

Soil and Water Conservation/ Watershed Management

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ABSTRACT

The watershed is a geographical area through which water flows in the form of streams, rivers, canals or oceans. It includes the area lying around the ridge line as well as the lowest point of land up to which the water will flow out of the watershed. Watershed management is necessary to improve the quantity and quality of water in the downstream which comes from rainfall and storm water runoff. Since water quality is affected by all the alterations of land- mining, agriculture, vegetal cover, roads, urban development and human activities within the watershed. So it is essential to consider these downstream impacts when developing and implementing the water quality protection steps and restoration actions. Rain water management is very important especially in those areas where rain water is either in excess or in scarcity as during flood. It's said that "Water is everywhere but not even a drop to drink". In Himachal Pradesh, MHWMP (Mid Himalayan Watershed Management Project) has been started since 2005 in mid hills and high hill zones with financial assistance to World Bank. It covers an altitude range of 600m to 1800m above the mean sea level i.e. from Shivalik to High Hill Zones.

Keywords: *Watershed management, Himalayan Watershed Management, Rainwater harvesting, Rain water management.*

1. INTRODUCTION

In developing countries both non-government organizations (NGOs) and government agencies have implemented watershed management projects for at least 25 years with the aim of increasing agricultural productivity and optimize the rainwater usage in the hilly areas. Majority of India's population depends on agriculture, which in turn is largely dependent on rainwater. Therefore, Watershed Management Programmes (WSM) are very important for improving the optimal usage of water, which directly affects the quality of water, land, and life.

2. WATERSHED PROJECTS IN INDIA, FROM 1970S TO 2003

From 1970 to 2003, various WSM projects have been initiated in India that has helped in optimizing the rainwater usage across the country. The following table will give an insight into the WSM Projects across the country and what all were salient features of those projects.

Table 1. WSM Projects in India

Year	Description
1970s	In this year, Technical approach was imposed. For example: Drought-Prone areas and Desert Prone areas were undertaken as target area.
1980s	Target area approach was adopted with the involvement of some communities. For example: Integrated Watershed Development and management programmes.
1990s	In this era, watershed and eco development projects were undertaken. For example: Joint forest management. Foreign donors provided financial support to the participatory approach working with informal village communities
2000s	These projects come with the introduction of Panchayati Raj Institutions (PRIs). The main focus was to empower PRIs for project planning, implementation and Mid Term Review and Evaluation (MTR&E) of micro-plans. For example: Watershed Development and Swajaldhara Rural Drinking-Water Programme. Hariyali guidelines were updated to involve PRIs for watershed management in the year 2003.

3. GERMAN SUPPORTED WATERSHED PROJECTS IN INDIA

The Indian Government in collaboration with the German State has worked on a large number of WSM Projects in India. Before the World Bank stepped in, the WSM projects in India were mainly supported by the German technology and money. The table shown below will provide an insight into the same.

Table 2. German supported Projects in India

Year	Name	Description
1989–2005	Indo–German Bilateral Project Watershed Management	Provides financial support for integrated watershed management programmes and main focus on capacity building, MTR&E.
2001-2004	Indo–German Watershed Self Help Program (WOTR)	The main focus on building capacity of non-government organizations (NGOs) and community based organizations. They promote watershed self-help Programmes.

1991 - 1994 & 1994 - 1999	Indo-German Changar Eco-Development Project	They promote PRIs, natural resource development; building capacity of local animators etc. to reduce environmental degradation. For example: Himachal Pradesh Eco-Development Society as a knowledge centre.
2002-2005	Reorganization and Strengthening of Watershed Training Institutes in Maharashtra	This institute is working to reorganize and strengthen Maharashtra state's Water, Soils and Watershed Management Training Institute.
2003-2007	Capacity Building and Strengthening of Decentralized Watershed Management	This project mainly focused to improve the capacity of all relevant and pre-existing watershed management programmes through trainings.

4. WSM PROJECTS IN HILLY AREAS: CASE STUDY OF HIMACHAL PRADESH

Being a hilly state, Himachal Pradesh has always been in a dire need of watershed management programmes. Water running down the slopes of fields and roads has hurt the state's agriculture and common life severely. Various Projects have been initiated by the State Government and the prominent ones among those have been discussed here.

