SOCIO - ECONOMIC REFLECTION OF WESTERN GHAT WATERSHED PROJECT IN THE STATE OF KERALA IN INDIA

***Dr. Shijumon K J**

Abstract

In India, the watershed programmes are considered as one of the poverty alleviation programme. Through an effective watershed management, the government plans a sustainable development in particularly in rural areas. The Government of India implemented a Watershed under Western Ghat Development Programme (WGDP) in 12th five year plan. The more importance given to the people participation in all the activities related to the watershed projects and its core objectives of the preservation of resource trinity -land, water and biomass. The implementation of each watershed projects is done by either Grama Panchayat (GP) or any recognized Non Governmnetal Organisation (NGO). So, this study mainly focuses on the exploration of the economic and social impacts of watershed project on the Western Ghat region of Kerala. And it made on a comparison of projects completed by GP and NGO in selected project areas. Under this study the researcher used multi stage random sampling technique. By using paired t test and ANOVA, the watershed projects made a great change in the social as well as economic sectors in project areas. Further it's found that Watershed projects headed by GP and NGO are efficient in some sectors.

Key words:- Watershed, social benefits, economic impacts, employment generation, Non Governmental organisation, Grama panchayath.

Kerala, God's own country is endowed with adequate rainfall. It receives an average annual rainfall of 3107 mm. But, a major portion of the water is runoff through rainy season. There is no proper water preservation method to save this for future use. This argues for more collaborative and participatory approach. The integrated Western Ghat programmes are such a kind of policy of the government to save the rainwater.

In Kerala, the watershed projects under the Western Ghat development programme are mainly implemented through local authorities and Non-Government Agencies. (George, 2011). Water, the elixir of life is becoming scarce

**Dr. Shijumon K J, Assistant Professor, Department of Commerce, St. Xavier's College, Thumba, Trivandrum 695586. shijumonkjsxc@gmail.com, Orcid ID-0000-0002-0612-4894.*

year after year. With the steep increase in population, the water available for drinking and irrigation purposes has reached an alarming level. Though we are blessed with many rivers and plenty of rainfall, water shortage especially in the summer season has become a recurring feature. People are not much aware of the water conservation techniques. This again worsens the situation (Thomas Webler, 2001). In this context the concept like watershed gains significance. The concept of the watershed lies in the conservation and productive use of land and water for a better livelihood. A watershed is a geographical unit that collects, stores and releases water (Khalid Malik and et.al, 2014).

The shortage of water may raise problems to the economic and social progression of a country. India has 16 per cent of the global population, but it has only 4 per cent of the world's total water resources (Gadgil, 2011). Currently, over 10 per cent of blocks or areas as classified by the Central Ground Water Board of India, have been identified as being overexploited and, blocks, where exploitation is beyond the critical level, have been increasing at a rate of 5.5 per cent each year (Jim Smyle, and et.al, 2014).

The Watershed programmes are always measured as people centric programmes. The study conducted by (Dash et al., 2011), coined that the impact of the functionality of all kinds of local institution and examines the degree of women's participation in relation to the effective management of natural resources and sustainable development. The authors concluded the study with a suggestion that institutional sustainability can be ensured with the willing participation of the local people. The integration of indigenous knowledge in project design, the inclusion of men in Self-Help Groups, and the incorporation of adequate gender responsive policies in local institutions are perhaps the most important components that considered for the sustainable management of natural resources.

This paper has an objective of whether these watershed projects have a reflection on the social and economic conditions of the local people in the implemented area. It tried to find answers for issues like increase in days of employment, and improvement in the standard of living of the residents after the implementation of the project so as to understand if the watershed projects are capable of meeting the increasing needs of the population.

Statement of the Problem

The steep rise in population argues for more water to meet the various needs. Due to the decline in the forest cover, natural sources of water are vanishing tremendously. Conflicts are increasing over shared water resources between agriculture, industry and urban domestic use as well as between state governments. The protection of water bodies has become imperative to meet the agricultural needs of men. Sustainable water management gains crucial significance for economic development and livelihood of the people of Kerala. To generate water resources the government has introduced many soils and water conserving programmes. Western Ghat Watershed Programme is

one among them. The watershed projects are mainly carried out by local governments in the state, but voluntary organisations' role is not at all meagre. The Grama Panchayats and the NGOs have an entirely different administrative structure for their operation.

