

WATERSHED DEVELOPMENT OF CATCHMENT AREA

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Abstract – Watershed is defined as the drainage basin or catchment area of a particular stream or lake. It is a convenient unit to determine input-output relationship of precipitation and its partitioning into various components of water resources in a hydrological cycle. It also resembles a drainage basin or catchment as it drains water from small streams or lake into a common stream and in the process recharging the groundwater and irrigating the plantation that falls in that watershed.

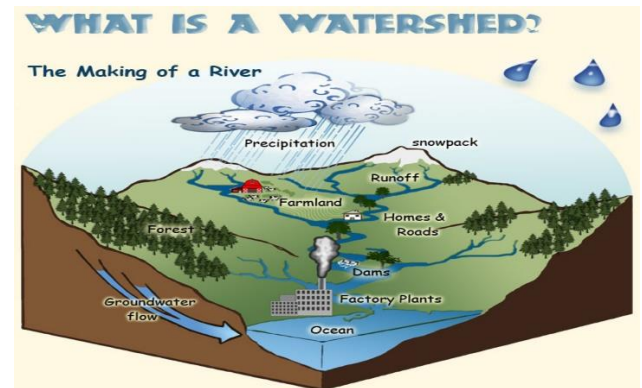


Fig 1.1 Watershed Catchment Area

1. INTRODUCTION

1.1 GENERAL

Watershed is defined as the drainage basin or catchment area of a particular stream or river. It is a convenient unit to determine input-output relationship of precipitation and its partitioning into various components of water resources in a hydrological cycle. It also resembles a drainage basin or catchment as it drains water from small streams into a common stream and in the process recharging the groundwater and irrigating the plantation that falls in that watershed. Resource depletion and stress are growing problems throughout developing countries in the world. Characterized by their lack of infrastructure, industrialization, and sophisticated technology, developing countries are known for their poor economies and poverty. As they continue to experience population growth, the effect that humans have on local ecosystems and resources is maximized. Population growth increases development, which decreases the availability of the land surface and resources required to meet the increased demand for basic necessities including food, fuel, and building materials. The economies of towns in the developing countries based heavily on the environment and natural resource production to support their livelihoods, making it pertinent to improve the productivity and sustainability of natural resource bases.

1.2 DEFINITION OF CATCHMENT

The action of collecting water during rainy season, especially the collection of rainfall over a natural drainage area.

1.3 PURPOSE AND OBJECTIVES

- i. To use barren land at dongargaon village for agriculture purpose.
- ii. Developing wastelands or degraded lands, drought-prone and desert are as on watershed basis, keeping in view the capability of land, site condition and local needs.
- iii. Promoting the overall economic development and improving the socio-economic condition of the resource poor and disadvantaged section sinha biting the program areas.
- iv. Mitigating the adverse effects of extreme climatic conditions such as drought and desertification on crops, human and livestock population for their overall improvement.
- v. Restoring ecological balance by harnessing, conserving and developing Natural resources i.e. land, water, vegetative cover.
- vi. Sustained community action for the operation and maintenance of assets created and further development of the potential of the natural resources in the watershed.

vii. Simple, easy and affordable technological solutions and institutional arrangements that make use of, and build upon, local technical knowledge and available materials.

viii. Employment generation, poverty alleviation, community empowerment development of human and other economic resources of the village.

ix. To minimize the adverse effects of drought on the production of crops, livestock and productivity of land, water and human resources for drought proofing of the affected areas.

x. To promote the overall economic development and improve the socio economic condition of the resource poor and disadvantaged sections inhabiting the programme areas.

xi. To take up development works by watershed approach for land development, water resource development and afforestation or pasture development.

1.4 ADVANTAGES OF WATERSHED MANAGEMENT

i. To increase agriculture production and utilize barren land at dongargaon.

ii. It gives importance to the scientific conservation of water and soil to increase the biomass production.

iii. It helps to prevent floods and drought.

iv. It produces animal and plant resources for use in such a way that it does not disturb the ecological balance.

v. It helps to increase the production of crops.

