

3 Assessing Attitude Towards Activities of Rangamati 4 Watershed Development Project in Cooch Behar 5 District of West Bengal, India 6

7 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 beneficiary (70%) and non-beneficiary (86.67%) population 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. This implies that 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.

9 *Key Words:* Adoption, crop production, watershed technology, crop diversity, occupation diversity.

11 1. INTRODUCTION

12 As a consequence of global population increase, water for food production is becoming an
13 increasingly scarce resource [1] aggravating to severe land degradation, food & water insecurity and
14 poor social and institutional infrastructure [2,3]; and needs a holistic approach to look upon it.
15 Watershed development approach is considered as an effective tool for addressing many of these
16 problems and recognized as a potential engine for growth and development in fragile and marginal
17 areas [4,5]. Watershed is an area of land that contributes run-off to a common point and is separated
18 from adjoining areas by a natural ridgeline. The size of a watershed may vary from a few square
19 meters to thousands of square kilometres. Watershed management approach as a paradigm is not,
20 however, restricted to the water sector only, but it offers a chance to deal holistically with a range of
21 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 Rainfed Areas (NWDPRA) 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 the 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 (NWDPRA) 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 (1932) [19]. The following steps were followed:

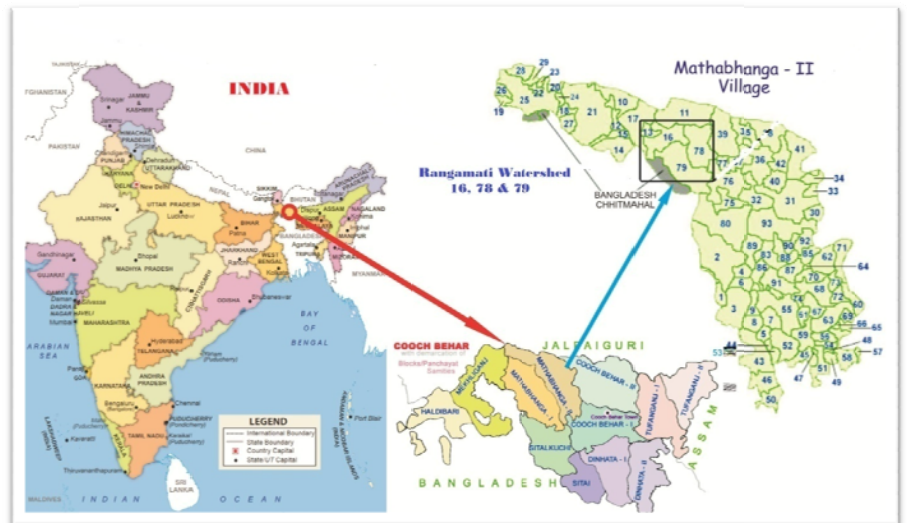
1. Lists of statements which reflect the attitude towards the watershed development were collected covering all the domains of watershed development. Care had been taken to make the list exhaustive and include positive and negative statements to make the scale appropriate.
2. After a preliminary processing of the statements based on the indicators proposed by Edwards (1957) [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

78 were exposed to 30 non-sample respondents for item analysis. Among the relevant
 79 statements those statements were finally selected which had significant (based on t-test
 80 value) discriminatory power over the respondents.
 81 4. The finally selected statements were included in the final attitude scale (table-3) and
 82 Cronbach Alpha was calculated for reliability test (Cronbach Alpha value was 0.708 including
 83 all the statements which is acceptable for an attitude scale).
 84 5. Finally fifteen attitude statements were selected for the study.

85 Each attitude statement was assessed on a five-point ordinal scale continuum with “strongly agree”,
 86 “agree”, “undecided”, “disagree” and “strongly disagree” with 2, 1, 0, (-)1 and (-)2 scores respectively.
 87 The scores was opposite [viz. (-)2 for “strongly agree” through 2 for “strongly disagree” for negative
 88 statements. The mean score was calculated for each attitude statement and for every respondent
 89 represented by simple arithmetic mean.

