

# Environmental, Economic and Social Impact of Watershed Development Project (WDP): A Case Study of Adnem and Bali Village]

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**Abstract:** Increasing day today needs of humans have burdened on resources. In terms of resource development it covers development and management of resources like soil, water, and plants, animal, human and all associated components. The total resources can be properly developed only by adopting the watershed approach. The basic unit of development is a watershed, which is manageable hydrological unit. In this approach, development is not confined just to agricultural lands alone but covers all the area starting from the highest point of the watershed to the outlet of the major lower channel. The major concern of development program to provide opportunity to backward section of the society. Agriculture is the major source of income where implementation of such programme provide wide opportunity to have subsistence yield and aware about the water resource in their surroundings. Which results in better environment and it helps in preserving natural resources. In a view of this Mineral Foundation of Goa (NGO's) carry WDP for community development and cooperative work for villager of Adnem and Balli village which managed through Self Help Group (SHG). The work status under WDP is perform through involving the village people (Women's) in various activities like digging trenches, sunken pond, constructing dams etc. Along with various training programmes are run for making local women's self-employable. As a case study two village have surveyed and simple statistics is used to derive growth of a region.

Key words: WDP (Watershed Development Programme)

## I. INTRODUCTION

Watershed development refers to the conservation regeneration. In terms of resource development it covers development and management of resources like soil, water, and plants, animal, human and all associated components. The total resources can be properly developed only by adopting the watershed approach. Watershed management is an integrated and interdisciplinary approach involving manipulation of natural agricultural and human resources to provide goods and services that are required for the sustainable development of the watershed community. Watershed management must consider the social, economic and outside the watershed.

Watershed management usually involves the use of watershed natural resources by people with their active involvement in harmony with the ecosystem. Watershed development tries to bring about the best possible balance in the environment between natural resources on one side and man and grazing animals on the other. It requires people participation for conserving the natural resources, which has been destroyed.

### I. THE STUDY HAS BEEN UNDERTAKEN WITH THE FOLLOWING SPECIFIC OBJECTIVES –

1. To study the changes in cropping pattern, land use.
2. To examine the changes in the ground water level.
3. To examine people's participation in watershed program & women empowerment in WDP.

### DISCUSSION:

Watershed Development Programme (WDP) is run through planning commission of India where it involves a rearward section of the society (ST's – Velip Community) for constructing various preventive measures (trenches, gully plugs, sunken pond, boulder dams etc.) for water conservation. Along with these training workshops are conducted to make them self-employ. The selection of watershed are done by delineating a river catchment and the study area comes under Sal River watershed. To specify the physiographic pattern of the area it falls under foothill of Western Ghat and topography structured is undulated which results in high volume of surface water runoff in rainy season. In summer seasons due high evapotranspiration the surface loses its water and results in decrease in ground water level. In same period some parts of the watershed (like Kupwad) face the water scarcity problem and tanker water is supplied them..

### Watershed Development Programme in Goa:-

In order to develop of water resources like local lake, river or stream, it is necessary to look at how the land affects the water and that involves those that live in that area. Average annual rainfall in Goa is 120inch (3500mm). On an average temperature ranges between 20°C to 32° C. Weather conditions of Goa during summer season (April to May) is hot and humid, with daytime temperatures peaking in the high 30°C, this criteria give a clear location of the Goa in tropical region. Amount of water hold by the rivers of Goa like Mandovi and Zuari (major) and other small rivers is very high. Rivers of Goa discharges huge

amounts of water during monsoon season into Arabian Sea. In order to develop this potential resource, detail study and development of each river watershed is essential.

Watershed development projects which would bring 40,000 hectares of rain-fed land as well as wasteland under cultivation in the next three years. The beneficiaries under these projects would be growers of cashew, coconut and paddy. It is a public-private partnership involving seven non-governmental organisations (NGOs) with the State Government agencies, led by Agriculture Department and Rural Development Agency funding the ventures through National Water Development Programme for Rain-fed Areas, Integrated Wasteland Development Project and Western Ghats Development Programme. Most of these projects, which were aimed at developing natural resources (soil, water and vegetation) and social resources (local people), were past the midway five-year mark, said officials of Agriculture Department.

