

SOCIO-ECONOMIC IMPACT OF PARTICIPATORY WATERSHED MANAGEMENT IN RURAL AREAS

Mane Neelam S.
(B.E.Civil),

Mulik Pratiksha N
(B.E.Civil),

Saste Madhuri R
(B.E.Civil),

Prof. Bobade S. S.
(M.E.Civil)

Abstract— Naikbomwadi is a small village in Phaltan Taluka of Satara District of Maharashtra state (India). It is located at a distance of 14 kms from Phaltan. Coordinates are Latitude 17°56'5" N, Longitude 74°32'33"E. The average temperature ranges from 27 to 38 degree Celsius and the average rainfall of Satara district including this area is about 337 mm. The hilly terrain is the main feature of this village. This area is in region which is in draught condition for most of the years in last decade. This village is facing acute water scarcity problem every year. To overcome these problems related to water Central Government had started a programme of watershed management viz. Integrated Watershed management Programme (IWMP). This study is an overview of various techniques like farm ponds, check dams, vanraibandharas, etc. which are suggested to overcome the problems related with reducing runoff amount after implementation of IWMP. In the Naikbomwadi watershed area, demand of water for agriculture and drinking purpose is increasing rapidly depleting water resources coupled with overpopulation. Efforts are made to divert large amount of rainwater to recharge ground water resources.

Index Terms— Integrated Watershed Management, Farm Ponds, Runoff, Check Dam, VanraiBandhara etc.

1. INTRODUCTION:

1.1: Watershed Management:

Watershed management is defined as development of an area through watershed approach using natural resources and taking into consideration needs of the inhabitants with sustainable and integrated approach. Watershed management can convert degraded areas into high productive zones and thereby improve the status of inhabitants. Watershed management is not so much about managing natural resources, but about managing human activity as it affects these resources.

The drainage area of the river provides the natural boundary for managing and mitigating human and environmental interactions. Because human activity includes actions by government, municipalities, industries, and landowners, watershed management must be a cooperative effort. Effective watershed management can prevent community water shortages, poor water quality,

flooding and erosion. The expense of undertaking watershed management is far less than the cost of future remediation.

For development of agriculture and drinking water resource the basic elements required are land and water. Because of tremendous rise in population, urbanization, industrialization and agriculture area, resulting in steep incline water demand line. Indian agriculture sector is lot more depend upon the monsoon. But last 3-4 years due to inadequate rainfall, people are looking towards the underground water as alternative source without regarding to its recharge resulting in deepening of ground water table 100-200m below the ground surface.

1.2: Watershed :

Watershed is the area of land of water bounded by drainage divide within which the surface runoff collects & flows out of the watershed through a single outlet in to larger river or lake. A watershed also called a "drainage basin", is an area in which all flowing into it goes to a common outlet, such as the same river reservoir. A Watershed is a topographically delineated area that is drained by a stream system. Watershed is made up of its physical and hydrological natural resources as well as human resources.

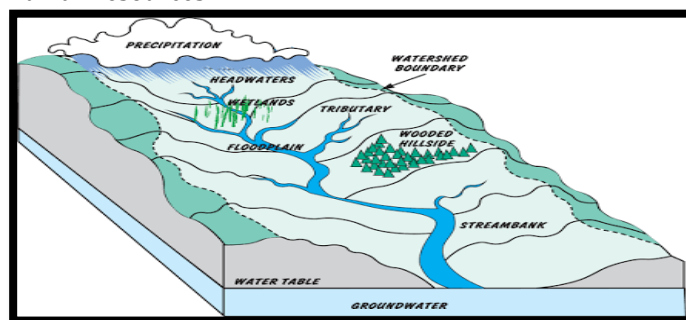


Fig.1:-Watershed

1.3: Classification of watershed:

Watershed could be classified into a number of groups depending upon the mode of classification. The common modes of categorization are the size, drainage, shape and land use pattern. The categorization could also be based on the size of the stream or river, the point of interception of the stream or the river and the drainage density and its distribution. The usually accepted five levels of watershed

dilation based on geological area of the watershed are the following:

1. Macro Watershed (>50,000 Hector.)
2. Sub-watershed (10,000 to 50,000 Hector.)
3. Mili-watershed (1000 to 10,000 Hector.)
4. Micro watershed (100 to 1000 Hector.)
5. Mini watershed (1-100 Hector.)