1.5 DISADVANTAGES OF WATERSHED MANAGEMENT

i. Water stored only in rainy session.

ii. It involves a lot of expenditure.

iii. Watershed require regular maintenance.

iv. The chances of flood on the downstream side.

v. If the catchment area is not properly maintained it can cause various problem in terms of bacterial growth which affect the human health.

2. LITERATURE REVIEW

2.1 GENERAL

India has primarily been an agricultural country. Water is the cornerstone of agricultural production. By proper utilization of water and land resources we can banish poverty and raise the standard of living of millions of our people living in urban and rural areas. Now water as a natural resource is under relentless

pressure due to population growth, rapid urbanization, large - scale industrialization and environmental problems. Development of water, as a reservoir, has become not only essential but also unavoidable, if the ever-increasing demands of the growing population are to be met. Rather, the development of water resources deserves a very high priority in national development. This underlines the importance of conserving water resource Briefly water conservation means putting the water resources of the country for the beneficial use with all the technologies at our command that is to make water as sustainable. Water from the watersheds supports irrigation systems all over the country (India). Our watershed resources provide the engine for the economic development of the country (India). Watershed degradation can lead to reduced recharge of groundwater aquifers (Pitafiet al 2006). The conservation of watersheds can help to preserve the groundwater supplies by avoiding this loss of recharge.

2.2 IMPROVING WATERSHED MANAGEMENT IN DEVELOPING COUNTRIES

Author, Carlos Perez and Henry Tschinkel

Publication by, Agricultural Research & Extension Network

Publication, 2003

2.3 WATERSHED DEVELOPMENT PROJECTS IN INDIA

Author, John Kerr, in collaboration with Ganesh Pangare and Vasudha Lokur Pangare,

Publication by, International food policy research institute

Publication, 2002

2.4 IMPACT AND EFFECTIVENESS OF "WATERSHED DEVELOPMENT PROGRAMMES" IN INDIA

Author, Dr. Prem Singh Dr. Hari Charan Behera Ms. Aradhana Singh

Publication by, National Institute of Administrative Research Lal Bahadur Shastri National Academy of Administration Mussoorie-248179

Publication, 2008

2.5 PARTICIPATORY WATERSHED MANAGEMENT TO DECREASE LAND DEGRADATION

Author, Kenge James Gunya

Publication by, Linkopings Universitet

Publication, 2009

3. METHODOLOGY

3.1 INTEGRATED WATERSHED MANAGEMENT

Watersheds, also referred to as catchments, are functional and geographical areas that integrate a variety of environmental processes and human impacts on the landscape. Integrated assessments recognize the interdependence of resources and components that make up a watershed. Due to their complexity, managers and planners have traditionally managed watersheds to optimize only one or a few resources. A more holistic approach is needed that addresses watershed resources and other components while stressing the importance of maintaining the sustainable uses of all the resources within a watershed. Recently there has been a growing recognition that in order to quantify and assess environmental systems it is necessary to conduct an integrated assessment. Integrated assessment accounts for multiple land uses while implementing the concept of sustainability through community based catchment management. Watersheds, are often subject to multiple land including recreation, agriculture, range management, mining, forestry, and development. Understanding watershed interactions while assessing a watershed requires a thorough understanding of physical, biological, social, and economic components within that watershed.

3.2 HISTORY: WHY IS IT NEEDED?

Previous watershed planning strategies tend to be focused on only one discipline, are often one-sided, and are top-down in approach. The topics addressed are only a subset of the issues present in the watershed and fail to address the complexity and interaction between physical, biological, geomorphic, and geochemical processes. Many management approaches focus on short-term needs of decision and policy makers and fail to address the long-term sustainability of a resource. Planning agencies traditionally address currently existing problems and fail to look towards prevention. Land-use and watershed plans fail to address certain areas and resources, due to the lack of coordination between varying management and planning agencies. Policy makers and social planners have historically existed in separate realms from environmental management and conservation. Planning strategies need to shift toward integrated of management skills, disciplines, and agencies. The integration of water quality management, sustainable development, economic prosperity, and increasing populations presents a challenge in 21st century developing towns. The need for integrated management intensifies as current monitoring indicates continuing degradation of watersheds. Water quality management has multi-objective, interactive, and dynamic features and the objectives associated with the management of these features are often conflicting. A lack of general knowledge and financial sources contributes to inadequate management and improper uses of natural resources. With increasing water scarcity and growing

populations, integrated management is necessary to sustain resources within watersheds.