The NGOs are trying to rejuvenate the water resources in villages. As for instance, Gram Vikas Kendra is working at Savoiverem, Pale Kothambi, Verem, Vagurme, in Central Goa, (Tata) Energy Resource Institute in Maulinge- Bicholim, Nirmal Vishwa in and around Ponda taluka in central Goa, Goa State Council for Science and Technology under Department of Science and Technology at Morpilla-Quepem and at Khola in Canacona and Don Bosco's Konkan Development Society at Sulkarna, Nune in Sanguem-Quepem taluks, and zonal agricultural office at Varkhand, Pernem have been associated with various projects. Goa Mineral Foundation (GMF), a body set up by iron ore Mining Cooperation to take up socio-economic projects for the people of mining areas as well as environmental and ecological regeneration projects in the mining areas. Two such projects, one each in North Goa's Mayem area and one in South Goa's Pirla-Cavrem and Rivona have involved self-help groups in watershed projects.

**Role of mineral foundation in watershed Development Programme:**

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The five year objective of Mineral foundation is to construct trenches, gully plugs, sunken pond, boulder dams etc. in area with catchment of about 1200 Ha. across two villages of Adnem and Bali, benefitting 500 families. Grassroots capacity will be built upon and developed so that the soil and water conservation works can be executed through people's participation with the help of the implementing agency, thus also serving the dual purpose of providing villagers with a livelihood in their backyard.

The expected rise in ground water level will also result in 10% to 15% increase in cashew yield, diversification in agricultural activities including dairy, increase in biomass and natural resource conservation having a positive impact on organizational, technical and managerial skills of the people besides enhance level of earning.

For this purpose, the natural resource management activities for these two villages are: 3800 Trenches, 1 sunken pond, 800 RM of live fencing, 22 Gully plug and 15 loose boulder check dams. Further, Exposure through visit to Rivona & Padi watershed, Training to dig trenches, sunken pond, gully plug, LBCD, Grafting training conducted, Sticking and tailoring for three months, Jack fruit chips training, and Exposure visit to know system of rice intensification (Sri) to Vichundrem.



**FIELD INSPECTION**



**TRENCHES FOR RWH & YIELD INCREASE**



**Study area:**

Bali, situated on the banks of the river Sal, was the capital of Goa during the Shilahara reign in the 10th-136' centuries. It was then called Valipattam or Balipattam, with pattam meaning a port (Prabhudesai 2003). Cuncolim town of Salcete taluka bounds it on the north, while on the south lies Barcem village of Canacona taluka. The village of Ambaulim lies to its east, while on the west it is bordered by Fatorpa, both located in Quepem taluka. The village is administered by a Panchayat; it comprises nine wards, namely, Cordem with two sub-wards; Bendurdem; Cotto Tiloi with three sub-wards, Mutt Bali, Deulwada with three sub-wards; Adnem with seven sub-wards and Kupwada with three sub-wards. Specific caste groups predominantly occupy certain wards in this village.

The village is blessed with a striking natural forest cover and topography. The main occupation of the villagers is agriculture. The village is dotted with fields watered by flowing rivers and gurgling springs. Paddy is the main crop of the village. Kumeri cultivation practised by the villagers has resulted in the setting up of a co-operative society, which functions as a marketing centre for the vegetable-growing farmers. Many villagers are also involved in agro-based occupations like dairy farming. Cashew feni distillation, though a seasonal occupation, is also very prominent.

**Impact on agricultural pattern:**

Interesting fact is that this village still lives quite undisturbed by modernisation, as the Velip living in the hilly terrain are found to be very close to nature. Before implementation of horticulture farmers were involved in rainfed agriculture where they use to grow paddy only. According to Prabhudesai (2003), the Velip first cleared the forests for kumeri cultivation of crops like nachne (ragi), pokoll, varai, misango (chillies), karante, kattkonngam, zhaddkonngam and allum, most of which they cultivate till date. Homestead gardens (porsu), it is an age old practice.

