"SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT OF PARTICIPATORY WATERSHED MANAGEMENT PROGRAMME AT KOTHALE VILLAGE"

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ABSTRACT-Any living thing is not suffer without water. Now a day there is lac of water tan demand of water.The problem of water is arising since thousands of years.Watershed can be defined as the drainage basin of a catchment area of a particular stream or river including glaciers. Watershed development is used to the conservation, regeneration and judicious utilization of the entire resources such as land, water and vegetative, animal and human within a particular watershed. The watershed development is nothing but percolate and stores the flowing rain water, due to that increase in economy of village and overall development of village. Village will be stable or suffer even if there is drought condition. Due to watershed management increase agriculture standard and to bring the barren land under cultivation. Yield of crops can be increased due to proper use of available water. We take different crop pattern due to that we use limited water. Thechemical and physical properties of water to determine properties. This includes survey about progress and model preparation of case study place. Study of watershed development project increase economy of villagers, increase in price and productivity of land. Increase in physical and chemical properties of water and soil.

I.INTRODUCTION

Water is play vital role in environment and living organism. Water is key of social development, due to watershed management yielding of crops are increasing. People stop there migration for jobs.The problem of water is arising and arising since thousands of years, sosaving every drop of water is necessarythat's why man started thinking on the water problem and its proper use. From the time he started fanning and henceforth this problem is going to arise in so many ways and it is the challenge before the people to solve the problem. "Many a Little Manes a Meckler "each and every single drop of water is very necessary but, its management is not proper. At some places drip irrigation and sprinkler are installed but, that water cannot be used for larger areas due to fluctuation of rainfall in different regions. The crops and trees are destroying is imbalance of environment it is taking a step forward to save each drop and to use it in extreme situation.

II. LETERATURE REVIEW

A. Abhaykumar S. et al. (Sep 2013) studied on Watershed Management in rural area. He reported the watershed management program mentioning Ralegan Siddhi and Adgaon in Maharashtra were the initial NGO successes that popularized these model- villages. The importance of watershed development as a bulwark for rain fed agriculture is obvious in

these large tracts of drought prone lands irrigation not expected to cross 30% of the cropped area.

B. Dr.Vishal P. Kumbhar et al. (2013) presents a case study where large amount of rainwater is possible to direct to recharge ground water resources. It is planned to take such engineering and biological measures which will direct this extra runoff to ground water storage. The most significant feature of the work is that if such technologies are developed and adopted at larger scale in rural areas, it will prevent thousands of villages of the country from water supply by tankers. Moreover this will also help us for economical development of village people which mainly occurs due to water scarcity. Through the application of watershed management options, there is 71% of water storedout of total runoff i.e. 11.03 M.Cum.

C. Caroline Hermans et al. (2007) presented a Collaborative environmental planning in river management. He have described Multicriteria decision analysis (MCDA) which provides a well-established family of decision tools to aid stakeholder groups in arriving at collective decisions. MCDA can also function as a framework for the social learning process, serving as an educational aid in decision problems characterized by a high level of public participation. In this paper, the framework and results of a structured decision process using the outranking MCDA methodology preference ranking organization method of enrichment evaluation (PROMETHEE) are presented. In conclusion they have mentioned that the use of an analytical decision framework offered a structured and deliberative analysis of the river management problem.

D. Tadashi Tanaka (2007) studied on Methodology of integrated watershed management for sustainable water resources use. proposed an integrated watershed management as one of the desired watershed managements for the next generation and showed a framework and a research flow of the management emphasizing the capacity building and the water governance as well as scientific researches on water resources issues In 2003, The Sassari declaration has emphasized some of the key elements for the next generation of watershed management programs as: a multi-sectoral approach; a combination of bottom up and top-down planning, monitoring and evaluation; shift from looking at supply to demand water; efficiency of water use; coping with hydrologic extremes and natural hazards; and the integrated management of water, vegetation, soils and sediments.

III. OBJECTIVES OF WATERSHED

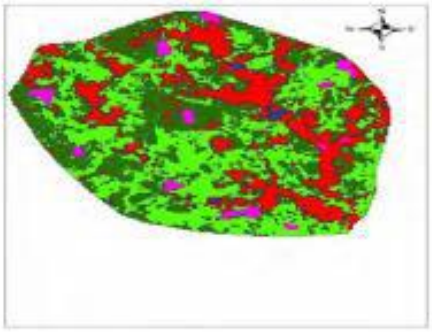
1. To examine situation before and after project.
2. To examine the chemical properties of water and compare with permissible limit and to check the water is safe for drinking and domestic purpose.
3. To analyze the properties of soil to know types of soil present in locality of kothale and the behavior of soil for permeability.
4. To check the socio-economical effect on the peoples of Kothale due to watershed development programmed and to provide good document for the reference ofwatershed development at other places.