This paper is to critically analyse the performance of Grama Panchayath as well the NGOs in the watershed project implementation. As a result of implementing a programme of this nature, whether there is increase in days of employment, and whether the standard of living of the residents have improved are some issues that need to be answered. So it becomes essential to examine if the watershed projects are capable of meeting the increasing needs of the population. This study is proposed to analyse the impact of watershed projects on the social and economic conditions in the implemented area with particular focus on the role of local body (Grama Panchayat) and NGO.

Objective of the Study

To examine the Socio- economic benefits attained by the respondents in the Western Ghat watershed project areas**.**

Hypotheses

The hypotheses framed for this study are:

H01: There is no significant difference in the economic benefits of projects by GPs and NGOs.

H02: There is no significant difference in the employment creation to respondents between GPs and NGOs

Methodology of the Study

Sampling

Multi- stage random sampling has been used for the selection of the sample respondents (beneficiaries). In the *first stage*, the Western Ghat region was divided into two - Southern segment starting from Kanyakumari, extending to Palakkad Gap and Northern segment starting from Palakkad gap and extending up to Kodagu boundary.

In the *second stage*, one district from each segment was selected-Idukki district from the south and Wayanad from the north. These two districts were selected mainly because they cover the largest western ghat area, and also have the highest number of projects implemented.

In the *third stage* 10 projects from each district were selected.

In the *fourth stage*, the selected ten projects were apportioned on the basis of the number of implementing agencies i.e. Grama Panchayats and NGOs in these districts.

In the *last and fifth stage*, the sample units numbering 420 were apportioned on the basis of the total number of projects implemented in these two districts.

Different programmes were launched by the government to conserve and utilise natural resources for enhanced productivity and higher socio-economic status. Up-scaling of watershed development programme was carried out by spending massive amount of funds every year. One such programme -The Western Ghats watershed programme was first started in Kerala as a model for

 ISSN : 2230-8431

participatory watershed projects in the year 2002.

The watershed projects are mainly carried out by local governments in the state, but voluntary organisations' role is not at all meagre.

The sample for the study consists of local people residing in the project implementing area. They are mainly grouped into agriculturist and non-agriculturist. The agriculturists are deemed to be the direct beneficiaries of the project and the non-agriculturists are the indirect beneficiaries of the project.

Socio- Economic Factors

In this paper, an analysis of primary data has been undertaken to evaluate the social and economic reflection of watershed projects in the implemented area. Social and economic aspects are some of the indicators that point out the developments. Socio-economic factors are characteristics that define the quality of life in a society. They influence the behaviors, attitudes, trends, tastes and lifestyles of individuals; Education, income and occupation are the main parameters of socio-economic status, according to the American Psychological Association.

In Kerala majority of the people are engaged in agriculture and allied activities. The state has a high intensity of cropping and utilizes about 58.31 per cent of its land area for cultivation (Pat, June 11,2005). Resource conserving technologies have to be popularized and widely adopted in order to conserve the natural resources and to achieve sustainable rural development. Watershed development is one of the basic approaches adopted in the country for poverty alleviation and rural development by stabilizing farm production at higher levels, provide more employment and income to the rural poor and conserve the precious natural resources of the country.

In this paper an analysis of socio-economic reflection of watershed projects are done with respect to pre implementation and post implementation phase of the project. The effects of socio-economic improvements are measured in terms of seven representative statements. Respondents were asked to mark their response towards the source of economic improvements before and after the implementation of the project in three-point scale with values as high, medium and low. The Paired t- test was used to determine the difference in the socio-economic improvements created by western ghat watershed projects before and after the project implementation.

The change in the physical assets of respondents due to the effect of Western Ghat Watershed Project was measured in three-point scale namely, high, medium and low. From the table it can be seen that 62.86 per cent of the respondents have reported that before the watershed projects were implemented, they had medium level income from their farming activities and 37.14 per cent reported low income. None of the respondents reported high income from their farming activities.

