



Importance Of Water Resource Management Development Programme On Betterment Of Rural Livelihoods: A Discussion

Priyaranjan Sahoo¹Dr.Bibhu Santosh Behera²Dr.KSS Rakesh³PRK
Rao⁴Patrick Kalifungwa⁵

1. PhD Student of LIUTEBM University,Lusaka,Zambia

2. Research Mentor,LIUTEBM University

3,4,5 Director,Outreach, Faculty & Hon'ble VC,LIUTEBM University

Abstract:

The purpose of the study was to assess the usefulness of various Water resource management development programs on enhancing the livelihoods of rural communities. The study employed a descriptive survey research design collect the betterment impacts on rural folks which are foremost needy to uplift their status of livelihoods. The target population for the study included management committee and the local community members. Data was collected using semi-structured questionnaires and interview schedule. Data was analyzed using Statistical Package for Social Sciences. The Research has been conducted in the Year 2022 in Odisha for the partial fulfillment of award of Doctoral Degree.

Keywords: impacts, rural communities, livelihoods.

Introduction

The institutions of collective action and system of property rights shape the utilization of natural resources. The patterns of usage in turn impact the outcomes of people's agricultural production systems. Together, strategies of collective action and property rights motivate people to undertake sustainable and productive management approaches. And they affect the level and distribution of benefits and livelihood from natural resources. The introduction of the Water Resource Management is not a goal in itself, but a means of resource management that augments the livelihood of Water Resource Management beneficiaries. "A livelihood comprises of the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope up with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihood at the local and global levels and in the short and long

run” (Chambers and Conway 1991, p.6).

In this background, the present chapter tries to examine the impact of the Water Resource Management project on rural livelihood. This chapter comprises of three sections. The first section deals with the introduction, livelihood framework, given by DFID (2000a), Baumann, Sinha (2001), and description of the existing sources of livelihood. The second section is about the empirical findings from the study areas. It analyses the impact of the Water Resource Management on different livelihood assets. The third section concludes the chapter. The DFID initiated WORLP programmes to eradicate poverty and to provide sustenance to the poor people residing in the most backward districts of Odisha. These programmes adopted ‘Water Resource Management Plus’ approach, which in turn, follows ‘Livelihood Guidelines’ made by the Odisha Water Resource Management Development Mission (OWDM) since June 2004. The PIAs of the twodistricts namely Balangir and Nuapada adopts these guidelines.

Literature Review:

Review:1 In the year 2012, Sundaram, A. in his study “Empirical Study on Impact of Integrated watershed Development project in Mizoram state of north east India” observed that among 7 watershed villages in Mizoram, Jhum cultivation causes serious land degradation and ecological problems in Mizoram. Integrated Wasteland Development Programme (IWDP) was carried out on basis of land and water resource management. This study has examined its effect on sustainable development of natural resources, environment protection, and improvement of the socio-economic conditions of the resource poor sections on participatory approach. Generally, people in the watershed area are spontaneously appreciated the watershed project because of its affiliation towards common poor as compared to the other centrally sponsored schemes. Revealing the livelihoods outcome, most of the activities have helped in promoting agriculture in a broad manner which is the vital portion of the rural livelihoods but also in empowering communities, especially the marginalized in social, financial and human development projects. Migration from project villages reduced as work was locally available during the lean season. Also, many households were able to repay their old debts.

Review:2 Singh, P and et. al. in their review analysis and documentation “Impact and effectiveness of Watershed Development Programmes in India” revealed that apart from the major advantages from Watershed Development Programmes like qualitative Water Harvesting Structures (WHS, reduction in soil erosion, increase in surface water and ground water, change in land use pattern and cropping intensification, reduced work burden, debt reduction position, people’s participation, social audit, various other benefits such as reduced migration, women empowerment, etc. were noticed in many regions of 12 states. But it was observed the benefits were not maximized without proper social mechanisms. Women participation in community institutions was still limited and landless communities, weaker sections were still left out of the land focused programmes. Employment opportunities for the community members were increased with better wage earnings in construction work during pre-watershed and engagement in the agricultural field during post watershed programmes. But there were no such specific formal mechanisms developed to enhance the ongoing opportunities.

Review:3 In the year 2019, Singh, A. and et. al. in their study “Impact of Watershed Development Programmes on Livelihood Conditions of Farmers in Haryana” revealed that the impact of watershed development programmes on agricultural production, yield, cropping pattern and cropping intensity, livestock population, milk production and feed and fodder. By focussing the randomly selected 2 districts along with 30 beneficiary and 30 non-beneficiary households, the study assessed the impact of DDP and IWDP watershed development programmes had been positive on agricultural yield, cropping pattern and benefit-cost ratios in watershed area (WSA), while impact had been weak on cropping intensity. The study also found that the watershed development programmes had positive impact on the population of livestock in WSA of Bhiwani and Rohtak districts, but it had weak impact in Hisar and Kaithal districts. The impact of DDP on total milk production and green fodder was positive in both of Bhiwani and Hisar districts but weak impact on IWDP programme. Both programmes had positive impact on employment generated in per acre man-days from agriculture. DDP had positive impact on employment generated from livestock.

