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Rain Water Harvesting and Watershed Management of Dhora Basin in Ahmednagar District

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Abstract:

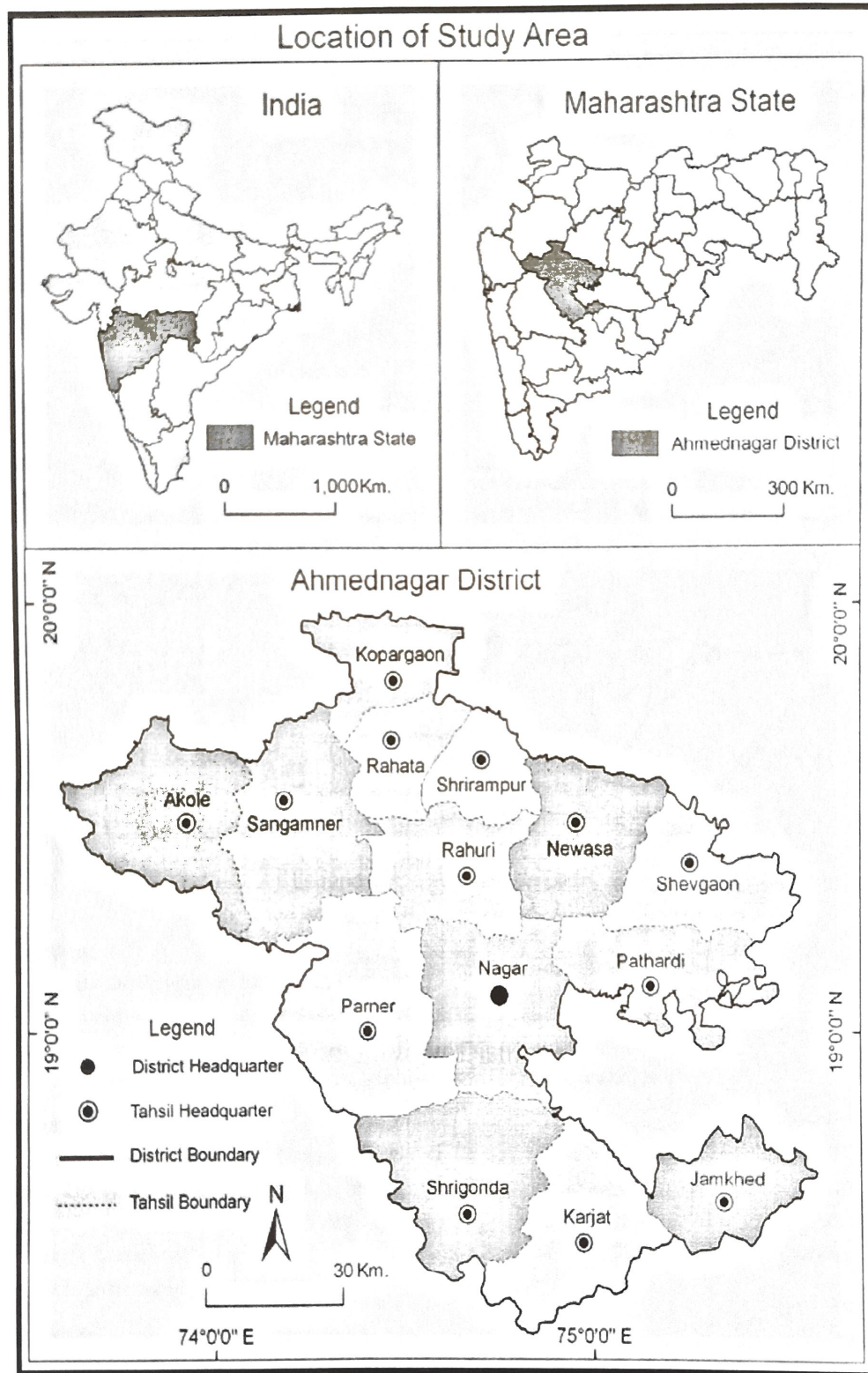
Land, water flora and fauna are the basic natural resources which are subjected to various processes leading to their degradation particularly in drought areas. With the increasing pressure of population, deforestation, indiscriminate use of fertilizers, exploitation of ground water as well as surface water resources, excessive grazing and degradation of land become a regular phenomenon. In less rainfall area especially in study area there are shortage of water for agriculture, domestic as well as industry purpose. Study area having good soil capability to produce more and more agricultural production but main problem is shortage of water. In that point of view Present study attempted to find out the various problems within study region. Problems like lack of irrigation, low agricultural productivity, people migration towards nearby cities and to suggest the various remedies to overcome this problem like rainwater harvesting and watershed management practices in study area. if this natural resource (Rainwater) utilize properly then severity of problem become less.. In that point of view rainwater harvesting and watershed management become very important because it will not only protect and conserve the environment but also contribute livelihood security.

