1.13	IX
WDP helps small farmers, marginal farmers and even the landless to take up viable income generation activities (+)	22 (36.67)	38 (63.33)	0 (0.00)	0 (0.00)	0 (0.00)	1.37	V
WDP improved the livelihood of only the big farmers (-)	0 (0.00)	0 (0.00)	1 (1.67)	43 (71.67)	16 (26.67)	-1.25	VI
WDP do not ensure efficient mobilization of people to participate in watershed activities (-)	0 (0.00)	0 (0.00)	2 (3.33)	42 (70.00)	16 (26.67)	-1.23	VII
Effective accountability and transparency is not ensured in conducting the watershed activities through participatory approach	0 (0.00)	0 (0.00)	2 (3.33)	50 (83.33)	8 (13.33)	-1.10	X
Group approach is an appropriate method to involve every farmer in watershed	30 (50.00)	29 (48.33)	1 (1.67)	0 (0.00)	0 (0.00)	1.48	IV
WDP gives adequate concern to social and environmental issues for sustainable development of farmers in watershed area	7 (11.67)	53 (88.33)	0 (0.00)	0 (0.00)	0 (0.00)	1.12	XII
Favouritism is shown while availing credit to the members of different groups (-)	0 (0.00)	0 (0.00)	9 (15.00)	49 (81.67)	2 (3.33)	-0.88	XIV
If there was no watershed, production of livestock and crops would drastically reduced (+)	33 (55.00)	27 (45.00)	0 (0.00)	0 (0.00)	0 (0.00)	1.55	II
If there was no watershed conflict over water use would be more (+)	39 (65.00)	21 (35.00)	0 (0.00)	0 (0.00)	0 (0.00)	1.65	I
Average score (Considering negative score for negative attitude statements as favourable)						1.26	

Figures in the parentheses indicate percentage

Table 4. Correlation between impact variables and attitude towards watershed development project

Sl. no	Impact variables	Correlation with attitude (r-value)
1.	Adoption of crop production technology	0.288**
2.	Adoption of watershed development technology	0.269**
3.	Change in cropped area in dry season	0.249*
4.	Change in Cropping Intensity	0.071
5.	Change in crop diversity	0.291**
6.	Change in occupation diversity	0.320**

* $p = .05$; ** $p = .10$

83.33% of them agreed that local resources had been managed effectively through community based organization in WDP. Not only that, 11.67% of the respondents strongly agreed that WDP gave adequate concern to social and environmental issues enhancing sustainable development. Cost sharing with beneficiaries by watershed projects ensured respect and responsibility to the farmers participating in the development activities of the project and there was no favouritism or biasness for availing credit to the members of different groups.

From the Table 3 it is found that the respondents of the watershed area had a favourable attitude; varies from moderate to highly favourable. The average mean score (1.26) of people's attitude indicates a good impact of watershed development project on the livelihood of the people of Cooch Behar district. Attitude towards watershed was also studied by Muni Kishore [21] and the results were more or less similar with the present study.

3.3 Impact of Favourable Attitude on Benefits Extracted from Project Activities

Watershed development project is a natural resource management based project. It was meant for the development of quality of natural resource base on watershed basis. So, although the beneficiaries reap direct benefit like input subsidy, assistance for micro-irrigation development schemes, but inhabitants from the watershed area may extract benefit from the community based programmes like development of water harvesting schemes, ground water recharge activities, development of large and small community water bodies, soil conservation measures etc. in the studied watershed, it was seen that all the inhabitants had extracted benefits through adoption of crop production technology, watershed development technology,

cultivation in dry season, increasing number of crops. The project also diversified occupations in the project area by developing animal husbandry, fishery etc.

Table 4 shows that adoptions of crop production technology, adoption of watershed development technology, change in cropping area in dry season, cropping diversity, occupational diversity have positive and significant relationship with attitude toward watershed development project with correlation coefficient values of 0.288, 0.269, 0.249, 0.291 and 0.320 respectively which is significant at $p = .05$ and $p = .10$ level of significance.

So, a positive attitude towards watershed development project enhances adoption level of crop production and watershed technology which also positively change crop and livelihood diversity of the area. The findings are in line with some of the previous studies [6,11].

4. CONCLUSION

Watershed development project directly improve the natural resource condition in its operational areas, and also can change the attitude of the people towards the activities of the development programme. Favourable attitude enhance the effective participation of people in the project. The present study revealed that the participant farmers of the watershed development project have developed higher level of favourable attitude towards the activities of the project. It is also seen from the study that the higher degree of favourableness in attitude has impacted on enhanced level of benefits extracted from the project.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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