2. Objectives of Watershed Development:

- 1) To carry out general and socio-economic survey of the village.
- 2) To analyse sources of water resources available in Naikbomwadi village.
- 3) To prepare contour map and stream line map by using Quantum-GIS.
- 4) To understand ground water fluctuations in study area.
- 5) To increase water table level and reduce soil erosion.

3. Study Area:

- Naikbomwadi is a village in Phaltan Taluka, District Satara, State Maharashtra, Country India.
- Coordinates are Latitude 17°56'5" N, Longitude 74°32'33"E.
- It is 14 km away from Taluka Phaltan,
- Area of Naikbomwadi village is 825.93 hectares.
- Total population of Naikbomwadi village is 604; male: 324, female: 280
- Average annual rainfall: 337mm.
- Literacy rate of Naikbomwadi is 81%
- Sex ratio is 819 females per 1000 males.
- Major occupation is sheep rearing and minor occupation is agriculture and other agro based side business.
- The minimum requirement of water is hard to be satisfied all year long.
- Water scarcity arises in the month of January and lasts up to May These five months tend to be critical water shortage period.

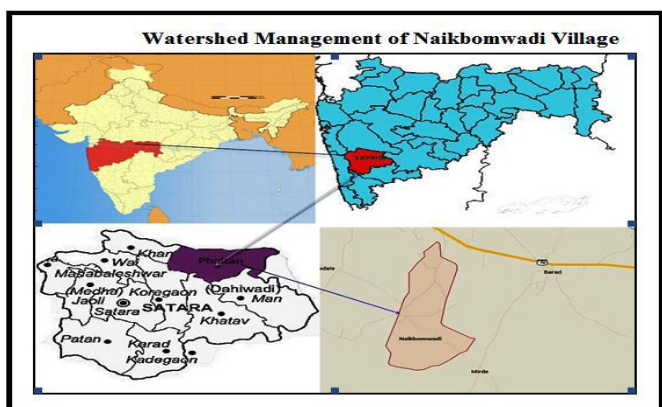


Fig.2:-Study area

4. PROBLEMS EXISTING IN THE AREA:

- 1) Average annual rainfall of Naikbomwadi village is 337 mm.
- 2) Fluctuations in the rainfall is very high in year 2003 rainfall is 298mm and in year 2010 it is 572 mm.
- 3) Silting of existing water resources.

- 4) Less Awareness of the people regarding watershed management programme and insufficient rainwater harvesting structures.
- 5) Excessive runoff due to hill slopes.
- 6) The study area has limited rainfall, due to which agricultural production is low.
- 7) Lack of water supply in summer season.
- 8) High percolation and evaporation losses from water bodies.

5. METHODOLOGY:

The methodology adopted for the present area includes the collection of data

- By observation and discussion with local people
- By personal interviews of the local people.
- Through Questionnaires prepared and getting them filled by people.
- Through Social Mapping of the areas for developing the social relationship with the local people.

6. General survey:

6.1. Land Holding Pattern:

The land use pattern of the Naikbomwadi is as follows:

Sr no.	Land use pattern	Area (hectares)	Area %
1	Total area	825.93	-
2	Area under agriculture	590.67	71.51
3	Non-agriculture area	19.89	2.4
	a) Industrial purpose	11.45	1.38
	b) Residential purpose	8.44	1.02
4	Irrigated area	335	40.56
5	Non-irrigated area	255.67	27.32
6	Road area	17.30	2.09
7	Area under lakes	6.47	0.78
8	Government acquired area	0.15	0.01
9	Forest area	Nil	0