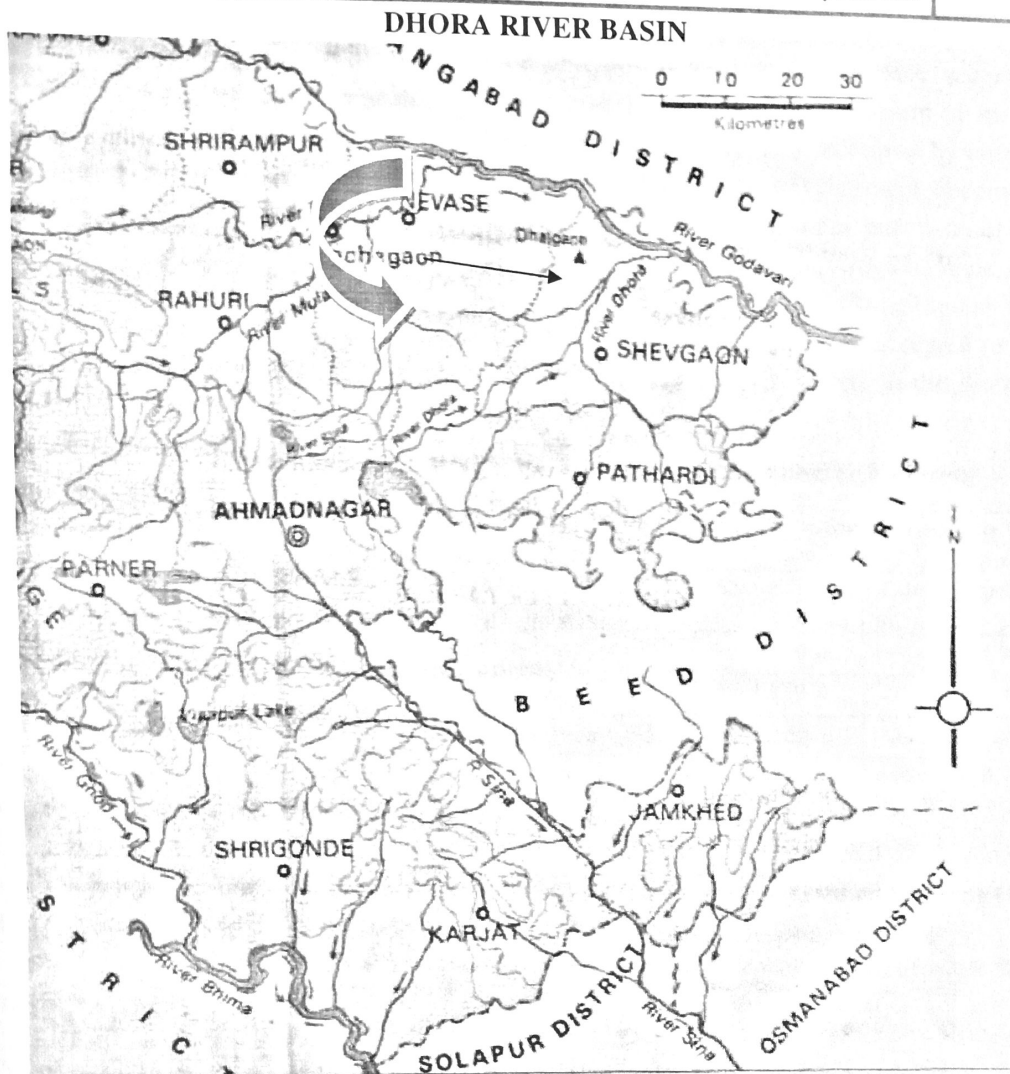
Keywords: watershed, deforestation, Rainwater harvesting, Agriculture

Study Region:

For the study purpose study region selected Dhora basin of Ahmednagar district. The basin drain north eastern part of Nagar, Newasa, and Shevgaon and Pathardi Tehsil of the district which comprising 78 villages. Study region located between 19° 11' 30'' North to 19° 28' 08'' North latitude and . 74° 53' 18'' East to 75° 12' 23'' East longitude.

