Research Paper
Impact Factor: 7.352
Peer Reviewed Monthly Journal
www.ijmdrr.com

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

PRIORITIZATION OF MACRO WATERSHEDS IN ANANTAPUR DISTRICT OF ANDHRA PRADESH

Dr .Palla Durgappa
Lecturer in Economics, P.V.K.K Degree& P.G College, Anantapur.

Abstract
The present paper aims at focusing on prioritization of the macro watersheds for implementing watershed development and management programs in Anantapur district. A watershed is a topographically delineated area draining into a small channel. It is a divide separating one drain basin from another. The size of watershed may vary from a few square meters to thousands of square kilometers. The size becomes important, depending upon the objective of the watershed. On the average 5,000 hectares is a mini watershed and 500ha is a functional micro watershed. The Anantapur district can be divided into 3825 micro watersheds with an area of 500ha each for implementation of watershed development programmes in the district.

Introduction

A watershed is a geo-hydrological unit draining at a common point by a system of streams. It is all the land and water area which contributes run-off to a common point. It is the land area that captures rainfall and conveys the overland flow and run-off to an outlet in the main flow channel. According to Brooks (1985)[1] watershed is a topographically delineated area draining into a small channel. It is a divide separating one drain basin from another. The size of watershed may vary from a few square meters to thousands of square kilometers. The size becomes important, depending upon the objective of the watershed. On the average 5,000 hectares is a mini watershed and 500ha is an functional micro watershed. Watershed management may be defined as process of formulating and carrying out a course of action involving manipulation of natural, agricultural and human resources to provide resources that are desired by and suitable to watershed community under the condition that soil, water and vegetation resources are not adversely affected. Watershed management practices are those changes in landuse, vegetation cover and other non structural and structural actions that are taken on a watershed to achieve watershed development activities. It is an integrated approach and requires land adjustment measures which contribute to the reduction in soil erosion rates, increased agricultural productions, generation of rural employment and balanced growth of rural economy. The studies on prioritization of watersheds basing on sediment yield index and erosion index are carried out by Karale et.al (1977)[2], Bali and Karale (1977)[3], and Rajeev Sharma and Baldev Sahai (1985)[4].

Anantapur district covers an area of about 19,125Km^2. It is located in southwestern part of Andhra Pradesh state in between 13^{0}40' to 15^{0}15' North latitudes and 76^0 50' to 78^0 30' East longitudes. It is divided into 63 mandals and five revenue divisions. The total population of Anantapur district is about 40,83,315 (2011 census). Geologically the district is comprised of Archean rocks consisting un classified granitic rocks and proterozoic formations consisting of shales, dolomite, quartzite and limestone. Climatologically the district experiences dry sub-humid type of climate.

As is generally the case in drought-prone areas, in Anantapur too, there is a conspicuous absence of perennial rivers. All the rivers in Anantapur district— Pennar, Jayamangala, Chitravathi, Vedavathi (or Hagiri)—are non-perennial and have their origin in the neighbouring state of Karnataka. Given this environment, the earlier rulers had recognised the need to promote several indigenous water harvesting systems. It has been observed that, 'The most indigenous rain water harvesting and management

systems like feeder channels, cascading chains of tanks and networking water bodies could be seen in Anantapur district…….The life and culture of Anantapur people revolved around these traditional water bodies…… The whole village was responsible to use, to conserve and to maintain the safety of the water bodies through locally established institutions like khudimaramath, neerugatti and pinnapedda' (Kadalika 2004)[5]. The Anantapur District Gazetteer[6] notes that there were over 700 tanks in the district in the beginning of the 20th century. The gazetteer further notes that special grants used to be conferred for the maintenance of the tanks. To quote, `These grants confer certain proportions of the ayacut on favorable tenure on condition that the grantee keeps the tank in order'[7]. Spring channels have also been an important feature of Anantapur irrigation scenario and the gazetteer notes, `These are either dug from jungle streams and nullahs which supply tanks or flow down to the rivers, or from the tank beds, hill sides, valleys and so forth. The supply in the former class is of course much better than in the latter and in ordinarily good years it is sufficient for two crops and is more reliable than that derived from many of the larger tanks….. They are marvels of industry, being often excavated to a considerable depth for a mile or more'[8]. River channels have also been a significant feature of Anantapur agriculture. The gazetteer comments, `They are merely diversions, by means of temporary sand dams, of the small streams which in wet weather flow down the river beds after the floods have subsided or, more usually, are dug in the bed of the river to take off the spring water'.[9] In the year 2004, the District Collector of Anantapur district initiated a survey to identify the number of water bodies that existed in the district. The study identified a total of 5,824 water bodies in the entire district14. Of this, 1,373 are big tanks with an average ayacut of above 100 acre; 2094 are small tanks with an ayacut of 10 acre; and 203 are spring channels. The survey found that only about one-fourth of the identified water bodies, that is, around 1500, were functional at the time of the survey. This survey clearly indicated that while the earlier rulers had recognized the importance of constructing large number of small water bodies in a rain-shadow region such as Anantapur, the modern state, by promoting private irrigation over community-based irrigation systems, has contributed towards the destruction of the indigenous rain water harvesting and management systems that prevailed in the region.