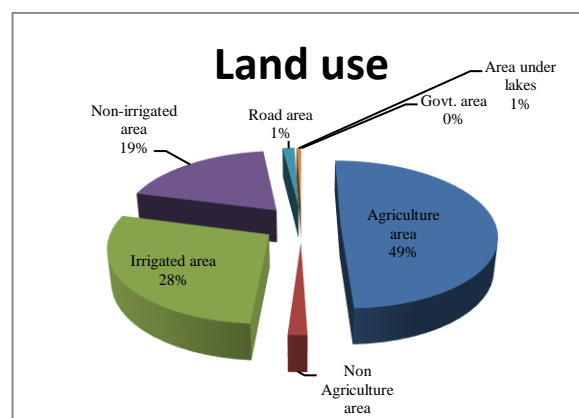


Fig.3:-Land use pattern

6.2 Crop Pattern of Study Area:

Ranking of the crop is the real feature of the cultivable area. The Ranking of the crop show the tendency of farmer or cultivator whether the farmer is traditional or market oriented. In this method the crops which occupy the highest percentage of the total cultivated area, is chosen as first rank crop.

Location	Crop	Area of crop sown (hectares)	Area available %
Naikbomwadi	Bajra	128	21.67
	Jowar	64	10.83
	Vegetables	23	3.89
	Maize	20	3.38
	Wheat	10	1.69
	Gram	8	1.35
	Groundnut	1	0.16

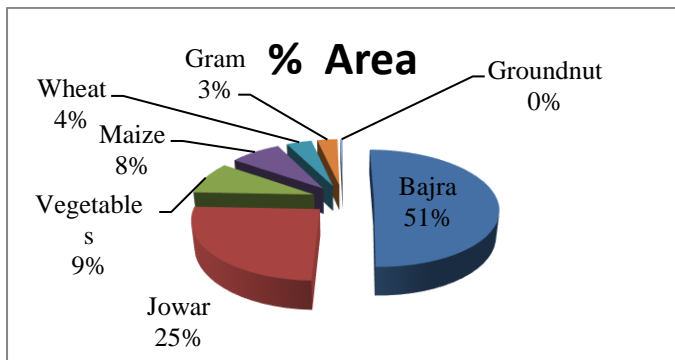
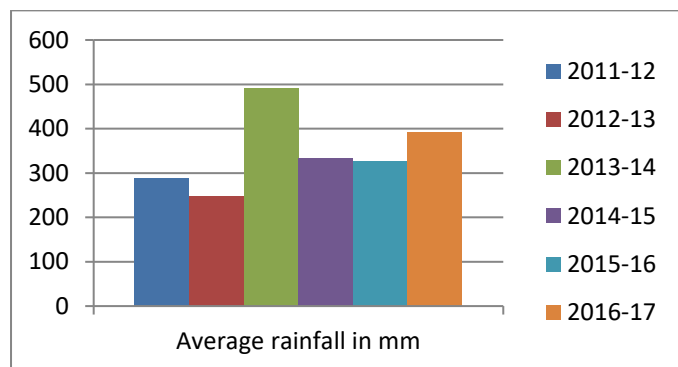


Fig.4:-Croppattern

6.3. Average rainfall of study area:

As per data obtained from the Tahsildar office of Phaltan, the average rainfall of Naikbomwadi village from past 6 years is as follows:

Sr no.	Year	Average rain fall (mm)
1	2011-12	287.75
2	2012-13	246.75
3	2013-14	490.88
4	2014-15	332.55
5	2015-16	326.44
6	2016-17	392.22



Graph.1:-Averagerainfallanalysis

6.4. Drinking Water:

The water sources in the village are not perennial. The village requires number of water tankers to fulfil daily water requirements. On an average the village requires 5 water tankers for daily domestic requirements. It indicates that this area is drought area and requires implementation of watershed management techniques.

6.5. Sources of Livelihood:

Like many villages in Maharashtra, Naikbomwadi is also characterized by the greater dependence of inhabitants on agriculture, sheep rearing, agricultural labour, etc. The graphical representation of income through various sources of livelihood in Naikbomwadi is given below:

Income	Inhabitants
Above 1 lakh	07
50,000 to 1,00,000	105
Below 50,000	24

6.6. Residential status (housing condition):

As per socio-economic survey, there are varies types of homes. Slab (12%), Mangalore tile (28%), flat roof soil type (28.6), shed (32.82%) are available. For the slab type home, watershed management technique like top rainwater harvesting technique is to be suggested.