Review:4 In the year 2012, Sadhukaran, S. in his study “Impacts of water resource projects on rural livelihoods in the Bundelkhand region” attempted on the potential impacts of the water resource projects on the rural livelihoods of this region. Most of the natural resources of Bundelkhand region have been depleted due to the erratic and indiscriminate behavior of the monsoon coupled with degraded and infertile land. Low Income level of the inhabitants portray the reality of the abject poverty of this ill-fated region. It has been in the news for its drought conditions that have plagued it. This region has lost its past legendary glory, as it is crippled with the mass migration, starvation deaths and farmer’s suicides and even the “mortgaging” of the women over the years. The state government and the central government have initiated plethora of water resource projects and schemes to improve the aching and distressful physical and socio-economic condition of this region focusing their livelihoods.

Research Methodology:

In the Year 2021-22, the Researcher namely Priyaranjan Sahoo, et.al has taken this study purposively to visualize and observe the pivotal role of Water Resource Management Development Programme on developmental promotion of livelihoods of rural communities focusing on Aquacultural system. Here the Participatory Rural Appraisal Tools and Sustainable Livelihoods Framework used for analyzing the fundamental database in the said research.

Statistical Tools Used in Research:

Participatory Rural Appraisal Tools and Sustainable Livelihoods Framework:

Table 6.1 and 6.2 reports the Sustainable Livelihoods Framework and WORLP schemes. In all the WORLP schemes the Project Implementing Agency, (PIA) conducted a ‘Well- Being Rankings’ of the all the households in the micro-Water Resource Management villages to identify the targeted groups. The ‘Well-Being Ranking’ is a Participatory Rural Appraisal (PRA) tool that categorizes the families based on their socio-economic status. It categorizes them into the four well-being rankings; very poor, poor, manageable and well-off. WORLP projects intervened in those areas where 80 percent of the population is below the povertyline. During the 1990s,

DFID developed Sustainable Livelihood (SL) framework consisting of five core elements of livelihood, i.e., financial, human, natural, physical and social capital (Figure 6.1).

Table 6.1: Budget allocation under the WORLP scheme

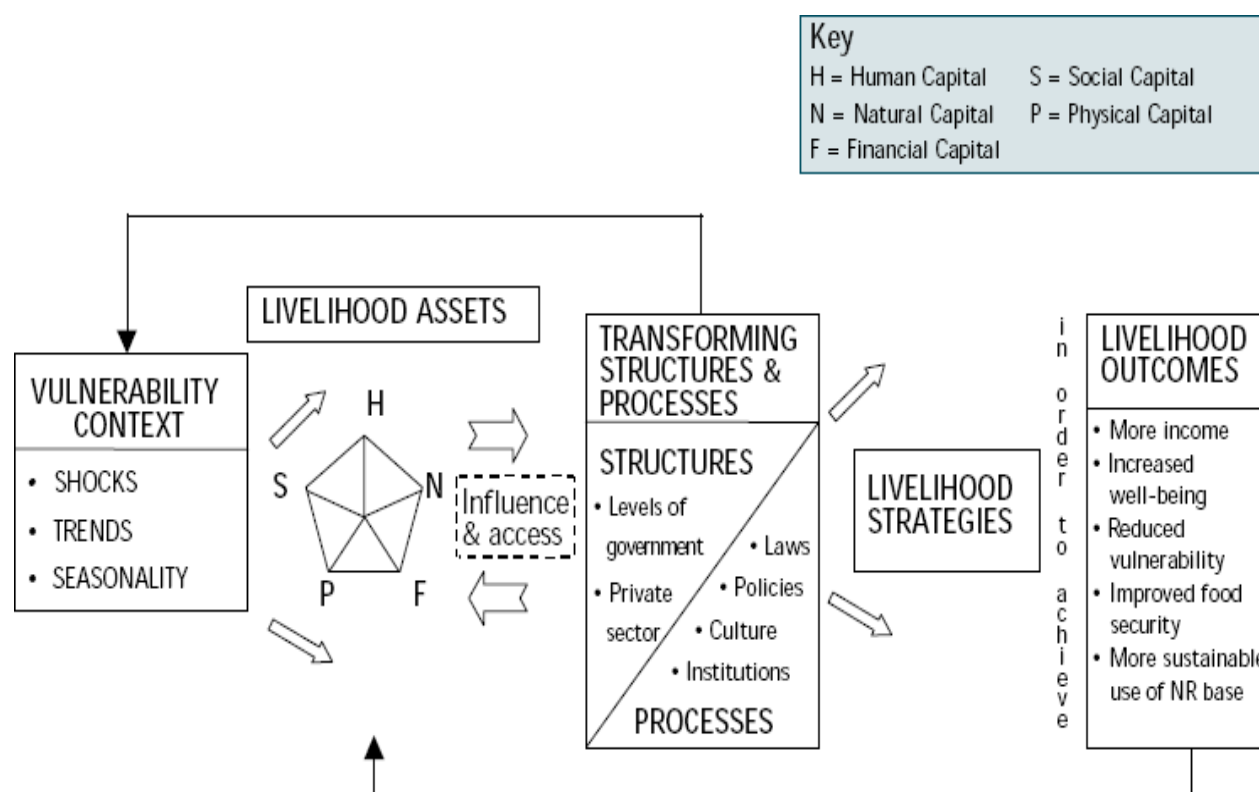
Budget head	Budget per hectare(In Rs)	Budget per micro Water Resource Management of 500 hectare (Rs. in lakh)
Water Resource Management Fund	6000	30.00
Livelihood Fund	3500	17.50
Total	9500	47.50