None of the respondents have low income from their farming activities. Therefore, it can be inferred that after the

implementation of western Ghat watershed projects in the sample districts, majority of the respondents were benefitted in terms of increase in agricultural productivity due to water availability and also increased number of employment days in farming activity.

In respect of non-farming activities too it is seen that 62.62 per cent of the respondents opined that their income from non-farming activities were low while the remaining 37.38 had medium income before the implementation of the watershed projects. But the situation after the implementation of the project had changed entirely with 87.62 per cent claiming that they had high income from their non-farming activities. Before the implementation of the project, the land use was very poor. Only 54 per cent of

Table 1

Distribution of sample with level of economic improvement from various sources with mean score.

Source of Economic improvement	Before					After				Paired t	Sig.
	Response	n	%	Mean	SD	n	%	Mean	SD		
Farming activity	High	0	0.00	1.63	0.48	336	80.00	2.80	0.40	41.000	0.000
	medium	264	62.86			84	20.00				
	Low	156	37.14			0	0.00				
Non - farming activities	High	0	0.00	1.37	0.48	368	87.62	2.88	0.33	54.244	0.000
	Medium	157	37.38			52	12.38				
	Low	263	62.62			0	0.00				
Land use	High	0	0.00	1.54	0.50	419	99.76	3.00	0.05	59.948	0.000
	Medium	226	53.81			1	0.24				
	Low	194	46.19			0	0.00				
Farm products	High	0	0.00	1.39	0.49	236	56.19	2.56	0.50	34.792	0.000
	Medium	163	38.81			184	43.81				
	Low	257	61.19			0	0.00				
Price on land	High	0	0.00	1.62	0.49	222	52.86	2.53	0.50	33.787	0.000
	Medium	262	62.38			198	47.14				
	Low	158	37.62			0	0.00				
Repayments on loans from banks	High	0	0.00	1.43	0.50	136	57.87	2.58	0.49	34.771	0.000
	Medium	100	42.55			99	42.13				
	Low	135	57.45			0	0.00				
Increased employment generation	High	0	0.00	1.27	0.44	192	45.71	2.46	0.50	37.342	0.000
	Medium	113	26.90			228	54.29				
	Low	307	73.10			0	0.00				

Source: Primary Data

respondents have claimed medium use of land. But in the opinion of 99 per cent of the respondents the use of land increased after the implementation of the project. Therefore, it can be concluded that the land use was highly increased by the implementation of the project.

In the case of Farm products, the respondents claimed that there is an increase in the farm production after the project implementation. Prior to project implementation the production was low as viewed by 62 per cent of the beneficiaries. But 56 per cent of the sample units felt that production of farm products increased to a high after the implementation of the project. Before the implementation of the project, the land prices were at a medium level according to 62 per cent of the respondents. But after the implementation of the project, 53 per cent of the respondents opined that the price of land increased to a high while 47 per cent felt that the increase in land prices was medium. It is interesting to note that none of the respondents thought that low prices ruled after the project implementation.

Repayment of bank loans by the respondents had changed dramatically. Before the implementation of the project 57 per cent of respondents had low capacity and 43 per cent had moderate capacity to repay the loans. However, after the implementation of the watershed project 58 per cent of respondents had high capacity and 42 per cent of respondents had moderate capacity to repay the loan. So, it can be claimed that implementation of the project improved the capacity of the respondents to repay bank loans with immediate effect.

The employment opportunities too had seen a tremendous increase after the implementation of the project. The increase in employment generation is considered to be high by 46 per cent of the sample respondents. Before the implementation of the project, 73 per cent of respondents, mainly from the rural areas, were of the opinion that there were only low employment opportunities.

It can be observed that all the variables used for measuring the economic improvements - the land use, price of land, employment generation, repayment of loan etc., have shown an increase after the project implementation with paired t values showing significance even at one per cent level. The highest mean score after the project implementation is in land use which is found to be 3, increased from 1.54, followed by non-farming activities, which is 2.88, increased from 1.37. The lowest mean score after the implementation of the project is reported for employment generation and price on land with respective post implementation mean scores of 2.46 and 2.53 respectively. And at the same time they have increased from 1.27 and 1.62 from the pre implementation phase.

