

Water Resources Management for Sustainable Development of Sadale-Madale Village, Kolhapur

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Abstract: Water plays exclusive role in development of all segments in economy of every country. Watershed development is an important module of rural development and natural water resource management policies in rural part of country. Sadale-Madale are small villages located at distance of 20 Kms from Kolhapur city, District – Kolhapur, State-Maharashtra (India). The latitude 16^o7' and longitude 74^o22' are the geocoordinate of the Sadale Madale. Present study is an overview of all available resources, demand of water for agriculture and drinking purpose is increasing rapidly and resulting depleting water resources. Efforts are made to manage the resources by some economic as well as technical suggestions.

Keywords: Water resource management, Technical suggestions, socio-economic impact, rural development, contour trenching.

1. Introduction

In country like India watershed management is the very prior concept of conserving water resources till now a huge funds are expended on the reservoir structures though also there is large area is facing problems of water in summer season .water is the basic prime natural source which is ultimately depends on the overall health and wealth of our country . The past data of water resources management shows the necessity of the water shed management at micro level implementation, proper management of institutional authorities they are failed to maintain the watersheds properly so it is ultimately affecting the socioeconomically growth and life style of the community. Watershed is a biological, physical, social and economic unit. There are many government organizations, NGO's, Institutes are working on this issue of Watershed development. Maharashtra is one of the agro based state of our country and also it contributes major part of our countries economy, many agro based industries are in Maharashtra so there is a huge need of water in every sector in the Maharashtra but in last decade crucial water problems are arises which was affected significantly on overall economy of Maharashtra. Though there is very good rainfall intensity in Maharashtra this happens. Need of water conservation is now becomes very prior for the sustainable development. Selected study area is in very good annual rainfall areas though also there is very critical water issues which are not noticed by the authorities, government schemes are also fails to improve this problems. Kolhapur is one of the major district of Maharashtra state and which is famous for agricultural sector industry. Kolhapur district is healthy and wealthy in all aspects. Study area is just 20 KM away from Kolhapur city. But due to the geographical conditions this area is facing very crucial problems now in summer seasons and if now this problem is ignored then there will be very major problems for this area in future. The study at micro level or at village level can do big things for the nation. This study helps these rural areas who facing the problems in Kolhapur district.

2. Earlier studies in Water Resource Management in India

Earlier studies said that, since last few decades many of organization had done many of surveys but though they are fail to maintain it properly afterwards. Many of state governments and government of India also planned some policies but it vain because micro level resource management is not in those policies, by all the policies huge funds are expended but them fails to build sufficient numbers of water retaining structures. One report shows that Maharashtra is too behind to build the water holding structures so as result now some rural part of Maharashtra is facing problem of water scarcity sometimes draught too. So it is need to manage the water resources at rural areas that would be beneficial to the rural population. This paper gives the suggestions for water resource management to one of rural area from the Kolhapur district, Karveer taluka, Sadale- Madale village.

3. Materials and methods

3.1. Primary survey

As this study of water resource management first it was essential to go for selection of village for this study and primary survey of the selected village for the better understanding of problems it was must to know the actual existing scenario of the selected village, so visited these villages many times. There are many problems are associated with those peoples so it was decided to know their problems by an actual survey with a questionnaire prepared. This Survey was conducted in the month of September and November. Which involves the detail information of each households in that villages. Personal interviews and this survey gives very important basic information at micro level. This questionnaire was getting filled by the peoples in the village.

The questionnaire used for the socio economic and ecological survey was as follows;

- Name of family head
- No. of people in household

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- Sources of livelihood
- Family income
- Own agricultural land (in acres)
- Own house type
- Daily water usage data
- Sources of domestic water
- Sources of agricultural water
- What are your main sources of income
- What type of crops
- Method of irrigation for applying water to crops
- What type and No. of Animals
- Routine water supply frequency
- Seasonal fluctuation in water supply
- No of vehicles in household
- Rainwater harvesting etc.

This survey shows the scarcity of water in this region. Sadale and Madale village are having population of 1287 (census 2001) Madale village has the sex ratio 1050 which is higher than Maharashtra state average 950 and literacy is 55 % average which is lower. Almost 85% workers are works outside the village and work as agriculture labor due to lack of water resources in the village and it resulting the livelihood of people, poverty is dominant in this region.

Main source of water is the bore wells in this region and some peoples in these villages is selling water at 150 to 200 Rs/month for drinking from their bore wells. This area is hilly region of Karveer taluka and situated on the slope of hill so undulations were there due to this rain water drains off to downstream side quickly. There is no any provision of storing this runoff water in this region. In these villages for drinking water supply program was implemented by government under "Rastriya Peyjal Yojana" but this scheme was not even started because of revenue collection cost for water was high and not affordable to the peoples in those villages. During survey some suggestions for this problems are also suggested by some peoples, that was water supply schemes, some people says that Warana river is very close to the village so it is possible to take water from this source but governmental authority was ignoring this.

