



ISSN 2278 – 0211 (Online)

Sustainable Development and Natural Resource Conservation through Watershed Approach: A Case Study

Smita Rani Nayak

Ph.D. Scholar, Ravenshaw University, Odisha, Cuttack, India

Lecturer, Buxi Jagabandhu Bidyadhar College, Bhubaneswar, Odisha, India

Abstract:

Kalahandi a western district of Odisha, India is one of the most backward regions of the country. Reeling with problems of prolong dry spell and erratic rainfall have caused havoc and has given the district the distinction of one of the worst drought affected regions of the country. With major chunk of its population representing the lower strata of the society (mostly SC, ST and landless), grabs the attention of national, international media for all wrong regions like pervasive poverty, crop failure, farmer homicide, malnutrition, migration etc. A centrally sponsored program called 'Integrated Water Management Program (IWMP)' has been launched in the region from the period 2010-11 to 2016-17 with an objective to combat different issues to bring sustainable development in the area and to elevate the living condition of the dwellers. The study infactis an attempt to evaluate the onsite impact of the project in the region. Two micro watershed namely Turpi (Lat. Ext.-20°06'5"E 6-20°05'N6" Long. Ext.-83°05'3" to 83°03'6 E") and Pastipada (Lat. Ext. 20°0'5" N to 20°1'57" N and Long. Ext.- 83°6'15" to 83°6'25 E") watershed of river Tel, a none perennial river, belonging to Bhawanipatna block of the district has been used as a case study for assessing effect of various watershed intervention. Poor soil cover, sparse vegetation erratic rainfall, large scale erosion, lower water table, over exploitation of ground water is the perennial problems of the region.