Source: Odisha Water Resource Management development mission, 2010).

The vulnerability in DFID's framework shows that livelihoods are vulnerable. There are different elements like economics shocks, critical trends and seasonality that influence and shape the livelihoods. People have limited or no control over the factors mentioned above. The DFID defines the people's strengths as "assets" or "capitals. Their livelihoods are drawn on some of the defined capitals. Therefore, the livelihood framework focuses on five critical capital assets (human, social, natural physical and financial). These assets are converted into positive livelihood outcomes (in the form of income, increased well-being status.). Apart from this, the framework also analyses the structures and processes operating at different levels.

The policies, laws, culture and institutions operate at various levels, from the household to the international level, and in all spheres including the government and the private sector. They regulate the accessibility of different types of capital, the livelihood strategies and the decision-making bodies (DFID, 2000b). Along with the five capital assets discussed by the DFID, Baumann and Sinha (2001) have added political capital to analyze the impact of natural resource management programme on rural livelihood (Figure 6.2). The concept of political capital has incorporated the analysis of the institutional set up for Water Resource Management development. This analysis is because Water Resource Management development is centrally planned poverty alleviation programme and work as a means to safeguard the political allocation of limited resources of the state. Political capital permitssignificant insights into the dynamics of Water Resource Management systems and the shifting costs of change (Baumann, 2000).

Figure 6.1: Sustainable livelihood framework by DFID (2000)



Result and Discussion:

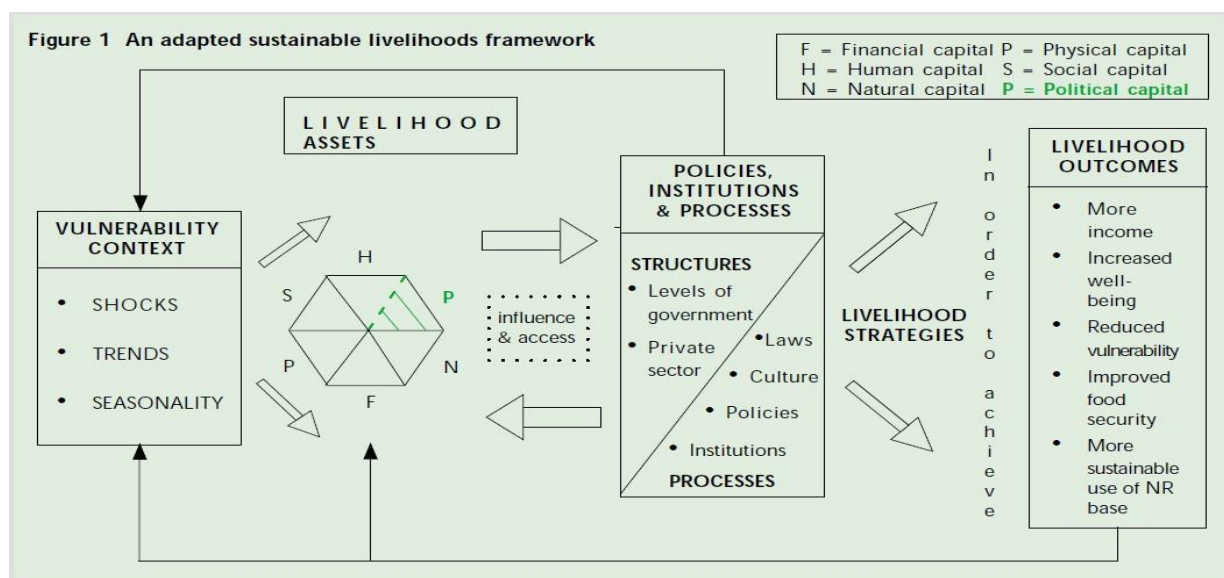
Existing sources of livelihood

The analysis of the information given by the beneficiaries show that, three primary sources of livelihood existed. These three sources of livelihood comprise of agriculture related activities, the collection of Non-Timber Forest Products (NTFPs), and daily wage labour work. Agriculture is the main occupation for almost all beneficiaries. Paddy is found to be a principal crop. Along with this, they also cultivate pulses, oil seeds, *moong dal* (green gram), and *chana* (chickpeas, brown). Before the implementation of the Water Resource Management project (nearly ten years back) along with agriculture, the forest was also a primary source of livelihood. Majority of the landless and women groups were engaged in the collection of herbs and NTFPs such as *kendu* leaves (*diospyros melanoxylon*), *mahua* flower (*madhuca longifolia*), *neem* seeds (*azadiracta indica*), *sal* leaves, firewood and bamboo. They sold these products in the market and used to earn their livelihood.

However, owing to gradual degradation and deforestation the dependency of the people on the forest for their livelihood has decreased. But still forest continues to be one of the primary sources of livelihood. The respondents informed that they walked around four to five kilometres to collect fuel wood and *sal* leaves for making the disposable plates due to the degradation of forests and increase in the population. They sell these plates in Balangir town and earn nearly 500-800 rupees per month. Sometimes, they have to go to the forest near Sambalpur (approximately 140 kilometres) for the collection of other NTFPs. Some of the beneficiaries work in the *kendu* leaf factory as a subsidiary source of livelihood. During the field visit, it was found that few people adopt illegal means to procure forest products. They sell fire wood and trunk of trees

in the market or to the furniture making agencies. Many people earn their livelihood from daily wage labour work apart from the agriculture and forest resources.

Figure 6.2: Sustainable livelihood framework given by Baumann and Sinha (2001)



Intervention of Water Resource Management development programme and livelihood

The introduction of the Water Resource Management programme is expected to have a direct bearing on the livelihood. The impact of the Water Resource Management project on the livelihood of both the NGOs and GOs implemented Water Resource Managements is measured by taking different indicators, such as the impact on financial, natural, social, physical, human and political capital. In the following section, an attempt is made to analyse the effects of the Water Resource Management programme on different aspects of people's livelihoods through the perception of respondents.

Financial capital

In the DFID's sustainable livelihood framework, financial capital is defined as the financial resources available to people. This can be in the form of savings, credit, remittances and any other sources. The impact of the Water Resource Management project on financial capital is essential to analyse because it is linked with the overall socio-economic status of a beneficiary. Improvement of financial capital is the indicator of better employment opportunities and income. It was observed that better employment and good returns from agriculture increased the income level and created the potential for more savings. During the study, the impact of the Water Resource Management on financial capital was observed by assessing many factors. These factors include impact on agricultural productivity, crop yields, cropping pattern, employment, impact on women labour days, migration, household income expenditure, saving, credit and indebtedness. There were different means adopted for the measurement of improvement of financial capital by the farmers. The means adopted by the farmers are discussed below.

Increased agricultural production

There are mainly three ways by which the rainfed area, rehabilitation and development is possible. These are increased agricultural productivity, improved natural resource conservation, and more equitable and sustainable management of common property resources (Dishingkar, 2004). As mentioned earlier, both the areas are rainfed areas; it is found that Water Resource Management improved the financial capital by improving the agricultural productivity. Three varieties of paddy cultivation are practised in both the Water Resource Managements.

These are small duration paddy called *saria*, which is harvested in *Kharif* season, medium duration paddy like *arnapura*, *lalata* and long duration paddy with high yielding varieties such as *swarna*. Table 6.2 shows the changes occurred in the production of some principal crops after the introduction of the Water Resource Management. It is found that Water Resource Management has a moderate impact on paddy production in comparison to other crops. Along with *dhan* (paddy), in NGO implemented Water Resource Management, main *Kharif* crops (monsoon crops) are moong (green gram), *arhar* (split pigeon peas), *chana* (chickpeas brown), *kultha* (horse gram), *mungfalli* (ground nut) and jute. These are cultivated mainly on the *att jami* (plain land). Most of the farmers also grow jute, split pigeon peas and paddy together. The farmers sometimes go for line sowing of green gram, split pigeon peas and jute. In this type of mix cultivation, they do four lines of green gram and split pigeon peas in one line and jute in between. They harvest moong after sixty-five days of cultivation, jute after hundred days and split pigeon peas after one hundred eighty days. In this type of mixed farming before the Water Resource Management project they used to produce around 50 kilogram (kg) of green grams, 20kg of split pigeon peas, 10 kg of jute, and 40 kg of horse gram per acre.

Apart from this if farmers go for groundnut cultivation as a single crop, they produce one quintal per acre. Few of the farmers also go for transplantation of tomato seeding. The growing of chickpeas brown and mustard seeds is also found. The productivity of chickpeas brown and mustard seeds per acre are one quintal and 10 kg respectively. However, the implementation of the Water Resource Management has increased the productivity of green gram, groundnut and chickpeas brown. Now per acre production of green gram, groundnut and chickpeas brown are 80 kg, one quintal 50 kg and 30 kg respectively. The output of remaining food grains or cash crops has remained unchanged.