IV. METHODOLOGY

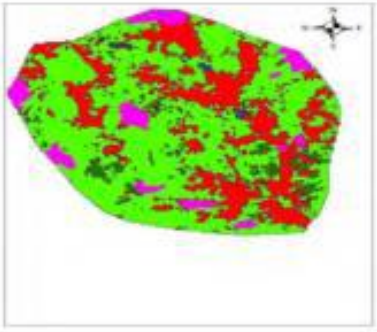
A. Situation before and after project

- **Examine Situation Before And After The Project:**

Before Project (2008)



After Project(2015)



Legend:

Grass Land	Increases from 19.25% to 21.61%. **i.e.2.36%** of total area.
Agriculture Land	Increases from 50.20 % to 54.5%. **i.e. .3.85 %** of total area
Forest/ Dense	Increases from 23.03 % to 25.95%.**i.e2.92%** of total area
Waste Land	Decreases from 13.40% to 2.04%.**i.e. 11.36%** of total area.

B. Examine chemical properties of water.

Photograph 1: collection of water sample

1. PH :

PH is = log {1/H+}.The pH of water or waste is a measure of its free acidity or alkalinity. The pH scale extends from 0 to 14.

Standards recommended for drinking water

Authority	Desirable Range	Maximum Permissible Range
BIS	6.5-8.5	No relaxation
GOI	7-8.5	6.5-9.2
WHO	7-8.5	6.5-9.2

2. Chlorides:

Fresh water sources can have chloride concentration varying from less than 100 mg/L to more than 2000mg/l.

Recommended Standards:

Authority	HDL,mg/I	MPL,mg/I
BIS	250	1000
GOI	200	1000
WHO	200	600

3. Hardness:

Recommended Standards for Total Hardness In Drinking Water, mg/l as CaCo3

Authority	HDL	MPL
BIS	300	200
GOI	200	600
WHO	100	500

4. Alkalinity:

Standards for Alkalinity Recommended For Drinking Water

Authority	HDL,mg/l as $CaCO_3$	MPL, mg/1 as $CaCO_3$
BIS	200	600

RESULT:

Sample Description	PH	Chloride mg/l	Hardness mg/l	Alkalinity mg/l	Total Dissolved Solids mg/l
Training Center well	8.00	190	190	190	250
Water tank	8.10	139	118	129	264

Pond	7.90	249	225	220	352
Well01	7.65	173	145	179	242
Well 02	8.40	182	168	182	335
Well 03	6.5	155	145	158	452
Well 04	7.5	190	146	185	467

V. SOCIAL INFORMATION

For development of village economical support is required also help can be taken from different organizations and programs.

A. Social information

1. Population of village:

Present and future estimation of benefited people is of men, women & children'sis 300 (2005) and 650 (2015)

2. Land holding:

Total area of land, agricultural land is necessary division of the land is done asper the type of land.

3. Number of animal:

Types their need of fodder and water, their use and related information must becollected.

4.Other information:

Availability of electricity, number of organization, weaklymarket telephone line, markets, business, etc.

B Technical Information:

The information required for sol management and about rainfall of a particularvillage is known as technical information. It varies from village to village but, type ofinformation to be collected is same.

Information required is as follows:

1) Village map and Toposheet:

With the help of the map we know the area of village, roads, and its direction.From this, we can also get unevenness in high and plateau regions.

2) Contour map:

A line joining the points of same level from a fixed point is known as contourmap. It shows the ups and down of the ground and show mountains, streams, lake,rivers, etc. It shows the slope and its direction it shows the catchment area.

3) Amount of rainfall:

Information about the amount of water that can be stored in dam is necessarywhile constructing any dam.