Study region has its origin Balaghat sub ranges of Sahyadri Mountain. Soil pattern is black soil, somewhere alluvial soil. the region having tropical climate region receive rainfall from south west monsoon ranging between 570 to 650mm annually. The climate of the Study area is generally dry except during the south-west monsoon season. The average annual rainfall for the district as a whole is 560.40mm. Within the district there are considerable variations. The rainfall in general decrease as one proceeds from west to east. Temperature begins to increase rapidly from the latter half of February. May is the hottest month with the mean daily maximum temperature 40.°C at Ahmednagar and 32.2°C at Akole. December is the coldest month with the mean daily minimum temperature 13°C at Ahmednagar . Agriculture is the chief support of the economy of the district and supports the population of 45,43,159 (2011 census).





Objectives:

- 1) To study the irrigation pattern in study region.
- 2) To find out water and land resources improper utilization in study region.
- 3) To find proper site for surface water harvesting purpose
- 4) to promote people participation for Rainwater harvesting techniques

Methodology:

Database- Secondary data collected from District census handbook, Socio Economic review, District Statistical Abstract, Water resource dept Govt of Maharashtra, Taluka revenue offices, National Beuro of soil and survey and land use planning Nagpur. To asses Geo-hydrology, Geomorphology and Geological characteristics of Dhora watershed thematic maps and Geological survey of India is used.

Discussion:

Water is as important for survival of human being as much as food air etc. but hardly any attention is paid for its economic use and conservation of this precious resource due to

indiscriminate pumping of ground water. The water table is going down abnormally and if the problem is not given a serious attention then the future generation may have to face severe crisis of water. In that point of view in selected study region faces very severe problem of the water scarcity. Although the agricultural, industrial and domestic use of water increased by increasing the population pressure. so rainwater harvesting and watershed development become very important because it will not only protect and conserve the environment but also contribute livelihood security. It will integrate the social and technical aspect of study region. Watershed is considered as Biological, Physical, Economic & Social system. Which is consider logical unit for planning optimal development of environmental resources thus watershed is accepted to be the natural home for the managing the resources like land, water and Biomass in the sustainable manner in the study region

Table.1 Taluka wise Rainfall of study Region from June – September(RF in mm)

| Sr.no | Taluka | June | | July | | Aug | | Sept | | June to September(mm) | |
|-------|----------|----------|--------|----------|--------|----------|--------|----------|--------|-----------------------|--------|
| | | Expected | Actual | Expected | Actual | Expected | Actual | Expected | Actual | Expected | Actual |
| 1 | Nagar | 101.8 | 100.8 | 90.2 | 47.8 | 91.7 | 71.4 | 176.2 | 34.6 | 459.9 | 254.4 |
| 2 | Shevgaon | 113.3 | 115.7 | 114.8 | 28.1 | 107.2 | 95.0 | 174.2 | 27.8 | 509.5 | 266.6 |
| 3 | Pathardi | 108.4 | 104.2 | 112.4 | 60.4 | 103 | 82.0 | 166.1 | 15.7 | 489.9 | 262.3 |
| 4 | Nevasa | 119.1 | 98.3 | 112.3 | 52.3 | 83 | 194.4 | 154. | 468 | 468.9 | 313 |

Source: District Survey Report(Ahmednagar) 2020

Above data of rainfall in study region clearly shows that actual rainfall is very less to expected rainfall so that crop production and various agro based activities directly going to be affecting. People socio-economic condition will also downgrade therefore watershed management, and rain water harvesting playing crucial role for the enhancement of water table of the study area, which will directly improve the irrigation in study region.