90 Attitude level of an individual (beneficiary and non-beneficiary) was the sum of scores attained by the
 91 individual from all these statements.

92



93

94 **Fig.-1 Location Map of Rangamati Micro Watershed**

95

96 **2.3 Measurement of variables**

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

- 99 • Age: years in nearest integer.
- 100 • Education: year of formal education.
- 101 • Outside contact/cosmopolitaness: number of visits to outer important places in specified
 102 period.
- 103 • Mass media exposure: extent of usage of mass media channels in specified period.
- 104 • Land holding: amount of land possession in ha.
- 105 • Organisational participation: membership of number of grass-root organisations other than
 106 WUGs

107 Impact of positive attitude was measured on the following variables:

- 108 • Level of adoption of technology: Measured by the number of technology used by the
- 109 respondent (crop production technology like improved variety, nutritional techniques, plant
- 110 protection techniques and irrigation or watershed development technology like making open
- 111 wells and use of earthen bunds, stone bunds, deep tillage, mulching etc.).
- 112 • Change in cropped area in dry season: Measured by the acreage under all crops in dry
- 113 season.
- 114 • Change in cropping intensity: It is the ratio of 'gross cropped area' over 'net cropping area'
- 115 multiplied by 100.
- 116 • Change in crop diversity: Measured by the number of crops cultivated in a year
- 117 • Change in occupation diversity: Measured by the number of occupation in a family.

118 Attitude was measured as described in Sec. 2.2

119 Inferential statistics like t-test, Fisher Exact test and simple correlation were used for comparison and

120 generalisation of results.

121

122 3. RESULTS AND DISCUSSION

123 3.1 Socio-economic characteristics of the beneficiaries of watershed development

124 project

125 The data in Table-1 depicts the personal and socio-economic characteristics of the respondent. From

126 the table, it is found that most of the respondents (beneficiary and non-beneficiary) belonged to

127 middle age group; and were from low-medium education status (up to 6th standard for beneficiary and

128 7-8th standard for non-beneficiary). Beneficiary respondent had significantly higher levels of outside

129 contact and organizational participation on an average on $p = .01$ level of significance. It may be due

130 to the fact that the watershed development programme created an opportunity of mass exposure to

131 different awareness programme through local television channel or group meeting. Different workers

132 and officers of watershed project had also visited time to time to the watershed areas and distributed

133 mass media literature for awareness generation. Watershed programme has an inbuilt objective of

134 creating different grass root organization like self-help group (SHG), farmers club etc. including WUA

135 which enhanced the overall average score of organizational participation. But in case of land holding

136 non-beneficiary farmers had more occupancy than the farmers of beneficiary farmers on an average.

137 As per the project objective, emphasis was given on selection of beneficiaries from resource poor

138 farmers. The findings are in agreement with Pal et al. (2017) [13].

139

Table-1 Comparative socio-economic characteristics

140

Expressed as mean values

Respondents' Characteristics	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**

141

* $p = .05$

** $p = .01$

142

143 3.2 Attitude towards activities of watershed development project

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

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

155 Muni Kishore (2006) [21] found that most of the respondents had higher level of favourable attitude
 156 towards watershed development project.

157

158 **Table-2 Distribution of beneficiaries and non-beneficiaries according to attitude towards**
 159 **watershed development project**

160 **Expressed in percentage**

Attitudinal class	Beneficiary (n=30)	Non-beneficiary (n=30)
Less favourable (Mean Score upto Mean-SD) (upto 1.07)	5.00	13.33
Moderately favourable (Mean Score between Mean $\pm$ SD) (1.08 to 1.50)	70.00	86.67
Highly favourable (Mean Score > Mean +SD) (> 1.50)	25.00	0
Mean attitude score	1.38	1.22
<u>Statistical implication</u>		
Fisher Exact test value=10.56; $p = .009$		