Table 6.2: Changes in productivity of different crops before and after Water Resource Management

Type of WS	Type of food grains	Before WS (in quintals/ per acre)	After WS (in quintals/ per acre)
NGO	Paddy	13 quintals	17 quintals
	Green gram	50 kilogram (kg)	1 quintal
	Split pigeon peas	20 kg	No change
	Chickpeas brown	1 quintal	1 quintal 50 kg
	Horse gram	40 kg	No change
	Ground nut	1 quintal	1 quintal 30 kg
	Jute	10 kg	No change
GO	Paddy	15 quintals	18 quintals
	Green gram	70 kg	1 quintal
	Split pigeon peas	60 kg	No change
	Chickpeas brown	1 quintal 30kg	1 quintal 80kg
	Ground nut	1 quintal 20kg	1 quintal 50kg

Source: Field Study

Even though the Water Resource Management project increased the per capita crop production, it was not observed to be equal among all the land holders. It is important to know that prior to the introduction of the Water Resource Management, only 30 percent of the semi medium and medium farmers were raising *Rabi* crops (winter crops) but after Water Resource Management 70 percent farmers are growing *Rabi* crops. In case of small farmers and marginal farmers, only 30 percent and 10 percent of the farmers were engaged in cultivation that has increased up to 40 percent and 20 percent respectively in the post-project period. To make the farmers aware about the cultivation of suitable crops in different seasons, the PIA has set up an institution called *Krishi Bikash Kendra* (farmers club). However, it failed to motivate all farmers to participate.

In the GO implemented Water Resource Management area, the pre-project agricultural production of paddy, green gram, split pigeon peas, chickpeas brown and ground nut was one quintal, 70 kg, 60 kg, one quintal 30 kg and 20 kg respectively. Few farmers also pursued the transplantation of potatoes. During post-project, the productivity of green gram and ground nut has increased about one quintal and one quintal 50 kg per acre respectively. However, there was no significant increase in the production of other food grains. The contribution of irrigation sources on private land in Water Resource Management activities has increased the production of food grains. Here majority of the wealthy farmers can afford the private irrigation sources as compared to the NGO implemented Water Resource Management. The introduction of the Water Resource Management had increased the *Rabi* cultivation, before the Water Resource Management, around 40 percent of the semi medium and medium farmers used to go for *Rabi* cultivation, now it is 60 percent. However, the situation is same in the case of small and marginal farmer. While 30 percent of the small and one percent of marginal farmers were going for *Rabi* cultivation before the Water Resource Management project, now it has grown up to around 50 percent and 20 percent. After the Water Resource Management project, remarkable development has been found in the cultivation of sunflower and vegetables like tomato, potato and onions.

It is learnt that just after the completion of the Water Resource Management project initially for two years the production was higher, as the water level was higher in different water bodies. So many reasons were found for the variation in production, such as, the size of landholding, ability to invest agricultural hybrid seeds and fertilizers, high level of motivation, possession of skills, cropping pattern, awareness to market price. The semi medium and medium farmers have been found to invest more in agricultural inputs and participated more in Water Resource Management activities. In case of small and marginal farmers although the ability to invest in agriculture is less, lack of participation in the Water Resource Management project has stood as a hurdle in the improvement of agricultural production. It was observed that due to lack of involvement and cooperation among the farmers, they are not able to access the Water Resource Management assets. However, in most of the cases the influential farmers using their man and mussel powers extracted the available resources. Thus, it reflects the fact that merely implementing the Water Resource Management project is not sufficient for irrigation, water, agricultural production and sustainable livelihood.

Yield components

As a result of the Water Resource Management project, the yield components of the crops have improved. However, the yield growth rate in the NGO implemented Water Resource Management areas is higher than the GO implemented Water Resource Management. The factors for higher growth are the use of better irrigation, high yielding variety (HYV) seeds, advanced fertilisers and lesser use of traditional implements. In NGO implemented Water Resource Management, it was observed that before the introduction of the Water Resource Management project around 40 percent of the farmers were cultivating indigenous crops. But after the introduction of Water Resource Management almost 90 percent have adopted HYV seeds.

It is pertinent to note that, before the advent of the Water Resource Management project, most of the farmers were using 3-4 varieties of HYV seeds but now they are using around 7-8 varieties of HYV seeds. Another change is found concerning the use of chemical fertilisers and pesticides. Principal fertilisers that were used by them were made up of cow dung. This situation has changed after the introduction of the Water Resource Management project. Presently, almost all the farmers are using chemical fertilisers in their fields. The farmers stated that the declining of common grazing land caused the decline of livestock in the villages and, as a result, there is a shortage of compost now.