From the result it can be inferred that benefit from farming activity has significantly increased due to the effect of the Western Ghat Watershed Project.

Comparison of post implementation economic improvements created by GP and Non- Governmental Organisation

In Kerala, Western Ghat watershed projects are implemented by both Grama Panchayats and Non-Governmental

Organisations. To compare the economic benefits created by GPs and NGOs after the project implementation, a MANOVA test is being conducted. The results of analysis have been summarized below:

Hypothesis 1 (H01): There is no significant difference in the economic benefits between projects implemented by Grama Panchayat and Non-Governmental Organisation.

Mean scores obtained for different economic indicators are grouped with respect to GP and NGO and the difference in these indicators between GP and NGO are tested by using ANOVA and the overall difference in the economic improvements among different indicators are tested with the help of MANOVA. The ANOVA and MANOVA results are presented in the Table 2.

The MANOVA table shows that, out of the seven indicators, four indicators such as income from farming activity, increased farm products, increased price on land and increased employment generation are having F values with significance less than 0.05 indicating significant difference in these economic indicators after the implementation of projects among Grama Panchayat and Non- Governmental Organisation. And it can be further observed that out of these four indicators, two indicators such as income from farming activity and increased price on land are higher for GP than NGO.

On the other hand, the other two indicators such as increased farm products and increased employment generation are seen to be higher in the case of NGO

Table 2

Mean score of improvements of economic indicators after the implementation of the program

Economic Indicators	Total		GP		NGO		ANOVA		MANOVA	
	Mean	SD	Mean	SD	Mean	SD	F	Sig.	F	Sig.
Income from farming activity	1.17	0.59	1.27	0.60	1.13	0.57	4.968	0.026	6.333	0.000
Income from non - farming activities	1.50	0.57	1.52	0.53	1.50	0.58	0.105	0.747		
Improvements on land use	1.46	0.50	1.46	0.50	1.46	0.50	0.000	0.989		
Increased farm products	1.17	0.69	1.00	0.70	1.25	0.67	11.128	0.001		
Increased price on land	0.90	0.55	1.02	0.48	0.86	0.57	7.220	0.007		
Repayments on loans from banks	0.65	0.69	0.67	0.62	0.63	0.71	0.263	0.609		
Increased employment generation	1.19	0.65	0.96	0.69	1.28	0.61	22.302	0.000		

Source: Primary Data

than GP. It can also be observed that the remaining three indicators such as '*income from non-farming activities', 'improvement on land use' and 'repayment of loans'* are not showing significant F values, which indicates no difference in these three economic indicators after the implementation of the project among GP and NGO.

The MANOVA test reveals that all the economic indicators after the project implementation are having varying impacts on economic improvements as the F value is less than 0.05. *So the null hypothesis that there is no significant difference in the economic benefits between projects implemented by Grama Panchayat and Non- Governmental Organisation is rejected.* Hence it can be inferred that GP and NGO are different in their contribution to economic improvement and the level of improvement on different indicators are also found to be significantly different.

Employment Generation by the Western Ghat Watershed Projects

One of the major outcomes of social projects like watershed is the employment generation for the people residing in the project implementation area. Here the analysis has been done on the number of employment days created in various agricultural and self-employment areas. The result of analysis is presented on the Table 3.

Table 3 describes the mean employment days of sample respondents in the project area. Out of the 420 respondents, 145 respondents were engaged on the cultivation of crops and spices and their mean employment days were found to be 157 days. In addition, vegetable producers show a mean employment days of 162. It shows the least engagement on intercrops cultivation, with a mean of 7 days only.