161

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

165 The result reveals that 65 % of the respondents strongly believed that over use of water definitely
 166 would be more and 55 % believed that livestock and crop production would reduce drastically if there
 167 was no watershed conflict in that area. 51.67% agreed that watershed development project (WUA)
 168 was a boon to the farmers of that area. It also came to know, 50 % respondents believed that group
 169 approach was the key to the success of the project by involving every farmer of that area. 71.67 %
 170 reported that WUA project not only improved the livelihood of recourse rich farmers but also helped
 171 small, marginal even landless farmers by taking up different viable income generation activities both
 172 from agriculture and non-agriculture sectors (strongly agreed by 23.33 % farmers), thus ensured it's
 173 accountability and transparency. WUA also ensured efficient mobilization of people to participate
 174 different watershed activities like 83.33% mentioned that trainings provided by WUA were not
 175 monotonous and impractical 83.33% of them agreed that local resources had been managed
 176 effectively through community based organization in WUA. Not only that, 11.67 % of the respondents
 177 strongly agreed that WUA gave adequate concern to social and environmental issues also for

178 sustainable development. Cost sharing with beneficiaries by watershed projects ensured respect and
 179 responsibility to the farmers participating in the development and here was no favouritism or biasness
 180 for availing credit to the members of different group.
 181

182 **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	0 (0.00)	0 (0.00)	2 (3.33)	50 (83.33)	8 (13.33)	-1.10	X

Attitude statements	Strongly Agree	Agree	Undefined	Disagree	Strongly Disagree	Mean Score	Rank
watershed activities through participatory approach							
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	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 reduce (+)	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 statement as favourable)						1.26	

183

Figures in the parentheses indicate percentage

184 From the table it is found that the respondents of the watershed area had a favourable attitude; varies
185 from moderate to highly favourable attitude. The average mean score (1.26) of people's attitude
186 indicates a good impact of watershed on the livelihood of the people of Cooch Behar district. Attitude
187 towards watershed was also studied by Muni Kishore (2006) [21] and the results were more or less
188 similar with the present study.

189

190 3.3 Impact of favourable attitude on benefits extracted from project activities

191 Watershed development project is a natural resource management based project. It was meant for
192 the development of quality of natural resource base on watershed basis. So, although the
193 beneficiaries reap direct benefit like input subsidy, assistance for micro-irrigation development
194 schemes, but inhabitants from the watershed area may extract benefit from the community based
195 programmes like development of water harvesting schemes, ground water recharge activities,
196 development of large and small community water bodies, soil conservation measures etc. in the
197 studied watershed, it was seen that all the inhabitants had extracted benefits through adoption of crop
198 production technology, watershed development technology, cultivation in dry season, increasing
199 number of crops. The project also diversified occupations in the project area by developing animal
200 husbandry, fishery etc.

201 Table 4 shows that adoptions of crop production technology, adoption of watershed development
202 technology, change in cropping area in dry season, cropping diversity, occupational diversity have
203 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.

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**

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

So, a positive attitude towards watershed development project enhances increased 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.

REFERENCES

- [1] Molden D. Water for food, water for Life: A comprehensive assessment of water management in agriculture. IWMI. Earthscan, London, UK. 2007.
- [2] Rockstrom J, Hatibu N, Oweis T, Wani SP, Barron J, Bruggeman A, Qiang Z, Farahani J, Karlberg L. Managing water in rain-fed agriculture. In: Molden D editor. Water for food, Water for life: A comprehensive assessment of water management in agriculture. International Water Management Institute. Earthscan, London, UK. 2007.
- [3] Wani SP, Joshi PK, Ramakrishna YS, Sreedevi TK, Singh P, Pathak P. A new paradigm in watershed management: A must for development of rain-fed areas for inclusive growth. In: Swarup A,

233 Bhan S, Bali JS. Editors. Conservation farming: Enhancing productivity and profitability of rain-fed
234 areas. Soil Conservation Society of India, New Delhi. pp 163-178. 2007.