The change was also marked in the use of agricultural equipment. The tractor, which was very rare in pre-Water Resource Management period, has replaced the plough. In case of GO implemented Water Resource Management, it was found that before the introduction of the Water Resource Management project around 60 percent of the farmers were cultivating indigenous crops. But after the introduction of Water Resource Management, almost 90 percent of the farmers have adopted HYV seeds. The data shows more or less similar type of results regarding the changes in usage of HYV seeds, and fertilizer usage and tractors use for cultivation. In addition to this the yield rate has also increased. The growth rate of yield is higher among the semi medium and medium farmers than marginal and small farmers.

Lack of accessibility of irrigation and poverty are the major constraints for the marginal and small farmers

to improve the yield rate of their cultivation. The PIA officials failed to provide them a sustainable source of irrigation. The agricultural equipment provided by the PIA to Water Resource Management officials has failed to meet the requirement of poor and marginal farmers. Again due to lack of participation in Water Resource Management activities and improper coordination between Water Resource Management officials with all the categories of farmers, poor farmers were not able to get the information about the machines that could be provided to them at subsidised price. In both the Water Resource Managements, the semi medium and medium farmers irrespective of their caste and communities informed that the yield rate of their crops has increased.

Cropping pattern

The Water Resource Management had a real impact on the cropping pattern in all the villages. In NGO implemented Water Resource Management areas while previously most of the farmers were cultivating only cereals and paddy, now as a part of the multi-cropping system they are growing vegetables and horticulture along with paddy and pulses. As a part of Water Resource Management activities, the PIA officials have organised a farmers' workshop to make the farmers aware of some new pattern of cultivation and also some horticulture. However, it has not brought much change in the cropping pattern. Only 20 percent of the farmers have changed their cropping pattern (cereals) other than paddy. Others feared that if they change the cropping pattern they may lose all the crops. Still all are cultivating the crops according to their wish. During field work, some farmers revealed that, as they do not have proper training to cultivate other crops or horticulture they are still continuing with paddy cultivation. In the case of GO implemented Water Resource Management, noticeable changes did not take place in the cropping pattern. After the Water Resource Management project, 70 percent of the farmers, are going for the double crop (cereals and paddy) while it was only 20 percent before the implementation of the project. Most of the farmers complained that they have not received proper information regarding cropping pattern and availability of water either from the block office or the PIA officials.

Employment

Water Resource Management projects usually generate vast rural employment, more irrigation coverage and increased cropping intensities along with soil and water resource conservation (Bhattacharya, 2008). In both the Water Resource Management areas, the raising of crops during *Rabi* season by many farmers has increased employment opportunities for the landless. Along with the agricultural labour work, the poor people also got some non-agricultural daily wage labour work. The beneficiaries from NGOs implemented Water Resource Management areas experienced substantial increase in male employment rate (Table 6.3) after the intervention of Water Resource Management projects. While the employment opportunity for male labourer in agricultural sectors has increased up to 100 percent, it is 50 percent in case of non-agricultural sector. Opportunity for female labour has increased in the non-agricultural sector (100 percent) than in agricultural (50 percent). The Water Resource Management project converged with the Indira Awas Yojana (IAY) and sanitation work created employment opportunities.

Similarly in GO implemented Water Resource Management after the introduction of Water Resource Management project the average employment in agricultural related activities of male and female has gone up to

33.33 percent and 0 percent respectively, and in non-agricultural activities the average income has increased up to 100 percent and 33.33 percent. Though the primary objective of the Water Resource Management project is to create the employment opportunities for both the landless and land owner, landowners have got the more benefit since the land related activities has dominated the Water Resource Management project work. It was also found that the introduction of the Water Resource Management has generated more non-agricultural employment opportunities for female as compared to the male, and it has created more agricultural work for the male than female.

Table 6.3: Average employment in farm and non-farm activities before and after Water Resource Management

	Sources	No. of days		No. of days		percent of increase	
		Before Water Resource Management		After Water Resource Management			
		Male	Female	Male	Female	Male	Female
NGO	Agricultural	30	10	60	15	100	50
	Non-agricultural	30	15	45	30	50	100
GO	Agricultural	45	10	60	10	33.33	0
	Non-agricultural	10	30	20	40	100	33.33

Source: Field study

Impact on women labour

The introduction of the Water Resource Management project has increased the labour opportunities for women. In NGO implemented Water Resource Management the revolving fund given to SHGs encouraged women to start the business-like goat rearing, poultry, *mudi* (puffed rice) business and *Kirana* shop (grocery). PIA officials also initiated the institution called Meena club for the adolescent girls of the village. This club aimed at providing vocational training like tailoring, food processing, making of toys and facilitated them to market it. During the focused group discussion with women members, it was informed that nearly 30 percent of the girls got the benefit by this club. But the club did not function properly because of non-cooperation of parents of girls and lack of good trainers provided by the PIA. Earlier women used to work in other's field or sometimes as housemaids in wealthy households.