Table 3

Mean employment days of sample respondents

Occupation*		N	Mean	SD
Agriculture	Crops & spices	145	157.24	49.04
	Vegetables	146	162.33	55.57
	Inter crops	145	7.27	4.64
	Fruits	140	50.59	29.77
Self- employment	Tailoring Unit	40	350.00	0.00
	Carpentry Unit	41	340.24	8.21
	Goat / rabbit Rearing	58	330.00	18.73
	Poultry Farm	41	309.76	8.21
	Cow and Calf Rearing	42	340.00	8.26
	Sericulture	29	310.34	10.17

** Multiple responses,*

Source: Primary Data

The watershed project also provides self-employment to the respondents. They are engaged on tailoring, goat or rabbit rearing, poultry farm etc. The above table shows a mean of 350 days on tailoring unit. It means the respondents who are engaged in tailoring have high employment days. Moreover, other self-employment schemes such as rearing cow and calf and sericulture also provide more or less better employment days to them. They show a mean of 340 to 310 days respectively.

Employment days created by GP and Non- Governmental Organisation

Here in this section a comparative analysis of employment days generated by GP and NGO have been undertaken with the help of MANOVA test.

Employment generated from farming activities

Respondents were asked to provide the number of employment days received from the project. The employment activities are broadly grouped into agricultural and self-employment activities. Agricultural activities include cultivation of crops and spices, vegetables, inter crops and fruits. Mean number of employment days generated from agricultural activities for GP and NGO are worked out and compared using MANOVA test.

Hypothesis 2 (H02): There is no significant difference in the employment creation to respondents with reference to PIA.

The ANOVA table shows that, out of the four agricultural activities like cultivation of crops and spices, vegetables, inter crops and fruits, two agricultural activities such as cultivation of vegetables and fruits are having F values with significance less than 0.05 indicating significant difference between GP and NGO and it can be further observed that in both activities NGOs provide more employment days than GP. The number of working days for cultivating vegetables is 140 for NGOs and 127 days for GPs.

Table 4

Mean scores of agricultural activities that provide employment to the respondents under the Western Ghat Watershed Development Programme

Agricultural activities	Total		GP		NGO		ANOVA		MANOVA	
	Mean	SD	Mean	SD	Mean	SD	F	Sig.	F	Sig.
Crops & spices	135.92	14.02	138.89	11.21	134.09	15.34	1.986	0.163	4.254	0.004
Vegetables	135.77	21.56	127.41	17.01	140.91	22.60	7.139	0.009		
Inter crops	6.59	2.93	7.30	3.29	6.16	2.62	2.585	0.112		
Fruits	46.31	19.86	37.59	15.02	51.66	20.71	9.398	0.003		

Source: Primary Data

Similarly employment days created for cultivation of fruits numbered 52 days by NGOs and 38 days by GPs. Two agricultural activities such as cultivation of crops and spices and inter crops are not showing significant F values, which indicates no difference in the employment days on these two farming activities. The MANOVA test reveals that all the agricultural activities are having varying employment days as its F value is less than 0.05. *So the null hypothesis that there is no significant difference in the employment creation to respondents with reference to PLA is rejected.* Hence it can be inferred that GP and NGO are different in the generation of employment days and the number of employment days generated by different farming activities are also found to be significantly different.

Employment generated from self-employment activities

Non-agricultural or Self-employment activities include Tailoring Unit, Carpentry Unit, Goat Rearing, Poultry Farm, Cow and Calf and Sericulture. The employment generated from self-employment activities are tested using t- test.

The table 5 shows that out of the six self-employment activities, three are showing significant t-values indicating significant difference in the mean number of employment days generated with respect to that activity between GPs and NGOs. Out of these three, two activities such as goat rearing and sericulture generated higher employment days from projects of NGOs than that of GPs. And at the same time other three self-employment activities are not showing t values less than 0.05 indicating no significant difference in the mean number of employment days from these activities among Grama Panchayat and Non-Governmental Organisation.

Conclusion

Since its inception in 2002 the Western Ghat Watershed Development Programme, have come a long way, in the state of Kerala. During the period under study, large amount of funds has been pumped by the government for the implementation of the programme through two implementing agencies viz. Grama Panchayat and Non-Governmental Organisation.