The main objectives of the present study are to delineate the macro watersheds of the Anantapur district, to workout intensity soil removal at macro watershed level, sediment yield index and erosion index and to prioritize the macro watersheds for implementing watershed development and management programs of Anantapur district.

The macro watersheds of the Anantapur district are divided based on relief and drainage taken from survey of India topographic sheets and IRS-IB Geocoded data on scale 1:50,000. The intensity of soil removal and sediment yield predictive equation (SYPE) at macro watershed level was used for estimation of sediment yield adopting basic equation given by Flaxman (1971)[10]

$$\text{Log}(100+Y) = 6.63792 - \text{Log}\,(100+X_1)^{2.40504} + \text{Log}\,(100+X_2)^{0.06567}$$
$$-\text{Log}\,(100-X_3)^{0.01820} + \text{Log}\,(100+X_4)^{0.040109}$$

Where Y: Sediment Yield in acre-feet/Square mile/year

X_1: (Average annual precipitation in inches)/(Mean annual temperature in ^{0}F)

X_2: Average Slope

X_3: Percent of soil particles than 1mm in top 2" soil profile

X_4: Percent of 2 Microns or finer soil particles in the top 2" soil profile

X_4 is assigned positive value, if soil is alkaline and negative value if soil is neutral or acidic.

For the identification and delineation of physiographic unit's relief, average slope, soil PH and land use are used. For the classification of watershed area into various erosion susceptible classes, criteria given by Zachar (1982)[11] has been used. The erosion index is worked out basing on ration of expected sediment yield and potential sediment yield for all macro watersheds.

The study reveals that largest watershed in area is Bommanahal with an area of 72.50 thousand hectares and the smallest watershed is Hemavathi with an area of 3750 thousand ha. There are about 8 watersheds with more than 50,000 hectares in area and eight watersheds with less than 25,000 and 50,000 hectares are 34.

The intensity of soil removal varies from a minimum of 0.30 m^3/ha/year in Parigi micro watershed to a maximum of 55m^3/ha/year in Golla macro watershed (Table 1). In yellanuru, Bathalapalli, Nallamada, Chilamathuru, Gudibanda, Nelagonda, Yerragudi, Gooty, Kudair, Golla, Setturu, Kambadur and Hampapuram (13) macro watersheds the intensity of soil removal is more than 50m^3/ha/year.

The intensity of soil removal varies from 15 to 50m^3/hectare/year in Bommanahal, Beluguppa, Penakacherla, Vidapanakal, Kristipadu, Yadiki, Nuthimadugu, Mulakaledu, Darmavaram, Sankepalli, Peruru, O.D.Cheruvu, K.Cherlopalli and Somandepalli (14) macro watersheds.

The Intensity of soil removal ranges from 5 to 15m^3/ha/year in Kanekal, Vajrakarur, Kundurpi, Tadimarri, Maddileru, Kadiri, Gorantla and Roll (8) macro watersheds. The intensity of soil removal varies from 0.5 t0 5 m^3/ha/year in Putluru, Narpala, Pamidi, Kotanka, Chennakothapalli, Peddannavaripalli, Talupula, N.P.Kunta, Nallacheruvu, Amadaguru and Lepakshi (12) Mega Watersheds. The intensity of soil removal is less than 0.5m^3/ha/year in Uravakonda, Parigi, Madakasira and Hemavathi (4) macro watersheds.

The sediment yield Index varies from a minimum of 979 in Uravakonda macro watershed to a macro watershed to a maximum of 1479 in Golla macro watershed (Table I). the sediment yield index is 1300 and above in Nelagonda, Yarragudi, Gooty, Kudair, Golla, Settur, Kambadur, Hampapuram, Yellanuru, Bathalapalli, Nallamada, Chilamathuru and Gudibanda macro watersheds. The sediment yield index ranges from 1200 to 1299 in Dharmavaram, Sankepalli, Peruru, O.D.Cheruvu, K. Cherlopalli, Somandepalli, Bommanahal, Beluguppa, Penakacherla, Vidapanakallu, Kristipadu, Yadiki, Nuthimadugu and Mulakaledu macro watersheds. The sediment yield index varies from Kadiri, Gorantla and Rolla macro watersheds. The sediment yield index ranges from 1000 to 1099 in Putluru, Narpala, Pamidi, Kotanka, Chennakottapalli, Peddannavaripalli, Talupula, N.P.Kunta, Nallacheruvu, Amadaguru and Lepakshi macro watershed. The sediment yield index is than 1000 in Uravakonda, Parigi, Madakasira and Hemavathi macro watersheds.