Type of house	No.
Slab	15
Manglore tile	35
Shed	45
Huts	30

7. Water availability in the study area:

Catchment area: 825.93 Ha.

Available water due to rainfall: 89448 cu.m

8. Result and conclusion:

Socio-Economic and ecological survey of Naikbomwadi

- 1) Name of village- Naikbomwadi village
- 2) No. of People In Household

	Below 18 years	18-60 years	Above 60 years
Age	150	364	90
Sex	M-85, F-65	M-185, F-179	M-54, F-36
Literacy	91%	81%	71%

3) Source of Livelihood

Private jobs	Labour	Labour outside village
15	71	2

- 4) Family Income- Above 1Lakh- (07); 50,000-1Lakh- (105); Below 50,000- (24)
- 5) Available Job in Village- Nil
- 6) Own Agricultural Land- 590.67 Hector.
- 7) Bio-gas/Solar Plant- Nil
- 8) Own House

Slab	Manglore tile	Shed	Huts	Flat Roof Soil
9	65	44	18	Nil

9) Source of domestic and agricultural water

Well	Bore Well	Stream	Govt. Scheme
178	27	2	Nil

10) What are your main sources of income?

Agriculture	Own Business	Other
Yes	Yes	No

11) What types of crops?

Kharif	Rabbi	Perennial
Bajara, Pomegranate	Gram, Jawar, Wheat	No

12) Method of irrigation for applying water to crops

Furrow Irrigation	Basin Irrigation	Sprinkler Irrigation	Drip Irrigation
Yes	No	No	Yes

13) What type and no. of animal

Cow	Buffalo	Goat	Sheep
339	93	210	956

14) Migration of Members in Family

If Yes (How)- 32

Reason of Migration- for the purpose job in govt. as well as in private job.

10. CONCLUSION:

After the rainy season around month of February upto month may of each year the water scarcity starts in the study area and water demand increases. As large amount of ground water is drawn out from under ground, reduction of ground water table which in turn reduces water level in wells. To cater this problem of water storage in study area, the technique of watershed management is best suited. By implementing this method the ground water table is increased thus providing sufficient water to the farmers during drought season and reducing the call of tankers on which crores of rupees were spent by the government. This method is cheap and also provides employment to villagers. In this village there are great losses due to evaporation upto 69330 cu.m. So take remedial measures to avoid these losses. By reducing these losses we get extra supply of water for watershed management. Total demand of water in that village including man, animal and crop requirement is 2248376 cu.m. and supply is 89448 cu.m. This supply is calculated by considering evapotranspiration losses and avoiding evaporation losses.

10. References:

- 1) Aher S. B. and Pawar J. R., "Socio-Economic and Environmental Impact of Participatory Watershed Management Programme: A Case Study of Sundarwadi Watershed in Maharashtra". November 2012 -January 2013, Vol. 3, No. 1, 637-645.
- 2) Dr. Barakawde A.J. Dr. Tonape L.B., Dr. Lokhande T. N. "Agricultural Land Use Pattern Satara District Maharashtra" International Referred Research Journal, February,2011 ISSN-0975-3486, Vol. 1.
- 3) Gavade V. V. Dr. Patil R. R. Palkar J. M. and Kachare K. Y. "Site Suitability Analysis For Surface Rainwater Harvesting of Madha Tahsil Solapur Maharashtra" A Geoinformatic Approach",12th Esri India User Conference 2011.
- 4) Jankar P. D., Dr. Kulkarni S. S. "A case study of watershed management for Madgyal village" Department of Civil Engineering, Rajarambapu.
- 5) Johnson J. N., Govindaradjane S. and Sundararajan T. "Impact of Watershed Management on the Groundwater and Irrigation Potential: A Case Study". International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 8, February 2013.
- 6) More R. S., Ghodake V. and Sathe N. J. "Integrated Watershed Management By Using Remote Sensing and Geographic Information System". Vol.1,Issue.2/Nov. 2013,ISSN: 2347-5420.