3.3 WATER USE.

Integrated watershed and resource management has recently been recognized as a more coordinated and unified approach to managing water resources in the Dongargaon Management issues extend to developing countries and focus on concepts including land management, erosion control, sedimentation, flooding, and water resources.

They suggest categorizing water uses within a watershed into three categories:

- i. Water for people (municipal, industrial, health requirements, etc.,
 - ii. Water for food and rural development (irrigation, etc.), and
 - iii. Water for nature (environment and ecosystems).
- These three categories of water are useful for integrating water resource management with a variety of land uses and practices.

3.4 GIS-BASED WATERSHED CLASSIFICATION.

A geographic information system (GIS) can be used to classify watersheds and assess spatial variation patterns according to water quality monitoring data and land use distribution.

Watersheds can be delineated according to topographic boundaries and extracted from digital elevation models (DEMs). Using the idea of the coastal fringe, a GIS system can determine the distance classification schemes for the different swath areas surrounding the coast and can also calculate the stream length that flows through each coastal swath. Rectified aerial photographs and digital elevation models can be used to determine the areas that will be classified according to landscape zones. GIS-based classifications can be particularly useful to overlay different classification schemes and assess spatial patterns between the classification schemes, and ultimately apply those classifications to watershed management goals.

Watershed planning and assessments can be approached on a variety of scales, ranging from the larger basin to the much smaller catchment scale. This thesis classifies watersheds according to the sub watershed and catchment scales as described by the Centre for Watershed Protection because streams obtain their characteristics from their watershed and the practices implemented within the landscape.

The influence of land use on stream integrity has been found to be scale-dependent. Habitat and organic matter inputs are strongly influenced by local conditions, whereas vegetative

cover, sediment delivery, hydrology, and channel characteristics are affected by regional conditions.

3.5 CRITERIA FOR SELECTION OF WATERSHEDS

The following criteria used in selection of the watersheds:

Watershed area may be about 500 hectares however, if on actual survey, a watershed is found to have slightly less or more area, the total area may be taken up for development as a project.

Watershed which has acute shortage of drinking water, large population of scheduled castes and scheduled tribes who depend on watershed that has a preponderance of non-forest waste lands or degraded lands must be selected.

3.6 NEED AND IMPORTANCE OF WATERSHED DEVELOPMENT PROGRAMME

Dry land areas in the country accounts 70 per cent of the cropped area and contribute more than half of the country's food grains production. These areas share 60 to 80 per cent of the output of coarse cereals, major oilseeds and fibre crops. Even after realizing the entire irrigation potential in the country, about half of the area will remain un-irrigated. Stagnation of production and productivity has been observed in all the major food crops of dry land agriculture.

The Watershed Development Programmed is the basic need for integrated development and management of the land and water resources which provide life support for rural communities.

The following watershed development programme, we can achieve:

- i. The problem of drinking water can be solved, and to some extent the problem of water for irrigation will also be solved.
- ii. Increase agricultural production and create employment within the village and make food available to them.
- iii. Migration to urban areas can be checked and reduce the problem of growing cities.
- iv. By conserving soil and water ecological balance can be restored.

3.7 WATERSHED PROTECTION TOOLS.

The Rapid Watershed Planning Handbook (RWPH) written by the Centre for Watershed Protection provides a comprehensive guide for managing urbanizing watersheds on a sub watershed scale, and sets a basis for classifying sub watersheds. The guide presents eight tools of watershed protection which can be applied individually or jointly to a sub watershed. The tools of protection include land use planning, land conservation, aquatic buffers, better site design, erosion and sediment control, storm water BMPs, non-storm water discharges, and watershed stewardship programs. Each of these tools could be applicable to different sub watersheds and stream system. Definitions of each tool and examples of their applicability are given next to the protection tool.