Figure 1

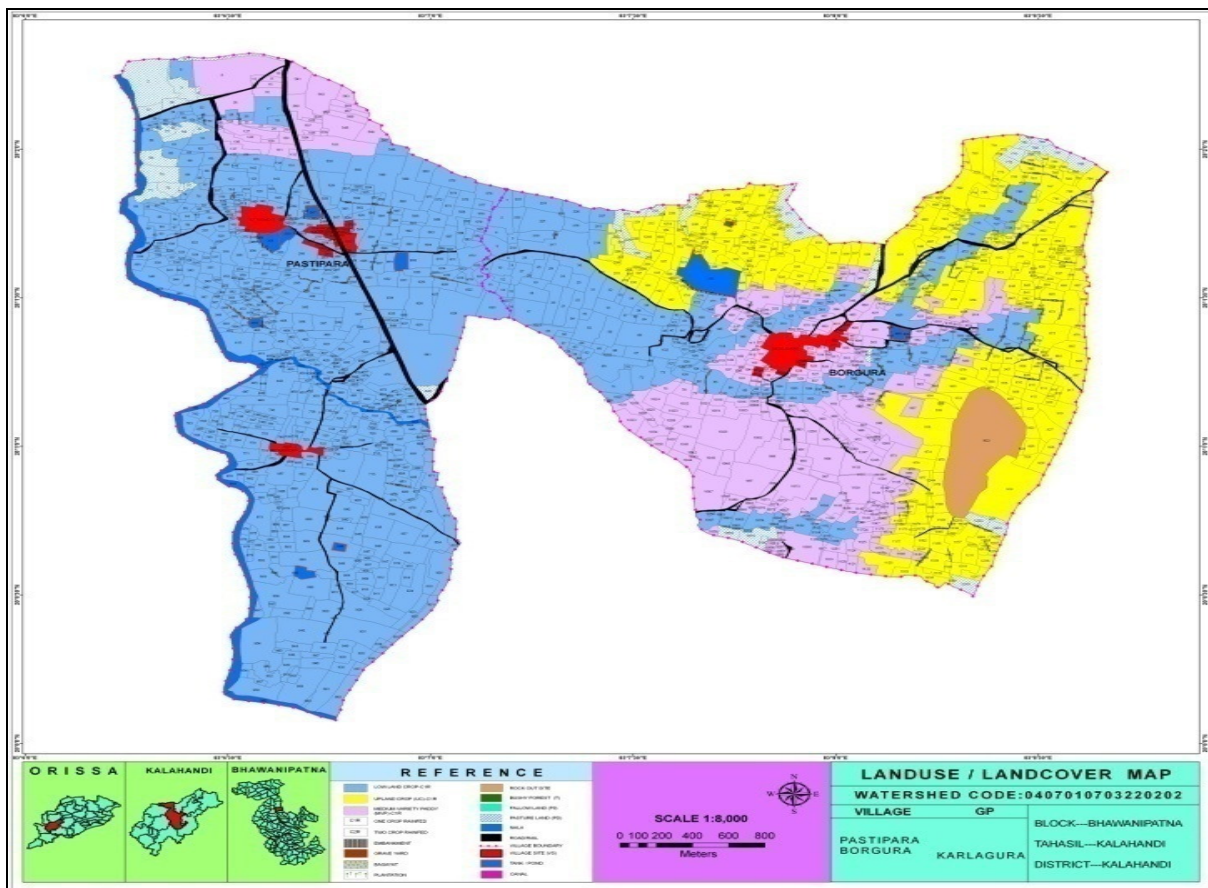


Figure 2: Land use map of Pastipada

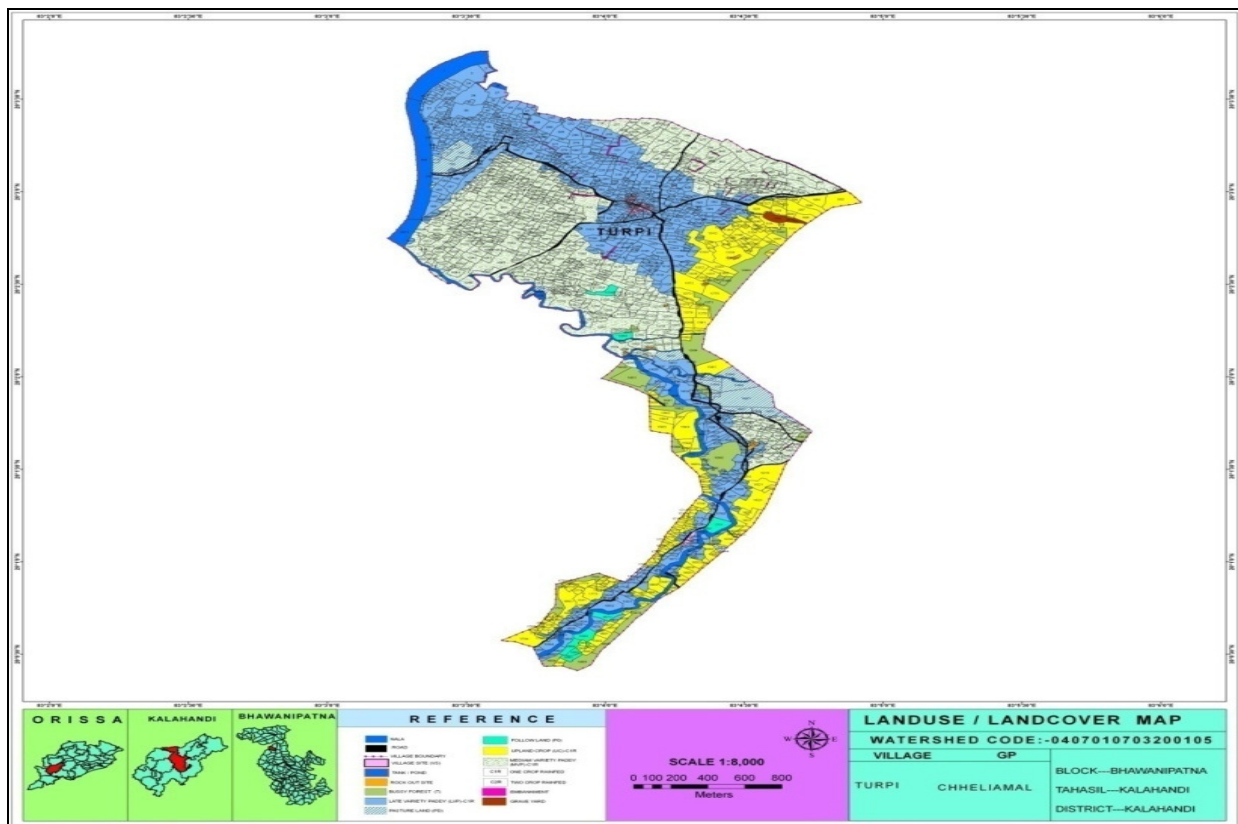


Figure 3: Land use map of Turpi

1. Introduction

Major chunks of Indian population (about 70%) are engaged in agriculture and allied activities. It is indeed backbone of the Indian economy. However irrigation facilities have failed to reach nook and corner of the country making agriculture mostly rain fed. In fact mostly 60% of total arable land in India is rain fed. Ironically monsoon which is source of rain fall for the entire country is highly irregular in terms of time, amount and distribution. Climatic change and global warming have further aggravated the condition. This has left the farmer very vulnerable. Moisture stress due to lack of rain fall during cropping periods leads to crop failure, making agriculture very unproductive and unprofitable.

These spates of incidence in the country gave birth to the concept of watershed management in order to combat various agricultural problems, address the trauma of the farmers and at large boost socio-economic development.

2. What is Watershed and Watershed Management?

Watershed is a geo-hydrological unit which separates two river systems. It is also called a drainage basin or a catchment area. In fact it represents a naturally demarcated region in which all water following into it goes to a common outlet i.e. to big river or a lake. It is in fact a functional unit, which performs the function of the collecting, storing (in soil and land depression) and circulating of water through its various hydrological units. Hence it is a source of water supply to all its inhabitants – plants, animals, birds and human being dwelling with its domain (GuoM). It has two components.

Resources components which includes water, soil and biota.

Socio-Economic component which includes man and its several social culture aspects.

So it is not just a hydrological unit but also a socio political ecological entity (Waniet al.)

2.1. Watershed Management