4) Survey of Soil:

The soils of Kothale watershed are divided into three distinct soil zones.

i. Soil on pathar: The pathar area has normal soil depth 10-20 cm. The productivity ofsoil is slightly good. Three soil samples were analyzed from different areas of the pathar.Soil texture is

mainly Sandy clay to sandy clay loam. Beneath the soil layer, there is alayer of hard murum having low infiltration and water holding capacity. The organiccarbon % in soil is good and the PH and EC are within the permissible limit. Based onthe above data it can be conclude that overall productivity of the soil is medium.

ii. Soil on the slopes: The land on the slope has limited soil depth ranging from 0-20 cmonly. Most of the lands on the upper slopes have negligible sol cover.15 soil samplewere analyzed from these land. Soil texture ranges from gravely sand to gravely loamysand.PH and EC within the permissible limit, fertility is poor. Hence the data is unfit foragriculture.

iii. Soil in the valley: Soil samples were analyzed from different parts of the valley land.These soils are formed by deposition of the eroded top soil from the pathar and slopes.Soil depth ranging from 20-90 cm.The PH and EC are within the permissible limits. Thetexture is mainly sandy clay loam. These are well suited for cultivation of differentprofitable cost.

5) Land and types of land: As we know, the area of the village. In that, some of thearea is gaothans while some are used as roads. We can bring the remaining land undercultivation also. The agricultural land which requires water and which depends onrainfall should be shown on the map. On some open land. We can bring undercultivation.

Table 1 : Educational status in kothale village.

Educational Status	2005	2010	2014	2016
$1^{st} - 2^{nd}$	30	35	45	55
3^{rd}	25	22	28	40
4^{th}	7	14	25	35
$11^{th} - 12^{th}$	20	25	30	40
Not eligible	18	12	8	5
Literate	35	30	25	22
Total	135	138	161	197

Photograph 2: School of kothale 2011-2016

Table 2. Types of Land with Area

Sr.No	Land	Area (ha)
1	Total area of the watershed	1,443
	i) Forest Land	330.47
	ii)Revenue Land	137.21
	iii)Community Land	15.29
2	Private Land	960.03

VI.ECONMICAL IMPACT

As discussed above, the basic goal of watershed management in rain fed systems is to reduce ruralpoverty and improve livelihood security while protecting or enhancing the sustainability of theenvironment and the agricultural resource base. Watershed development generates various types ofbenefits – tangible and non-tangible – some captured by individual farmers and some by the entirecommunity or society as a whole. Assessment of the economic and environmental impacts ofwatersheds is not always easy. Periodic monitoring and evaluation is an essential requirement in thisprocess.

The economic benefits that farmers have started to gain because of the watershed project.The assessment is based on data collected for the 2001 production from a randomsample of 120 household farms – 60 households within the watershed and another 60 householdsfrom six adjacent villages outside the watershed. Households outside the watershed are from watershed

villages. Because of the geographical proximity, the adjoining villages just outside thewatershed are considered to have comparable socioeconomic and biophysical conditions and themajor difference is the absence of a watershed project in these 'control' villages.

Table: Net income from crop production activities (Rs ha-1).

	Within the watershed		Outside the watershed	
Crops	**With irrigation**	**Without irrigation**	**With irrigation**	**Without irrigation**
Cereals	11,170	6,040	7,690	2,900
Pulses	8,860	3,810	4,080	1,920
Cotton	17,830	12,150	17,470	12,030
Vegetables	17,170	70,480	11,980	6,450
All crops	12,720	5,880	14,810	3,820

In addition to the impacts on the net productivity of land, we also compared net incomes from cropproduction activities among the households within and outside the watershed. The results are quitestriking. Average household net income (without excluding family labor and owned land costs) fromcrop production activities within and outside the watershed is Rs 15,400 and Rs 12,700, respectively.

The respective per capita income is Rs 3,400 and 1,900. Accounting for the cost of family labor, theaverage crop income within the watershed was Rs 12,700 compared to Rs 9,500 for the non-watershed villages. Based on the baseline data from a random sample of 54 households, we also computedthe average net crop incomes (accounting for the cost of family labor) within the watershed in 2005,before the project started in the village. The average net crop income (in 2008 prices) in 2005 was aboutRs 6,200 despite the high rainfall recorded in the village during that year (1084 mm vs 676 mm in 2001).This shows that the average crop net income has doubled since 2005.

VII. CONCLUSION

1. The control of damaging runoff and degradation and there by conservation of soil and water may achieve.
   a. The infiltration of water achieved.
   b. The downstream area is protected by moderate floods.
   c. Enhance the ground water recharge.
2. This system increases chemical and physical properties of water. Water is potable after the project and also harmful contains are neglected.
3. Village will be on the safe side even if there is drought condition, proper use of available water improves agricultural yield.
4. This watershed development relates with increase in economy of village and overall development of village.
5. The activities undertaken in this project include soil and water conservation measures like construction of Check dam, Bandhara etc. by construction of Bandhara the stored water is use for agriculture purpose and to increase infiltration and to prevent soil erosion.

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