Ground Water Resources :

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) have jointly estimated the ground water resources of the district based on GEC-97 methodology

The stage of ground water development varies from 53.32 % (Parner) to 107 % (Rhata). The overall stage of ground water development for the district is quite high i.e., 79.83%. The 5 talukas viz., Sangamner, Shrirampur, Kopargaon, Newasa and Ahmednagar have been categorized as "Semi-Critical", whereas the Rhata comes under over-exploited and the remaining in safe category. .

The problem of scanty rainfall created the drought condition in the study region which leads land degradation, improper use of available resources even create drinking water shortage which affects the human life in this region. hence by applying rain water harvesting techniques and watershed management the problem of water shortage can be sort out in view of the vital importance of these natural resources for human and animal life for maintaining ecological balance for economic and developmental activities of all kinds . and considering its increasing scarcity planning and management of this resources and its optimal, economic and equitable use has become urgent.so following rainfall practices can be exercised in study area.

Table.2 Possible Rainfall Harvesting Practices In Study Area

| Rain water harvesting structure | Rainfall(mm) | Slope (%) | Soil type | Land use | Catchment area in (ha) |
|---------------------------------|--------------|-----------|----------------------------|----------------------------------|------------------------|
| Farm pond | >200 | < 5 | Sandy clay loam/silty loam | moderately cultivated shrub land | > 2 |
| Check dam | <1000 | < 15 | Sandy clay loam | Barren/ shrub land | < 25 |
| Percolation pond | <1000 | < 10 | Silt loam/ clay loam | Barren/ shrub land | < 25 |
| Tank | <1000 | < 10 | Silt loam | Barren/ shrub land | < 40 |

Deep Ploughing:

This refers to mechanized deep ploughing technology. Through deep ploughing by machines, we can break the sub-arable layer without disturbing surface soil layer so as to improve soil ventilation and rainfall retention capacity.

Trenches:

In this method the trenches or pits are dug out across the slope and along the contour, suitable to the vegetation/crop present in the area. This method helps the water to arrest and to stop soil erosion effectively it also helps percolation.

Farm ponds :

It is a small storage structures constructed at the lowest point of a farm to collect and store run-off water. The water harvested through farm pond can be used for protective irrigation to crops at critical stages. Apart from that, stored water can be used as drinking water for cattle and other domestic usages. Farm ponds can recharge the ground water and the adjacent wells in the region. Farm Ponds can also be used as a Fish Pond which would serve as an additional source of income for the farmers. Farm Pond may be square or rectangular in shape based on the dimensions and area of the field. Generally, the recommended size of the Farm Pond is 30mx 30m with the depth varying from 1.20m to 2.00m depending on the available soil depth. Pipes or masonry structures may be better than dug wells/ open wells and bore wells.

Compartmental Bunding:

Bunding is a very effective soil and water conservation measure especially in dry areas. Compartmental bunds, also called as Peripheral or field bunds are small earthen bunds constructed along field boundaries without consideration of contour. Compartmental bunding is more beneficial in medium to deep black soils with high clay content (>45 %) and low infiltration rate (0.8 to 1.2 mm h⁻¹). Farmers in the study area reported that adoption of compartmental bunding reduces runoff and nutrient losses. It is a low cost in situ moisture conservation practice that can be easily laid out with the help of a bund former in the farmers fields.

Land levelling

shaping Land levelling reshapes or modifies the land surface to a planned grade or slope, so as to control the runoff, check the soil erosion and conserve the moisture for better growth.

Bunding and levelling have extensively demonstrated beneficial results in drought prone areas the convert the stopped fallow/undulated fallow to cultivable lands.

Conclusion:

Present study attempted to find out the various problems within study region. Problems like lack of irrigation, low agricultural productivity, region receive very low rainfall it leads shortage of water even for drinking purpose. Agricultural production is gowning to minimize day by day. Ground water table is depleting at very deep level. Most of the wells which is major irrigation source remain dry throughout year in the study region due to water table depletion. Drinking water become very severe problem, Numbers of cattles also decreasing day by day. lack of employment become common due to that people become very panic it leads migration of people to surrounding metro like Pune Mumbai is noticeable.

So to overcome all these kinds of problems watershed development and rain water harvesting is become necessary to solve the problem of study region, which will enhance the water table. Surface water like gully plugging, conservation of water will bring the change. Watershed management will change the entire picture of study region, which will change socio-economic life of the people of study region.

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