By this primary survey primarily basic data for the desired work was collected with the help of this data, forecast, planning aspects and feasibilities of work was made easy.

3.2. Secondary work

After the interpretation of data collected & number of visits to village following Problems are identified in study area;

- 1) Lack of water supply/irrigation facilities due to lack of sustainable surface water and lack of water harvesting Structures.
- 2) Deforestation in hilly area.
- 3) Poor socio-economic condition of the farmers.
- 4) Excessive humming (slash and burn) activities of the farmers.
- 5) No permanent agriculture system.
- 6) No other income generating activities for landless laborers.
- 7) Low income levels hence low living standards.
- 8) Lack of water supplies in summer season.

- 9) Agricultural production in only one season.
- 10) Insufficient rainwater harvesting structure.

3.3 Techno-social suggestions for identified problems.

After the identification of problems in study area following are the feasible and techno social suggestions are to be essential to implement by the present scenario of the water resources suggestions are as per these two resources available,

(A) Suggestion for Ground Water Recharge

1. Roof top rainwater harvesting
2. Farm pond
3. Check dam
4. Vanarai bandhara
5. Contour Trenches
6. Gully plugs

(B) Suggestion for Surface Drinking Water

As ground water sources are contaminated with impurities in this area so for drinking purpose it is very essential to have sustainable surface water source so for that near study area MANPADLE dam, would be use with water supply scheme in association with National Rural Drinking Water Programme (NRDWP) is feasible to develop in future by considering the health of people in study area.

3.4 General Description of suggestion for Ground Water Recharge.

1. Roof top rainwater harvesting:

The site includes four types of home i.e. Mangalore tile home, Slab type home, Flat roof soil type home, Shed type home, Hence it is suggest to have roof top rainwater harvesting from the roofs of all the buildings.

Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments and stored in reservoirs. Harvested rain water can be stored in sub-surface ground water reservoir by adopting artificial recharge techniques to meet the household needs through storage in tanks.

The Main Objective of rooftop rain water harvesting is to make water available for future use. Capturing and storing rain water for use is particularly important in dryland, hilly, urban and coastal areas.

2. Farm pond

To fulfill the demand of irrigation potential in agriculture as supplementary irrigation water management plays an important role, because rainfall in drought prone areas is highly erratic, storage must be an integral part of rainwater harvesting. It is therefore necessary to harvest water from any water sources e.g. precipitation, perennial sources, roof water etc. in ponds and reservoirs for varies domestic, agriculture and industrial purpose over a period of time to stretch its usage to the maximum. This is very effective remedial and for this government authorities are funding for such mini projects. Under many national programmes.

3. Check dam

Check dams are proposed across bigger in areas having gentler slopes. Layout and construction of permanent check dams to ensure proper storage and adequate outflow of surplus water and to avoid scours on the downstream side for long stability of the dam.

Check dams are generally used in concentrated-flow areas, such as vegetated ditches and swales. Check dams are not used in streams or channels. Check dams can either be permanent or temporary barriers that prevent erosion and promote sedimentation by slowing flow velocities and/or to filtering concentrated flow. Check dams can be constructed from a varieties of materials.

4. Vanarai bandhara

Vanarai bandhara or Bunds are constructed across a stream or small river using gunny bags are filled with locally available soil or sand. These bags are sealed properly and are arranged in the form of a wall barrier. This is a temporary structure built across water course to collect the water as well as to reduce the velocity of stream so that infiltration rate of water increases.

5. Contour Trenches

As its simplest, contour trench construction is an extension of the practice of plowing fields at a right angle to the slope. Contour trenches are ditches dug along a hillside in such a way that they follow a contour and run perpendicular to the flow of water. The soil excavated from the ditch is used to form a berm on the downhill edge of the ditch. The berm is planted with permanent vegetation (native grasses, legumes) to stabilize the soil and for the roots and foliage in order to trap any sediment that would overflow from the trench in heavy rainfall events.

3.5 Suggestion for Surface Drinking Water

Domestic water supply scheme was designed from manpadale dam to madale with following specifications;

3.6 General description of suggested scheme:

Brief history:-

SADALE- MADALE is the village in Karveer Taluka of Kolhapur District. The village is 20 Km away from Kolhapur city. At present there are no water supply scheme facilities available for this village either by canal irrigation or by lift irrigation.

Rainfall in this area is moderately fair and good. However is very uncertain and unevenly distributed. Peoples are suffer from drinking water crises in summer seasons. The peoples in this area are completely depends on the ground water source. This village is situated in hilly area so runoff is more and no sustainable water resource for these peoples. Farmers are dependent on the rain only there is no any irrigation project was undertaken.

- 1) **Village area:** - The village area of this scheme covered is 525.29 hacters.
- 2) **Discharge requirement:** - The requirement of water is worked out as per the requirement. The maximum

discharge is 7.10 LPS (Design discharge = 8.00 LPS) and the scheme is designed accordingly.