In Himachal Pradesh, watershed management project has been started on the river Swan in Una district. The main objective of these projects is to combine the goals of resource management and poverty alleviation. The **Swan River Integrated Watershed Management Project** has come into being since 2006-07 with the financial assistance from Japan International Cooperation Agency (JICA). The State Forest Department is mainly responsible department along with department of Agriculture, Horticulture and Animal Husbandry of the State that are participating in the Project.

Project cost and duration at the inception of Project was Rs. 160 crores and 8 years (2006-07 to 2013-14), respectively. Now, following the process of micro-planning and as per the recommendation of MTR &E of the project held in 2011, the cost and duration has been revised to the tune of Rs. 215 Crores and 9 years (2006-07 to 2014-15), respectively.

Often poverty reduction and watershed management goals are combined in a simplistic manner. It has initiated large number of sectorial livelihood activities for a group of villages, so that common services and market can be provided easily.

Various activities initiated under this project were Vermicomposting, Sericulture, Knitting, Khaddi unit, and Floriculture.

5. THE BASIC COMPONENTS OF WSM PROJECTS

1. *Treatment of Non-arable land :*

- Ecological rehabilitation of degraded catchments is the primary objective. This is done by carrying out soil and water management through site specific treatment plants.
- Secondary, to maintain a balance between biomass production and consumption by promoting community plantations.
- Treatment of non-arable lands in local communities and undertaking ecological considerations.

Activities:

1. *Plantation:*

- 1.1 Plantations of grasses shrouds and fruit bearing trees
- 1.2 Community plantations are being raised to increase fodder production.
- 1.3 Modern nurseries are being developed for quality planting material.

2. *Soil Conservation Works:*

Proper soil drainage treatment projects like check dams, dry stone structures, crate wire structures etc.

3. *Water Harvesting:*

3.1 To improve water availability in the project area by different water harvesting techniques. For example: ponds, tanks, roof water harvesting structures, dams and other irrigation techniques are being implemented

2. *Treatment of Arable Land:*

The treatment of arable land means to improve the cropping system by adopting new agronomic activities such as crop rotation, diversification of crop into high value crops, reducing pre and post harvesting losses etc. It will also improve water availability in the Project area using appropriate water harvesting technologies.

Activities:

1. Agriculture and Horticulture Development programs:

The main focus is to promote Homestead Horticulture, organic farming and low harvesting costs techniques in the project area. The more education and knowledge is being imparted to the farmers about vegetables, spices, medicinal plants etc.

(2) Rural Infrastructure:

This subcomponent covers the construction of footpaths and small bridges to provide services to the people more easily like accessibility to market and other public institutions where conventional road construction is not feasible due to geographical conditions.

(3) Livestock and Fodder Development:

The aim is to improve quality of food through improvement of fodder management practices and genetic upgrading. Since good food leads to good health and good health leads to healthy nation. So it will also contribute towards restoration of health, and purity of the production environment.

Comparison of Myanmar and India on the basis of rainfall and watershed management:

In “Myanmar”, WSM project has been started since 1935 and has achieved a tremendous success afterwards. "Watershed Management for Three Critical Areas Project" working on Kinda, Inle-Moebye and Phugyi watersheds. It has introduced modern techniques such as Land Use Planning, introducing Remote Sensing and GIS, trainings and actual implementations of Land use surveys, down to the level of Treatment Oriented Land Capability Surveys.

