ISSN: 2455 – 4200
International Journal of Engineering Research and Modern Education
Impact Factor 6.525, Special Issue, April - 2017
6th National Conference on Innovative Practices in Construction and Waste Management
On 25th April 2017 Organized By
Department of Civil Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu

GROUND WATER MANAGEMENT AND SOIL CONSERVATION OF KORAYAR WATERSHED THROUGH REMOTE SENSING AND GIS

M. Balakrishnan* & Dr. Ilanthirayan**
* Research Scholar, Bharathiar University, Coimbatore, Tamilnadu
** Assistant Professor, Department of Geography, Government Arts College (Autonomous), Salem, Tamilnadu

Cite This Article: M, Balakrishnan & Dr. Ilanthirayan, "Ground Water Management and Soil Conservation of Korayar Watershed through Remote Sensing and GIS", International Journal of Engineering Research and Modern Education, Special Issue, April, Page Number 265-268, 2017.

Abstract:
Watershed management is often seen as a potential engine for agricultural growth and development in fragile and marginal rain-fed areas India. Enhanced livelihood opportunities for watershed community through investment in their assets and improvements in income and productivity are the leading objective of the programme, as mentioned in the guidelines for watershed management programme (WMP) in India. Watershed management may be defined as an integrated approach of greenery for a better environment. The management is essential for preceding the natural ecosystem in the catchment areas of rivers. The current research aims at developing an integrated water and soil conservation plan for Korayar watershed with in an adaptive management framework using geospatial tools. The soil and water conservation for watershed management process is among the requisites that need to be considered for the control of sedimentation and soil erosion. Other elements like climate, edaphic factors, land management, topography, and land cover, etc. will also determine the sedimentation and soil erosion process. Integrated Watershed Management approach is a worthy approach to manage the ecological, social and economic watershed development challenges in countries. The study chosen Korayar watershed area extent Coimbatore and Palakkad district, using remote sensing and GIS.To study and Mapping of the watershed through SOI with 1:50,000 scale, suitable Remote sensing data with available secondary information for soil conservation.

Key Words: Integrated, Watershed, Soil, Water Conservation and ArcGIS

Introduction:

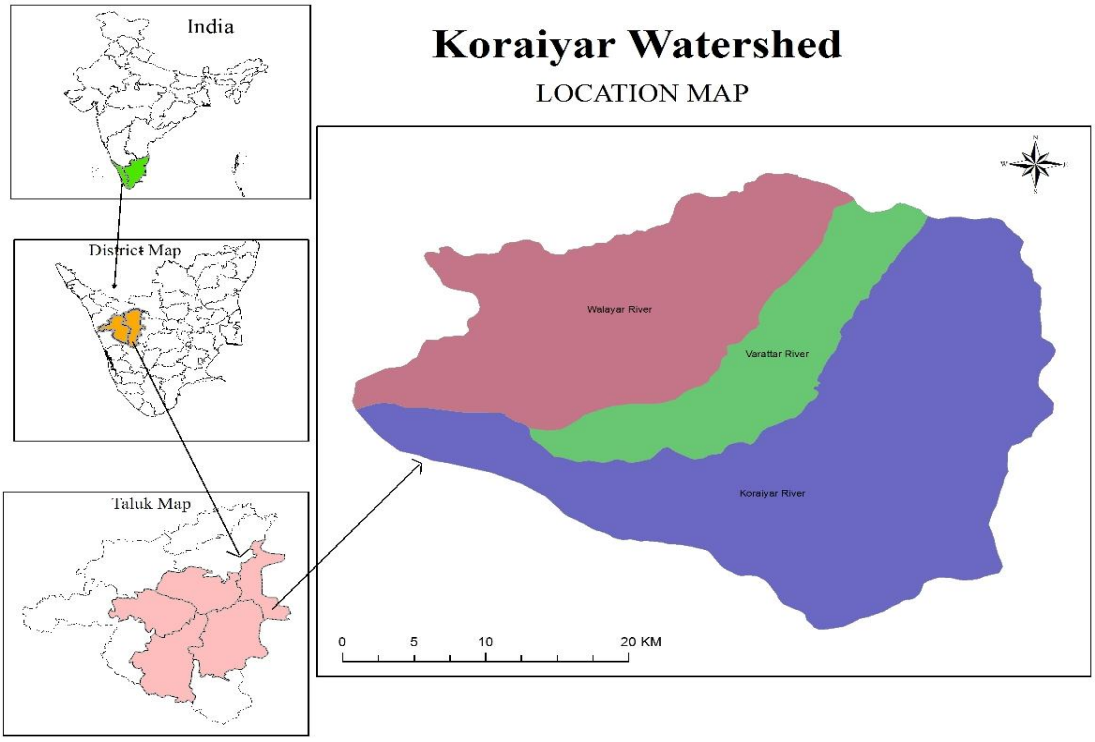
The rapid growth of population and advancements in life style have massively increased the demands for food, fuel, fodder, fiber, shelter, communication, etc. These growing demands are putting the flexibility of the natural resource base under warning. To ensure food and water security, the vertical and horizontal expansion of production, has to be effective without degrading productivity. Watershed management may be defined as an integrated approach of greenery for a better environment. The management is essential for preceding the natural ecosystem in the catchment areas of rivers. This approach is needed to generate sufficient interest among the local communities for the watershed management and soil conservation. The economic security and ecological stability could be achieved only through integrated watershed management approach; the watershed being the planning unit. Remote sensing and GIS technologies permit rapid and cost effective natural resource survey and management. Moreover, remotely sensed data serve as vital tools in ground water prospecting in identifying landform features, drainage pattern and geomorphic indicators for location of recharge and discharge area. Analysis of geomorphologic condition is an essential prerequisite in understanding water bearing characteristic of most rocks. (Horton.1945). Groundwater is a dynamic and replenishable natural resource, but in hard rock terrain availability of groundwater is limited. Occurrences of groundwater in such rock are essentially confined to fractured and weathered horizons. In India, 65 percent of the total geographical area is covered by hard rock formation. Therefore, efficient management and planning of groundwater recharge in these areas is necessary. (Saraf and Choudhury 1997, 1998) Development through watershed approach is one such developmental option. Watershed management is the study of the relevant characteristics of a watershed, aimed at the sustainable distribution of its resources and the process of creating and implementing plans, programmes and projects to sustain and develop the watershed functions that affect the plant, animal and human communities within a watershed boundary. Watershed is a hydrological unit bounded by natural ridges and allows the run off due to rainfall to drain in a well defined drainage pattern of streams flowing within the watersheds boundary. It aims at alleviating habitat and inhabitant impoverishment through a holistic approach of conservation and sustainable exploitation of natural responsibility and harmonious co-existence manner. Proper planning of watershed and soil conservation is essential for the conservation of land and water resources and their management for optimum productivity. Characterization involves measurement of parameters of geological, hydrological, geomorphological, hydrological soil, and land use / cover. As an integral part of area development programme, land resources development programmes are taken upon watershed basis as the shape of the watershed controls, the natural resources like water, soil and productivity of the land for successful implementation of agriculture, forest and other micro level development in each hectare of a watershed and the village becomes the most adaptable unit. For regional planning and management the micro watersheds and villages are the most workable units. Using satellite data and GIS technology, maps of land use/land cover, drainage, soil, etc., will became essential to manage natural and human resources.

Study Area:

Korayar watershed area extent Coimbatore and Palakkad district lies between longitude from 76°15'E to 77°18'E and latitude from 10°63'N to 10°95'N and the total area of Korayar basin is covered by 1100sqkm. The watershed comprise the Pollachi, Kinathukadavu, Coimbatore (South) Taluks in Tamil Nadu and Chittur, Palakkad Taluks in Kerala. The elevation of the watershed between 140 to 230 meter from west to east. Korayar Watershed is situated at Palakkad Gap and the watershed composed of plains, valley bottoms. The gap is the lowest pass through the Western Ghats. It is also the only break in that stretch