Rural communities depend upon tree-grooves in the backyard of the houses for supply of fruits, fodder, fuel wood, medicinal plants etc. Along with this they are shifting their field into vegetables like Chilies, Ladies finger, Sweet potato, Brinjal, Cucumber, Custer bean, Carrot. This has done at subsistence level previously and people were not much aware about HYV (High Yielding Variety) seeds, but now a day's agriculture department collect the soil samples for soil testing and provides appropriate seeds to the people.

The role of SHG is more in developing horticulture because the selection of species, planning and preparation of sites execution and cultivation, planting and aftercare, protection and maintenance should be taken care of by the community at large and by self help groups in particular. This has made transfer of rice field into vegetable garden. Although paddy (rice) is a staple food of locals so at subsistence level they cultivate it in small holdings.



1) Water supply



2) Summer crop



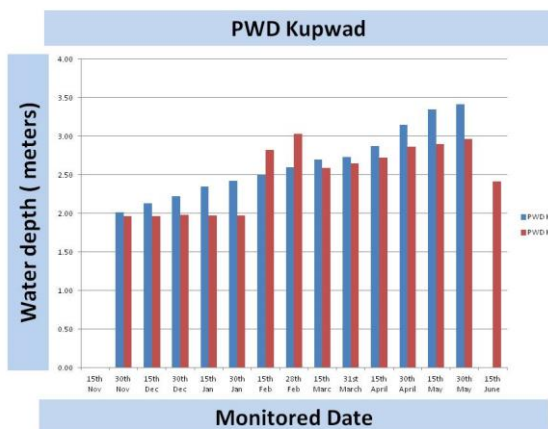
3) Vegetable cultivation



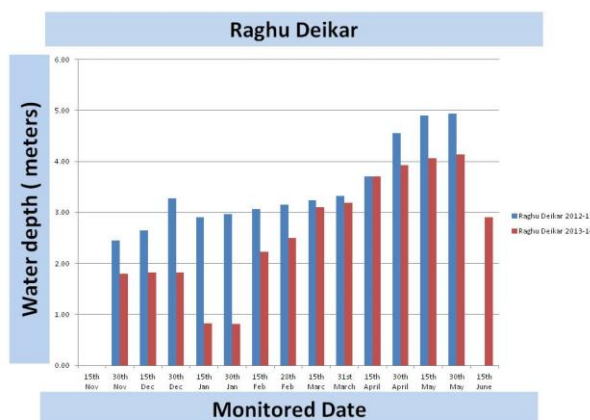
4) Fallow paddy field

Source: Vishal Advaiakar clicked.

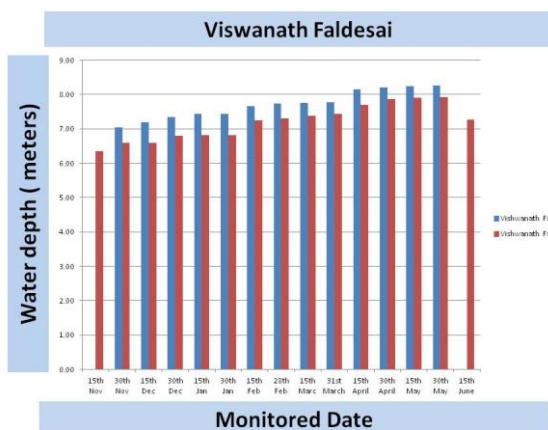
Change in ground water level (2012-13 to 2013-14 monitor)