4. STUDY AREA

VISIT DATE - 03/04/2021

4.1 PHYSICAL DESCRIPTION

Dongargaon is a Village in Gondia Taluka in Gondia District of Maharashtra State, India. It belongs to Vidarbha region. It belongs to Nagpur Division. It is located to 2 KM towards North from District head quarters Gondia. 951 KM from State capital Mumbai Dongargaon Pin code is 441614 and postal head office is Gondia Ramnagar Dongargaon is surrounded by Goregaon Taluka towards South, Amgaon Taluka towards East, Kirnapur Taluka towards North, Tirora Taluka towards west Gondia, Tirora, WaraSeoni, Balaghat are the near by Cities to Dongargaon.

Following details are collect talathi office at kalimati.

Total hill area :-	64.14 hectares.
Catchment area:-	15 hectares.
Water supply area :-	50 to 60 hectares.



Fig 4.1 Gram Panchayat Dongargaon

4.2 DONGARGAON 2011 CENSUS DETAILS

Dongargaon Local Language is Marathi. Dongargaon Village Total population is 2028 and number of houses are 453. Female Population is 51.0%. Village literacy rate is 71.9% and the

Female Literacy rate is 34.2%.

Population

Census Parameter	Census Data
Total Population	2028
Total No of Houses	453
Female Population %	51.0% (1035)
Total Literacy rate %	71.9% (1458)
Female Literacy rate	34.2 % (693)
Scheduled Tribes Population %	0.4% (9)
Scheduled Caste Population %	10.7% (217)
Working Population %	52.3%
Child (0-6) Population by 2011	226
Girl Child (0-6) Population by 2011	50.4% (114)

Locality Name : Dongargaon

Taluka Name: Gondia

District : Gondia

State: Maharashtra

Region : Vidarbh

Division : Nagpur

Language : Marathi

Current Time 03:09 PM

Date: SAT, 03 APRIL,2021

Elevation / Altitude: 316 meters. Above Seal level

Telephone Code / Std Code: 07182

4.3 CLIMATE

Dongargaon current Weather

Current Temperature is 32 °C

Humidity: 24

Wind : From West at 13 kph

Observed on Thu Time: 13:58:08

4.4 AGRICULTURE

Rise is agriculture commodities grow in this village. Total irrigated area in this village is 79 hectares from canal 116 hectares is source of irrigation and catchment water 50 to 60 hectares are used.

4.5 FARMING IN SLOPING BARREN LANDS (HILLY AREAS)

Graduated terrace steps are commonly used to farm on hilly or mountainous terrain. Terraced fields decrease both erosion and surface runoff and may be used to support growing crops and that require irrigation.



Fig 4.2 Dongargaon Village Watershed Catchment Area

5. FUTURE SCOPE

It helps to increase the production of crops & helps to fight climate change and promotes sustainable agriculture. recharges the groundwater table during rainy season. To restores soil fertility and helps in soil conservation.

6. RESULT

To increase food production in sloping barren land & Area used for irrigation - 50 to 60 hectares. To prevent soil erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table.

7. CONCLUSION

The following conclusion are collect talathi office at kalimati.

- i. Water catchment area at Dongargaon - 15 hectares.
- ii. Barren land area -10 to 15 hectares.
- iii. Hill area - 64.14 hectares.
- iv. Area used for irrigation -50 to 60 hectares.

The watershed management programmes aim at improving soil health, drainage and using harvested and stored rainwater efficiently for supplemental irrigation and consequently enhancing productivity and higher economic returns leading to overall socio-economic development of the entire farming community and increase water table.

8. REFERANCES

AUTHOR

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2. John Kerr, in collaboration with Ganesh Pangare and Vasudha Lokur Pangare,
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4. Kenge James Gunya,
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10. Dr. Glenn Smucker

TALATHI OFFICE AT KALIMATI AND GRAM PANCHAYAT DONGARGAON.

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