But after Water Resource Management project some of them are engaged in small scale business and livestock rearing. In GO implemented Water Resource Management no club established exclusively for the women groups. Some of the women groups complained that at the beginning of the Water Resource Management project the PIA promised them to give sewing machine and training for the tailoring but they did not fulfil. After the Water Resource Management project due to the availability of water, few of the women groups have started cultivating vegetables and earned the money.

Migration

The social, economic, political and environmental problems are the primary cause that forces people to migrate. The rate of migration is one of the indicators to access the employment potentiality of a region. The data collected from both the Water Resource Managements established a positive relationship between the Water Resource Management project and migration of people. Table 6.4 shows the migration rate of Water Resource Management beneficiaries. The data is analysed by using descriptive statistics in Statistical Package for Social Sciences (SPSS version, 20.0). The table depicted that in NGO implemented Water Resource Management before the introduction of the Water Resource Management project out of the total sampled population nearly 34.1 percent were migrating to the other neighbouring states for work. But while having the interview, beneficiaries informed that there was a significant decline in the migration after the Water Resource Management. Now only 19.2 percent are migrating. It was found that migration was mainly confined to the SC (40.4 percent) and ST (28.1 percent) communities before the implementation of the Water Resource Management project.

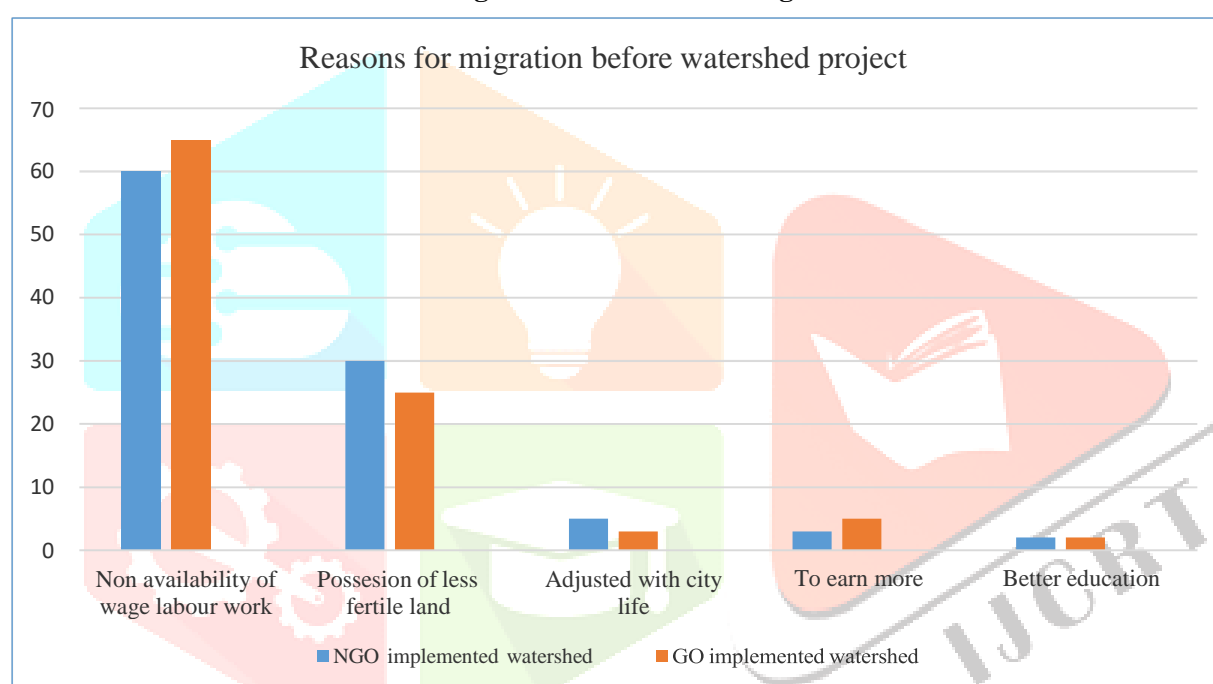
However, after the implementation of Water Resource Management it is higher among SC (37.5 percent) and OBCs (31.3 percent) beneficiaries. There were many factors that caused the migration of the people before the introduction of Water Resource Management programmes. Figure 6.3 shows these primary factors that compelled the people to migrate before the implementation of the Water Resource Management. These factors are non-availability of daily wage labour work (60 percent) and possession of less fertile land (30 percent). Other factors include adjusted with the city life (five percent), to earn more (three percent) and for better education (two percent). After implementation of the Water Resource Management, a remarkable reduction was found in these factors. Most of the OBC households (70 percent) migrated in the post-Water Resource Management period to earn money. In the case of GO implemented Water Resource Management the percentage of migrants was reduced after the Water Resource Management project. The total population used to migrate were 29.2 percent that has reduced to 17.8 percent after the Water Resource Management project.