Watershed management is an area planning within a watershed with an objective to elevate the conditions of the inhabitants, residing within its domain with optimum utilization of its natural resources. In fact watershed has emerged as new tool of regional planning to obtain sustainable development of natural resources like land, water, biomass so that the benefits shall trickle down to the inhabitants within the purview of a watershed. As a matter of fact watershed management is a way of looking at relation among people, land and water in a watershed to realize optimum production with maximum disturbances to the environment.

2.2. Objectives of Watershed Management

- Check surface run off to control soil erosion.
- Enhance the soil quality
- To mitigate drought and floods
- Reclaim and rehabilitate degraded land.
- Last but not the least, generating awareness among people towards conservation and sustainable development of natural resources.

2.3. History of Watershed in India

Traces of watershed programs in India can be found in as late as in 18th century. In 1880 Famine commission came into being. Both were organization for research within the frame work of watershed. However in the post independence era, watershed approach was genuinely started as late as in 1950s. In 1962-63 River Valley Project (RVP) was launched by the centre. In 1972-73 MoRD launched by Drought Prone Area Program (DPAP). 1980-81 Flood Prone River was launched by ministry of agriculture. During the 90s watershed programme was executed with more vigor. In 1994 Hanumanth commission made a makeover in watershed approach and made participation of locals mandatory. Some of the ongoing watershed programs are as follows:

- National Watershed Development Project for Rainfall Areas (NWDPA).
- Watershed development in shifting cultivation Areas (WDSCA).
- Drought Prone Areas Programme (DPAP)
- Desert Development Programme (DDP)
- Integrated Watershed Development Project (IWDP)
- Employment Assurance Scheme (EAS)

2.4. Micro Watershed Concept and Significance

A watershed is classified depending upon size, drainage, and shape and land use pattern. A micro watershed can be defined as which ranges between 100-1000 ha.