The erosion index varies from a minimum of 0.15 in Parigi and Madakasira macro watersheds to a maximum of 0.97in Golla macro watershed (Table-I). The erosion index exceeds 0.80 in Nelagonda, Yarragudi, Gooty, Kudair, Golla, Kambadur, Hampapuram, Yellanur, Bathalapalli, Nallmada, Chilamathuru and Gudibanda macro watersheds. The erosion index varies from 0.60 to 0.79 in Beluguppa, PenakacherlaVidapanakalu, Kristapadu, Yadiki, Nuthimadugu, Mulakaledu, Darmavaram, Sankepalli, Peruru, O.D.Cheruvu, K.Cherlopalli and Somandepalli macro watersheds. The erosion index ranges from 0.40 to 0.59 in Maddileru, Kadiri, Gorantla, Rolla, Kanekal, Vajrakarur, Kundrupi and Tadimarri macro watersheds. The erosion index varies from 0.20 to 0.39 in Narpala, Pamidi, Kotanka, Chennekothapalli, Peddannavaripalli, Talupula, N.P.Kunta, Nallacheruvu, Amadaguru and

Lepakshi macro watersheds. The erosion index is less than 0.20 in Uravakonda, Parigi, Madakasira and Hemavathi macro watersheds.

Prioritazation of Macro Watersheds

Based on the values of the intensity of soil removal, sediment yield index and erosion index the prioritization of watersheds is carriedout. The first priority macro watersheds in which watershed development programmes have to be implemented are Nelagonda, Yarragudi, Gooty, Kudari, Golla, Settur, Kambadur, Hampapuram, Yellanuru, Bathalapalli, Nallamada, Chilamathuru and Gudibanda. The second priority macro watersheds in which watershed development programmes have to be implemented are Bommanahal, Beluguppa, Penakacherla, Vidapanakall, Kristipadu, Yadiki, Nuthimadugu, Mulakaledu, Darmavaram, Sankepalli, Peruru, O.D.Cheruvu, K. Cherlopalli and Somandepalli. The third priority macro watersheds in which watershed development programmes have to be implemented are Maddileru, Kadiri, Gorantla, Rolla, Kanekal, Vajrakarur, Kundurpi and Tadimarri. The fourth priority macro watersheds in which watershed development programmes have to implemented are Putlure, Narpala, Pamidi, Kotanka, Chennakothapalli, Peddannavaripalli, Talupula, N.P.Kunta, Nallcheruvu, Amadaguru and Lepakshi. The fifth priority macro watersheds in which watershed development programmers to be implemented are Uravakonda, Parigi, Madakasira and Hemavathi.

Conclusion

Based on intensity of soil removal, sediment yield index and erosion index the fifty macro watersheds have been divided into thirteen first priority macro watersheds fourteen second priority macro watersheds in which the erosion susceptibility is high very high, eight third priority macro watersheds, eleven fourth priority macro watersheds in which the erosion susceptibility is low.The Anantapur district can be divided into 3825 micro watersheds with an area of 500ha each for implementation of watershed development programmes in the Anantapur district.

References

1. Brooks's (1985) definition mentioned in Monitoring and Evaluation of Watershed Management Project Achievements by Edgar Hernández Becerra, 1995, p. 7.
2. Karale et.al (1977).
3. Bali and Karale, 1977, Studies on silt deposition in Gambhiram Reservoir, Journal of Spatial Hydrology, pp.35-36.
4. Baldev Sahai. "Drought detection and quantification by remote sensing", Jal Vigyan Sameeksha, Vol.1, No.1 pp.138-152, 1986.
5. Kadalika, Monthly Journal, Anantapur.
6. The Anantapur District Gazetteer, 1905.
7. GoAP 1993, p.63.
8. Ibid.
9. Iibid. p.64
10. Flaxman, E.M., Sediment Yield Predictive Equation Soil Conservation Service, Technical Service Centre Advisory, Eng. PO-1, 1971.
11. Zachar, Soil erosion, Elsevier Scientific Pub. Co. , Amsterdam and New York, 1982.