ISSN: 2455 – 4200
International Journal of Engineering Research and Modern Education
Impact Factor 6.525, Special Issue, April - 2017
6th National Conference on Innovative Practices in Construction and Waste Management
On 25th April 2017 Organized By
Department of Civil Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu

of the Ghats that otherwise runs along the entire eastern edge of Kerala, isolating the State from neighboring Tamil Nadu. It acts as a corridor between the two States by linking Palakkad District of Kerala with Coimbatore District of Tamil Nadu. The gap is important to the climate of southern India in that it allows the moisture-laden Southwest monsoon winds into the Coimbatore region, which moderates Coimbatore's summer temperatures and generates greater rainfall in the region relative to the rest of lowland Tamil Nadu. At the same time, due to hot winds coming from Tamil Nadu, the district of Palakkad is warmer than the rest of Kerala during summer.



Methodology:

The following methodology and procedure is adopted in the present study:

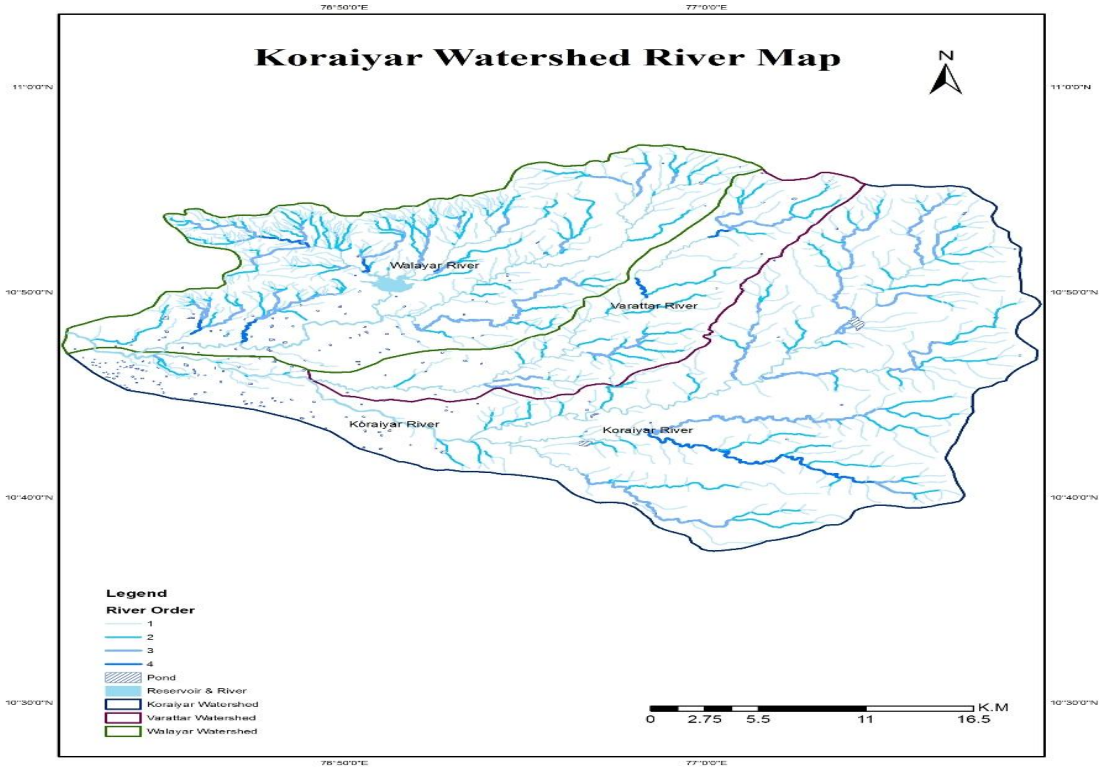
- ✓ Procurement of high resolution satellite data, Survey of India Topographical maps, collection of rainfall and temperature data and other collateral data covering the study area.
- ✓ Preparation of base map on 1:25000 scale using Survey of India Topographical Maps.
- ✓ Preparation of Settlement and Transport network map using SOI 1: 50,000 topographical maps.
- ✓ Preparation of Drainage Map using SOI topographical maps and updating with the satellite data
- ✓ Preparation of contour map of 5mts contour interval using SOI 1: 50,000 topographical maps.
- ✓ Preparation of DEM (Digital Elevation Model) from contour map (Using 3D Analyst Module of Arc/GIS software).
- ✓ Preparation of slope map using contours from SOI toposheet 1:50,000 scale.
- ✓ Preliminary pre-field interpretation of Hydro geomorphology, soils and land use and land cover maps using Satellite data.
- ✓ Ground truth data collection, verification of doubtful areas.
- ✓ Correction, modification and transfer of post field details of Hydro-geomorphology, soils and Land use / Land cover on to original maps.
- ✓ Generation of land & water resources development plan.