Table 5

Number of employment days generated by the Project Implementing Agency

Self-Employment	Grama Panchayat		NGO		t	Sig.
	Mean	SD	Mean	SD		
Tailoring Unit	350.00	0.00	350.00	0.00	-	-
Carpentry Unit	336.00	8.94	340.83	8.06	1.242	0.222
Goat Rearing	312.14	17.62	335.68	15.31	4.832	0.000
Poultry Farm	313.33	11.55	309.47	8.04	0.780	0.440
Cow and Calf rearing	350.00	0.00	336.88	6.93	5.941	0.000
Sericulture	300.00	0.00	315.79	8.38	5.909	0.000

Source: Primary Data

The people residing in the watershed areas of the two sample districts viz. Wayanad and Idukki were enjoying a medium socio- economic status. With the implementation of the watershed projects, there was reduction in water runoff, increase in the level of water table leading to more employments in the agricultural and non-agricultural sectors, and economic standard of the beneficiaries also improved.

The conservation measures undertaken by the implementing agencies were significantly different but they started paying off and people enjoyed the benefits of higher income, a greater number of employment days, better repayment of loans etc. The beneficiaries were satisfied with the overall performance of the Project Implementing Agencies.

The beneficiaries are satisfied with the pro people approach of the Non-Governmental agencies but are not happy with the way the Grama Panchayat officials deal with them.

The Project Implementing Agencies confronted difficulties like non-availability of fund, non-cooperation of the beneficiaries in the contribution of the land, labour etc. and most importantly non-cooperation of beneficiaries in attending the meetings conducted by them.

Though the primary objective of watershed – the management of natural resources through people's participation leading to sustainable development – has been achieved to some extent, the benefit has not percolated down to the fullest extent mainly due to the apathy on the part of the authorities.

References

1. *Dash, P. K., Dash, T., & Kara, P. K. (2011). Le rôle des institutions locales dans la gestion durable des bassins versants: Enseignements de l'inde. Development in Practice, 21(2), 255-268. https://doi.org/10.1080/09614524.2011.543271*
2. *Gadgil, P. M. (2011). Report of the Western Ghats Ecology Expert Panel. http://www.iphindia.org/archives/7683*
3. *George, C. (2011). Water resources development in tribal areas of idukki district (Issue April). Western Ghat Cell, Planning and Economics Affairs Department, Government of Kerala.*
4. *Jim Smyle, Crispino Lobo, Grant Milne, A. M. W. (2014). Watershed development in india An Approach Evolving through Experience (No. 04; Agriculture And Environmental Services Discussion Paper 04 Watershed, Issue March). www.worldbank.org*
5. *Khalid Malik and et.al. (2014). Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience. In Human Development Report 2014. the United Nations Development Programme. https://doi.org/ISBN: 978-92-1-126340-4*
6. *Thomas Webler, S. (2001). Public Participation in Watershed Management Planning?: Views on Process from People in the Field. Research in Human Ecology, 8(2), 29-40.*
7. *Bank, W. (1999). The World Bank annual report (English). ; . Washington DC : The World Bank. Commission, P. (2001). Report on water source of India. Govt. of India.*
8. *Emily Schmidt and Fanaye Tadesse (2014). Sustainable agriculture in the Blue Nile Basin: land &watershed management practices in Ethiopia. Environment &Development Economics, 19, pp 648-667.*

9. *Joy, K. J., Paranjape, S., Kirankumar, A. k, Lele, R., & Raju, A. (2004). Watershed development Review: issues and prospects. Centre for Interdisciplinary Studies in Environment and Development*

10. *Pat, A. K. (June 11,2005). Black Spot in Kerala's Economic Scene,. Economic and Political weekly, 23 & 92.*

11. *SS Khanka, A. B. (2006, July). Participatory Watershed Management. Kurukshetra, p. 12.*

12. *Schmidt, E., & Tadesse, F. (2014). Sustainable agriculture in the Blue Nile Basin: Land and watershed management practices in Ethiopia. Environment and Development Economics, 19(5), 648-667. https://doi.org/10.1017/S1355770X13000570*

13. *Western Ghats Development Programme. (n.d.). Retrieved from http://planningcommission.nic.in/plans/annualplan/ap2021pdf/ap2021ch10-2.pdf*