235 [4] Joshi PK, Jha AK, Wani SP, Joshi L, Shiyani RL. Meta-analysis to assess impact of watershed
236 program and people's participation. Research Report 8: Comprehensive Assessment of watershed
237 management in agriculture. International Crops Research Institute for the Semi-Arid Tropics and
238 Asian Development Bank. Pp 14-15. 2005.

239 [5] Wani SP, Joshi PK, Raju KV, Sreedevi TK, Wilson JM, Shah, A, Diwakar PG, Palanisami K,
240 Marimuthu S, Jha AK, Ramakrishna YS, Sundaram MSS, D'Souza M. Community watershed as a
241 growth engine for development of dryland areas: A comprehensive assessment of watershed programs
242 in India. Global Theme on Agroecosystems. Report No. 47. International Crops Research Institute for
243 the Semi-Arid Tropics (ICRISAT). 2008.

244 [6] Jain AK. Impact of organizational instruments on livestock activities in watershed developments
245 project. Journal of Rural Development. 27 (2): 401-410. 2008

246 [7] Palanisami K, Devarajan S, Chellamuthu M, Suresh Kumar D. Mid-term evaluation of IWDP
247 watersheds in Pongalur Block of Coimbatore district. Technical Report. Tamil Nadu Agricultural
248 University. 2002.

249 [8] Sharma BR Scott CA. Watershed management challenges: Introduction and overview. In: BR
250 Sharma, JS Samra and SP Wani Editors. Watershed management challenges: Improving
251 productivity, resource and livelihood. International Water Management Institute. Pp-1-21. 2005.

252 [9] Ghosh S, Sahoo N, Verma HN, Singh R, Panda DK. Participatory water management for
253 sustainable development in coastal belt of Orissa. Journal of Rural Development. 23 (2): 217-229.
254 2004.

255 [10] Turton C, Farrington J. Enhancing rural livelihoods through participatory watershed development
256 in India, Key sheets for development in the natural environment. ODI. No. 34. 1998.

257 [11] Palanisami K, Suresh Kumar D. Impacts of watershed development programmes: Experiences
258 and evidences from Tamil Nadu. Agricultural Economics Research Review. 22: 387-396. 2009.

259 [12] Sundaram A. Empirical Study on Impact of Integrated watershed Development project in Mizoram
260 state of north east India. IOSR Journal of Humanities and Social Science 5(3): 07-13. 2012.

261 [13] Pal PK, Ganguly B, Roy, D, Guha A, Hanglem A, Mondal S. Social and biophysical impacts of
262 watershed development programmes: experiences from a micro-watershed area in India. Water Policy. 19
263 (4): 773-785. DOI: 10.2166/wp.2017.189. 2017.

264 [14] Rishi P. Joint forest management in India: An attitudinal analysis of stakeholders. Resources,
265 Conservation and Recycling. 51(2): 345-354. 2003.

266 [15] Sisay M. Attitude towards watershed management programs and level of participation: Liaison
267 analysis in southern Ethiopia. International Journal of Current Research. 7(10): 20984-20992. 2015.

268 [16] Lise W. Factors influencing peoples' participation in forest management in India. Ecological
269 Economic. 34 (3): 379-392. 2000.

270 [17] Mondal S. Agricultural Extension. Kalyani Publisher. P-122. 2015.

271 [18] Ganguly B. Impact of watershed development programme on rural livelihood in Cooch Behar
272 district of West Bengal. M. Sc. (Ag.) dissertation. Uttar Banga Krishi Viswavidyalaya. Cooch Behar.
273 WB. P-4. 2014.

274 [19] Likert R. A technique for the measurement of attitude. Archives of Psychology edited by R. S.
275 Woodworth. No. 140. New York. 1932.

276 [20] Edwards AL. Techniques of Attitude Scale Construction, Appleton century Crafts, Inc., New York.
277 1957.

278 [21] Muni Kishore S. Beneficiaries' attitude and project facilitation services of *Sujala* watershed
279 project. M. Sc. (Ag.) Dissertation. University of Agricultural Sciences. Dharwad. Karnataka, India