- 3) **Intake chamber:** - An Intake chamber is provided at diversion canal for collecting and diversion water into the jack well, through an Intake pipeline. The internal diameter of the Intake Chamber is 2.00 m and total height of the Intake Chamber is 2.5 m. M.S. gratings with M.S. opening with wooden planks are provided in the Intake openings.
 - 4) **Sump well with pump house at (A):** -Sump well 2.0 m X 2.5 m X 3.0 m and Pump House height is 3.0 m is provided at first stage for installation of pumping machinery and other electric equipment's.
 - 5) **Sump well with pump house at (B):** - Sump well 2.0 m X 2.5 m X 3.0 m and Pump House height is 3.0 m is provided at first stage for installation of pumping machinery and other electric equipment's.
 - 6) **Mechanical and electrical works:** - For lifting water from the slump well, centrifugal pumps are provided in the pump house with suitable electrical motors and all other equipment's.
 - 7) **Rising main:** - For lifting water from sump well 140 mm dia. pipe. Rising Main of 600 m length for 1st stage and Rising Main of 650 m length for 2nd stage. Necessary valves such as air valve. Pressure relief valve, etc.
 - 8) **Topography:** -The rainfalls in Warana river basin. The general topography of the area is undulating.
 - 9) **Rates adopted:** - For preparing estimates rates for civil works are adopted as per M.J.P and P.W.D. D.S.R. for the year 2013 -2014.
 - 10) **Infrastructures:**-There are good communication facilities available as this area is situated on Kolhapur-Manpadale Road. The area is approachable throughout the year.
 - **Salient features of scheme:**-Water supply for Sadale-Madale village, from Manpadale dam, Tal: Karveer, Dist-Kolhapur.
 - River : Warana
 - Taluka: Hatkanangale/Karveer.
 - District : Kolhapur
 - Location and Approached: The scheme is located near Sadale-Madale 20 Km away from Kolhapur. The area is approachable throughout the year.
 - Discharge requirement : 07.1 LPS
 - Designed Discharge : 8.00 LPS
 - Source of water: Rainfall in watershed Warana is the perennial River water will be released. Hence sufficient water will be available throughout the year. Pumping station is situated at Manpadale Village
 - Important features :
- A) Intake Chamber:
Dia.: 2.0 M
Height: 2.5 M
 - B) Intake Pipeline:
Length: 10.00 M
Dia. of pipe: 450.00 MM RCC pipe
 - C) Rising Main -1st stage:
Line AB: From 0 to 600.00 M
Length of rising Main: 600.00 M
Dia. of Pipes: 140 mm PVC pipes

Discharge passing: 8.00 LPS

D) Rising main -2nd stage:

Line BC: From 601 M to 1250 M
Length of rising Main: 650.00 M
Dia. Of pipes: 140 mm PVC pipes
Discharge passing: 8.00 LPS

E) Sump well with Pump house at Pt (A)

Dia.: 3 .00 M
Height: 12.00M (with pump house)
Retention period: 5 Minutes.

F) Rising Main Line AB 1st Stage

Length: 600.00 Mtrs.
Discharge Required: 8.00 LPS
Static Head: 45 M
Gross Head: 48.00 m
H.P. Required: 7.5 HP
Units: 2 Units of 7.5 HP each C.F. Pumps are Provided. (One unit for standby)

G) Rising Main Line BC 2nd Stage

Length: 650 Mtrs.
Discharge Required: 12.00 LPS
Static Head: 45 m
Gross Head: 48 .00 Mtrs.
H.P. Required Units: 7.5 HP
Units: 2 Units of 7.5 HP each C.F. Pumps are Provided. (One unit for standby).

3.7 Socio-Economic Impact

The water supply scheme will contribute the positive impact. The contribution to public drinking water demand. This will directly improve the living standard of the farmer/peoples due to the integration in the agriculture returns.

The following are the points:

- 1) Confirmed water supply to village in summer season also.
- 2) Regular Domestic water supply.
- 3) Will improve the living standard of people.
- 4) Will improve the health of consumers.

4. Conclusion

Sadale-Madale village is situated in hilly area so though the rainfall intensity is very good then also runoff is also more so water scarcity in this region is common and main water resource for this area is ground water and ground water is also goes at its minimal level in summer days. Ground water in this area is used for drinking purpose and also for the irrigation purposes. It was found that water quality of ground water is contaminated by unhealthy metals like nitrate, iron, fluoride etc. which can causes very critical health issues in future so it is observed from this study is ground water is contaminated so it can be used for the drinking and domestic purposes and so it can be used for the agricultural purposes and for drinking water there is need of sustainable drinking water resource lift irrigation scheme which was earlier suggested by many of peoples in this area while taking their interviews so for sustainable drinking water resource water

supply scheme is strongly recommended and it is very essential to recharge the ground water so for that roof rain water harvesting, farm pond, check dams, vanarai bandhara and contour trenching these all possible measures are to be implement in future for the sustainable water resources. If this all measures are implemented successfully then socio-economic condition of the peoples in this area will be improved significantly.

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