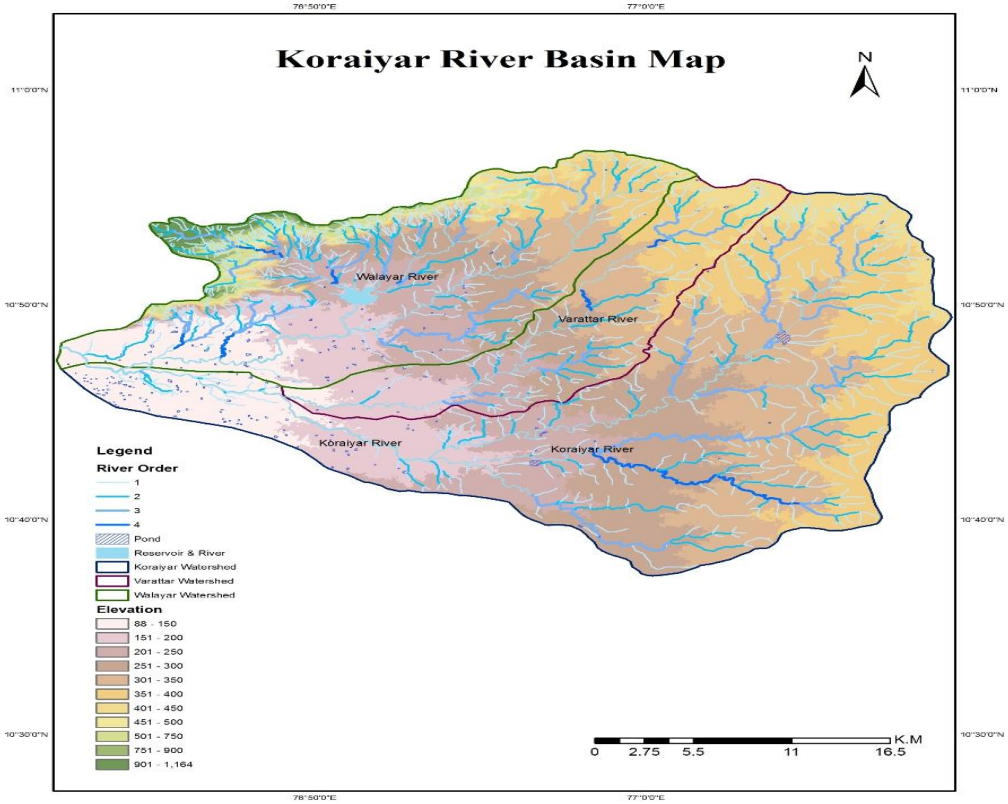
Analysis:

Watershed management refers to conservation, sustainable development and optimal utilization of land and water resources for the ultimate benefit of people. The development and changes proposed to meet the needs of people area necessarily brought about without diminishing the potential for meeting their future needs, as well as those of future generations.

- ✓ To conserve soil and water resources of Korayar watershed via control damaging runoff sediment reduction, erosion and effect reduction in the sediment production. Afforestation and Plantation including social forestry. Integrated on farm activities like dairy, poultry, horticulture. To make appropriate use of the land resources in the watershed and thus develop forest and fodder resources.
- ✓ To Analysis and Mapping of the watershed through SOI with 1:50,000 scale, suitable Remote sensing data with available secondary information for soil conservation. In addition to this collect the soil sample for quality control with suitability of the watershed zone. To interpret the watershed zone through the satellite images and analysis for the soil conservation of the zone.