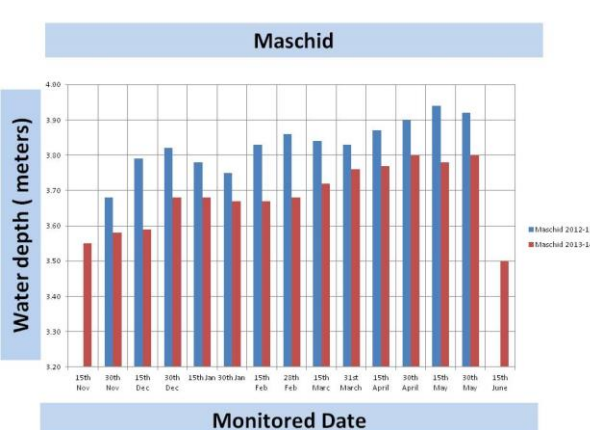
Case I



Case II



Case III



Case IV

Source: Primary Data (Survey)

Analysis:

Method: The water level is marked from upper circle of the well till water level is reached. It implies that water level goes down than distance will increase where if water rise than distance will decrease.

Case I: The well is located in Kupwad Village where first phase work of digging trenches have been finished. As indicated in the graph compare to past year there is increase in ground water level 2.96 m to 2.46 m. It shows a difference of 0.50 m.

Case II: The owner of well Raghu Deikar, as shown in the graph compare to past year there is increase in ground water level 4.94 m to 4.14 m. It shows a difference of 0.80 m.

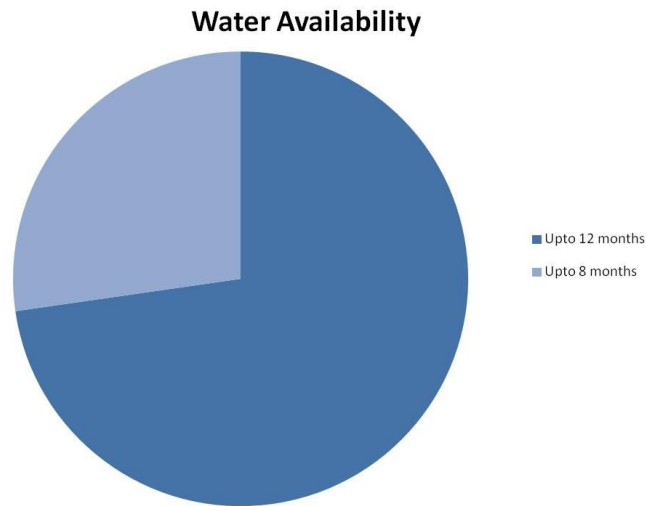
Case III: The owner of well Viswanath Faldesai. As indicated in the graph compare to past years there is fluctuation water depth, comparably there is more change in 30th May – 7.93 m (2012-13) and 15th June 7.26 m (2013-14).

Case IV: The well is located near Mosque. As indicated in the graph the blue bars nearly touches 3.80m mark in the year 2012-13 comparably in year 2013-14 it ranges between 3.50m to 3.65m. Hence there is change in the difference.

As far as ground water level are concern which are selected on from four well samples of watershed it shows increase in water level compare to past year. The major objective of WDP to increase ground water level have been fulfilled. Still there is more scope to rise in the of December and January.

Water availability:

As the rainfall pattern are concern the area receives around 300 cm (3000mm), where it should not have water scarcity but still people face water problem in Summer Season. Specifically those study sample lives in Kupwad face water problem during summer season, where the water is supplied through tanker by PWD.



### People awareness about watershed programme:

Especially the SHG are made by women and its functions are witness by themselves and as followed by President, Vice president, Treasurer etc. Where it boost community development and help to form integrity among women. It is also observed that to conduct meeting, going through agenda, discussion and planning gives a developmental prospects of rural women.

By survey of 33 samples in outcome I find that women's perception was positive and they are happy with the WDP. 70% of women's are aware of watershed programme and water conservation. Where 30% are unknown but they are conscious about water scarcity and conservative measure.

### Conclusion:

The major concern in front of world is, how to conserve a fresh water resource? To make it simpler and effective the WDP is playing a crucial role in rural areas like Adnem and Bali village. Water is important for all biotic as well as abiotic component of our ecosystem. With nourishment of these resource if a community is developing it always better to have such programme which can solve a various purposes of habitat survive into watershed.

### BOOKS:

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