A micro-watershed planning has been adopted as a wholesome development of rainfall region with an aim to conserve soil and moisture and improve soil productivity of catchment region. In fact the major objectives of the programme are the following.

Increase production of crops, management and practice of animal husbandry and afforestation

Maintaining balance between resource development and welfare of the population, conserve resource for the present and for the future.

2.5. Criteria for Selection of Watershed in the Block

Several regions in the block have been enrolled under the watershed approach based on fixed criteria which is as follows;

- Regions suffering from acute shortage of drinking water during summer due to fall of water level.
- Regions having less than 30% under irrigation.
- 60% population of the region must be SC and ST.
- Highly eroded region due to surface runoff.
- Region with large scale deforestation.
- Region registering large scale migration.
- Region having undernourished and malnutrition population.
- Region involved in shifting cultivation.
- Region not covered under any other scheme of treatment.
- Region close to previously implemented watershed approach region.

3. Data Collection and Analysis

The case study is based on collection of both primary and secondary data. The primary data were collected by house hold survey as well as focus group discussion. Pre-tested questionnaires were used. The data were personally collected through interviews with the farmers. The secondary data were collected from the various sources, most importantly reports prepared by implementing agencies various National and International journals and online information were also largely collected.

3.1. Impact of Watershed Management in the Region

Impacts of watershed management in both the regions are spectacular. There are sea changes in the life and activities of the residents. Noteworthy transformation is witnessed in all aspects like bio-physics, socio-economic, ecology, and environment. Some of the tangible and intangible benefits of watershed project are as follows.

3.2. Increase in Availability of Water

Scarcity of water was one of the limiting factors in the region. The water table was much below the average, around 24 feet which dipped further during summers. The availability of water 6-7 months in a year. During project large-scale afforestation was carried along with construction of number of water harvesting structures like farm pond, percolation tank, rings well and dug wells etc. which not only supplied water for domestic as well as agriculture activities during lean period, but also recharged the soil moisture. Consequently in the post intervention period, the water table increased to 20' where as water availability rose to 9-10 months of a year.



Figure 4: Ring well in Turpi watershed



Figure 5: Water harvesting structure in Pastipada

3.3. Decrease in Soil Erosion

Deforestation, poor drainage, steep slopes, overgrazing and most importantly lack of soil conservation measures were largely responsible for large scale soil erosion in the region. It was estimated that annually 15 ton /Ha (approx) of soil erosion occurred in the region (PIA report) creating spill over problems like loss of soil nutrients, low fertility of soil and low production. Large scale afforestation in the up land, bund plantation, construction of various erosion control structures like gabion, spill over, check dams, loose boulders check dams etc during the project period drastically reduced soil erosion in the region.



Figure 6: Loose Boulder Check Dam



Figure 7: Spillway

3.4. Increase in Yield of Agriculture Production

Increase in soil moisture, availability of water round the year, control in soil erosion and with balanced nutrient diet increased the crop production in the region to large extent. Integrated nutrient management has been introduced where the farmers are taught to use more and more organic manure and little and right amount of chemical fertilizers. During the project period number of vermin compost were constructed to encourage farmers to use organic manure in right proportion. Paddy and cotton are the chief crops cultivated in the region along with pulses vegetables and off late farmers have started cultivating onions. The yields of paddy have increased to 25Q-35Q from 8Q-10Q/ha during post- intervention period. The yield of other crops likes cotton and pulses have increased considerably.