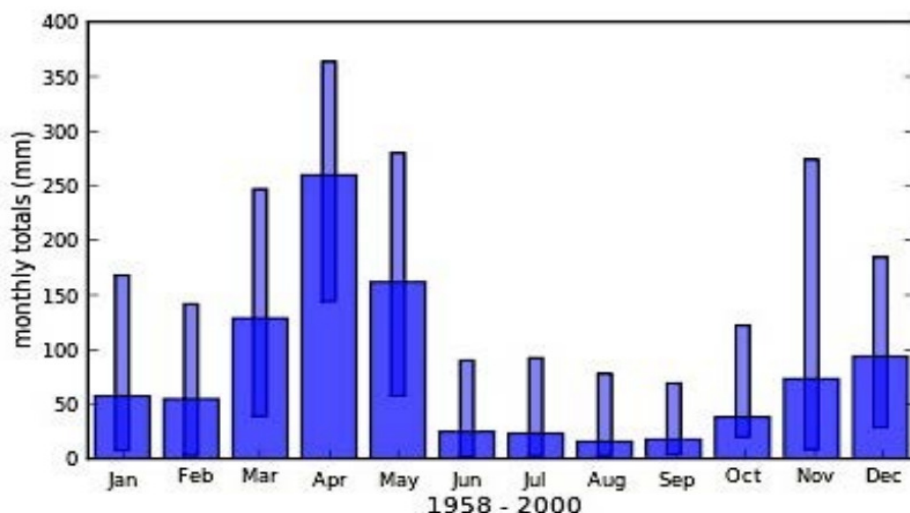


Fig. 1 Observed Rainfall of India in the Year 1958-2000

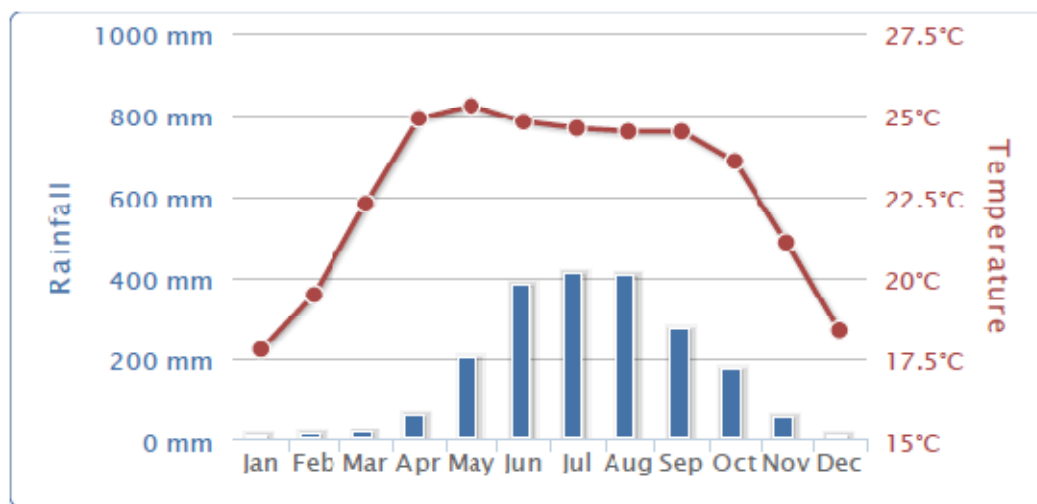


Fig. 2. Observed Monthly Rainfall of Myanmar

The above figures show the rainfall data comparison of India and Myanmar. For the same amount of rainfall received by Myanmar, they are able to save or conserve fairly a large amount of water whereas for the same amount of water, only a meager percentage of water is being saved in India.

6. CHALLENGES IN WSM

- Population growth and their related demands for food and other resources within and outside watershed areas are greatly affecting the ecological balance of the watershed areas.
- Forest fragmentation decrease watershed areas.
- The development of infrastructure in rural as well as urban areas also contributes to the fragmentation and loss of forest cover lead to severe soil erosion.
- Urbanization, frequent wildfire, development projects such as roads, dams and hydropower plants, tourism infrastructures has an adverse effect on watershed project areas.
- Land usage change.
- Climate change.
- Poverty linked with unsustainable cultivation practices (e.g. shifting cultivation).
- Limited resources and knowledge.
- Limited community participation/ no incentive mechanism for participation.
- Practiced single approaches rather than integrated approach.
- Poor Law enforcement.

7. CONCLUSION

The idea of watershed management is to make use of the free water that is available to us every year, every season, without failing. Particularly, in the Indian scenario, watershed management will

not only help us improving the agricultural output but also to improve the lifestyle of the rural and hilly regions. If implemented on a local level, like in educational institutes and residential societies, these watershed management techniques can raise awareness on a large scale. Educational Institutes, in particular the technical institutions will have to make these watershed management techniques a part of the academic curriculum so as to spread awareness among the youth.

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