The analysis of data shows that migration rate was higher among the SC and ST, beneficiaries in the pre-post Water Resource Management period. The findings of the field study show that the non-availability of wage labour work (65 percent) and less possession of fertile land (25 percent) were the dominating factors of migration before the Water Resource Management (Figure 6.3). Other respondents informed that the reason for migration was to earn more (five percent), adjusted to the city life (three percent) and for better education (two percent). The analysis of data collected from both studied areas shows that the reason for migration differs from community to community. It was found that many SC and ST families migrated to brick-making factories in Hyderabad (Andhra Pradesh) and textile factories in Surat (Gujrat) and Bhadohi (Uttar Pradesh) because of their poverty. Among OBC, it was for getting the better employment or to earn more money. The general caste people mainly migrated to get a higher education. On the other hand, the youths of the village once acquainted with a new lifestyle in the places of migration wanted to stay there.

Table 6.4: Rate of migration before and after implementation of Water Resource Management project

Category	NGO made Water Resource Management		GO made Water Resource Management	
	Before	After	Before	After
SC	23 (13.8)	12 (7.2)	23 (9.7)	18 (7.6)
ST	16 (9.6)	6 (3.6)	21(8.9)	13 (5.5)
OBC	13 (7.8)	10 (6.0)	18 (7.6)	7 (3.0)
GC	5 (3.0)	4 (2.4)	7 (3.0)	4 (1.7)
Total	57 (34.1)	32 (19.2)	69 (29.2)	42 (17.8)

The rate of seasonal migrants is higher than the permanent migrants. The Water Resource Management has enhanced the economic status of the farmers for which the migration rate has decreased in all the studied villages.

Figure 6.3: Reasons for migration

Source: Field Study

Household income

Water Resource Management project in both the studied areas has good impact on household income. To know the impact of Water Resource Management project on the income level, the data on before and after Water Resource Management is compared. Table 6.5 shows the average income level of different communities from agricultural and non-agricultural labour sources before and after the Water Resource Management in both the studied areas. The analysis of the data collected from NGO implemented Water Resource Management shows that a huge growth was observed in the case of annual income from the source of agricultural laborer in post implementation period. However, the growth rate was not similar for both male and female. While in the case of male the growth rate was 115.38 percentage, it was 83.33 percentage for female. With regard to the growth of annual income from non-agricultural labour activities it shows that while 76.47 percentage growth held in the case of male laborer; it is 57.14 percentage in case of female. In the GO implemented Water Resource Management areas it was observed that the average annual income

of a male agricultural laborer has increased from Rs. 1175/- to Rs. 1925/-(63.82 percentage growth). The annual income of female agricultural laborer has gone up to Rs. 666.66/- from Rs. 466.66/- (42.85 percentage growth). A significant growth

(57.89 percentages) was also marked in the average annual income of a male labour from non-agricultural activities. Before Water Resource Management it was Rs. 1266.66/-. Now it has increased to Rs. 2000/-. Apart from this the annual income of a female labour from non-agricultural activities has enhanced from Rs. 550/- to Rs. 750/- in post project period (36.36 percentage growth) (Table 6.5). The result indicates the gender difference in increment of level of income. Caste based occupation was found to be dominant from the results. Upper caste people refrained from labour work for conforming to caste-based stereotype.

Conclusion of the Research:

Opportunity for family labour

The Water Resource Management project has generated employment for almost all the family members. In NGO implemented Water Resource Management it has created employment for female members as labour in both agricultural, its allied and non-agricultural sector through SHGs and promoted the business of making disposable plates. The *Rabi* cultivation encouraged by the Water Resource Management also provided the labour work to women groups. In GO implemented Water Resource Management, the opportunity for family labour work was relatively lower than the NGO implemented Water Resource Management. It may be because the *Rabi* season cultivation was not as much improved as in NGO Water Resource Management villages. Again, the SHG revolving was not very much sincere as discussed earlier.

Reference:

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

Singh, P and et. al.: Impact and effectiveness of Watershed Development Programs in India: Centre for Rural studies, National Institute of administrative research Lal bahadur Shastri National Academy of Administration: A review analysis and documentation. Pp40-55.

Singh, A. and et. al. (2019). Impact of Watershed Development Programmes on Livelihood Conditions of Farmers in Haryana, NIRD & PR, Journal of Rural Development: 38(1).

Sadhukaran, S. (2012). Impacts of water resource projects on rural livelihoods in the Bundelkhand region, Research article- International Conference Water resources and Wetlands, Tulcea, Romania.

Acknowledgement:

I hereby acknowledge the Research which has been contributed by me is a result of the teaching of my Academic Faculty Dr. Bibhu Santosh Behera, Prof KSS Rakesh and also Hon'ble VC Patrick Kalifungwa. I am grateful and thankful to my parents, my Living Ideal and family members.