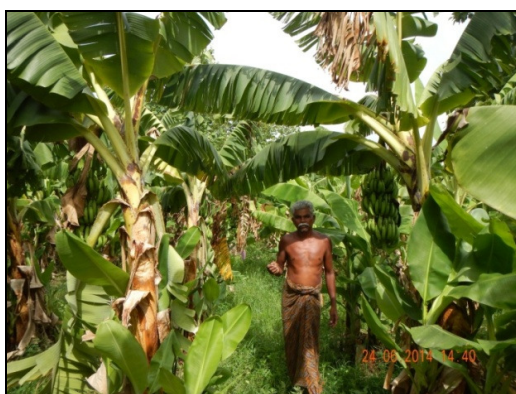


Figure 8: Tissue Banana Cultivation in Pastipada



Figure 9: Onion cultivation in Turpi



Figure 10: Mushroom cultivation in the Backyard

3.5. Promotion of Innovative Agriculture and Crop Diversification

Various interventions changed the crops and cropping pattern in the watershed. Many farmers have switched over to onion cultivation from vegetable cultivation which gives bumper result. Horticulture has been encouraged with large scale plantation of mango and tissue banana. Farmers have replaced traditional paddy cultivation with high yielding variety of paddy. Promotion of innovative agriculture practice are encouraged through mixed cropping, strip cropping adoption of organic manner, use of right proportion of fertilizer, rotation of crops etc. Backyard gardening has been encouraged where locals grow, guava, drumstick, papaya, mushroom

which are used for domestic purpose, as well as sold in the market. Off late mushroom cultivation in the backyard giving appreciable dividends to the farmers.



Figure 11: Bamboo craft

3.6. Employment Generation

Agricultural activities are supplemented with other activities in order to reduce the risk factor of crop failure. Animal husbandry has been taken as an alternative employment opportunity other than agriculture. Various cattle rearing activities like goatery, piggery, poultry (growing of highbred Giriraj and Vanaraj hen), rearing of milch animals are encouraged which not only generate employment, also provide the locals with meat and milk. Healthcare of the animals with required training guidance of the farmers are extended by the PIA. Apart from this various labour intensive activities like plantation and construction provide employment to the people round the year. Furthermore small enterprises have been encouraged by extending financial help and training like mobile repair, tailoring, grocery shop, bamboo craft, making of incense stick.

3.7. Decrease in Migration

Lack of employment opportunity during off season had forced large scale exodus of the local to the neighboring district and states. However introduction of various employment generation activities like animal husbandry and labour intensive work like construction and plantation, encouragement of various small enterprises have decreased the rate of migration in the region.

3.8. Increase in well being Status of the People

Last but not the least the post intervention witnessed increase in well being of the local of the region. Increase in percapita income, availability local produced food items like fruits, vegetables, milk and meat have reduced malnutrition and improved the health condition of the people around. Migration has considerable decreased. At an outset the locals have now better standard of living than before.

4. References

- i. Chatterjee U and B.K.Mishra – “Micro level watershed Management and Sustainable Development through watershed approach: A case study.
- ii. Hanumath Rao CH 2000- Watershed Development in India. Recent experience and Engineering Issues.
- iii. Kanak, K- Impact and evolution of micro level water resources development and improved agriculture practice crop productive and ecology.
- iv. MirekerOD, Mousha AK: - Policy intervention in watershed management: The case of Icchaben watershed Ghana.
- v. Mishra SK- Watershed issues and concerns of drought prone area
- vi. Phatak P, A.K. Chourasia, S. P Wani, R. Sudi, - Multiple Impact of Integrated watershed management in the low rainfall Soil-Arid region: A case study from Rajasthan India.
- vii. Sethi R.R, A. Kumar, S.P Sharma, R.B Singadhupa 2008: Water Resources Assessment in Manijhar watershed in odisha.
- viii. Sudhister S, A. Das, U.S. Pattnaik, P.R. Choudhury 2004 upliftment of tribal woman through integrated watershed Development.
- ix. Swaminathan B, K.C.Sivastav : Dry land management in India: Backdrop, focus and the future.
- x. Terafe HR, Asfew and S.Demission the link between Ethno botany and watershed development for sustainable use of land and plant resources in Ethiopia.
- xi. Wani S.P. K.K. Garg: Watershed management concept and principle.