ISSN: 2455 – 4200
International Journal of Engineering Research and Modern Education
Impact Factor 6.525, Special Issue, April - 2017
6th National Conference on Innovative Practices in Construction and Waste Management
On 25th April 2017 Organized By
Department of Civil Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu





Result:

Based-on the study and the analysis, we were able to recommend an action plan to conserve and increase the ground water potential though rainwater harvesting across Korayar river basin. Water and Soil conservation measures are purely dependent upon rainfall and soil type in a selected area. Several indigenous practices as well as in-situ rainwater harvesting measures are available for water harvesting. The following gully control measures can be adopted to recharge groundwater in the upstream and middle reaches of the streams. Following are the few recommended aquifers which can be built to help achieve the

desired goal: Check dam, NalaBandh, Percolation tank, Farm Ponds, Gully control works, Contour trenching, Desiltation of tanks and ponds, restoration of the tank, pit and Shafts and small reservoir. These approaches require both spatial and non-spatial data analysis .All the above results aim for optimum development of land and water resources and to meet the basic minimum needs of people there by improving their socio-economic conditions.

Conclusion:

There was carried out the ground water management and soil conservation of the Korayar watershed in and around of the sub-watershed. The basic study includes the primary and secondary data will be used for the socio-economic status with resources like water, soil, forest and other Livestock . The study via SOI, Satellite imageries with base line survey. The result we were able to recommend an action plan to conserve and increase the ground water potential though rainwater harvesting across Korayar river basin. Water and Soil conservation measures are purely dependent upon rainfall and soil type in a selected area. Several indigenous practices as well as in-situ rainwater harvesting measures are available for water harvesting.

References:

1. Burrough P.A. (1986) "Principles of Geographic Information Systems for land Resources
2. Morphometric analysis of a highland micro watershed in East Khasi Hills District of Meghalaya, India: Using remote sensing and geographic information system (GIS) techniques by Kalyanjit Sarmah, L. K. Jha and B. K. Tiwari
3. Anji Reddy M. (2001) "A Text Book of Remote Sensing & GIS", 2nd edition, B. S. Publications, Hyderabad.
4. Seshagiri Rao K.V. (2000). "Watersheds Comprehensive Development", B.S. Publication, Hyderabad.
5. Rokade V. M. Kundal R. and Joshi A.K. (2004) "Water Resources Development Action Plan Sasti Watershed, Chandrapur District, Maharashtra Using Remote Sensing and Geographic Information System", Journal of the Indian Society of Remote Sensing, Vol. 32, No. 4, 2004
6. Strahler AN (1964). Quantitative geomorphology of drainage basins and channel networks. In: V.T. Chow (ed.) Handbook of Applied Hydrology, McGraw Hill Book Company, New York, pp. 439-476.
7. Anonymous, 1965. Standard methods for examination of water and waste water. Amer. Publ. Hcl. Assoc. New York 765.
8. Faniran J A., Adeleke, B. B., oderinde R.A (1994): For cados Terminal integrated projects baseline ecological studies. Commissioned by Shell petroleum Development Company of Nigeria.
9. Grabow A K (1996). Properties of ordinary water substance in all its phases, water vapour, wate rand all the Ices. American chemical society Monogram no 81,New York, Reinhold publishing corp p.73
10. https://en.wikipedia.org/wiki/Bharathappuzha
11. https://en.wikipedia.org/wiki/Korayar_River
12. Irena Bielanska Grajner, Anna Cudak, Tomasz Mieczan (2011): Epiphytic rotifer abundance and Diversity in moss patches in blogs and fins in the polsie national park(eastern Poland) Inter Review of hydrobiology, vol 96(1),29-38
13. Wani, S.P., Sreedevi, T.K., Singh, H.P., Pathak, P., and Rego, T.J. (2002) "Innovative farmer participatory integrated watershed management model: Adarsha watershed, Kothapally, India- A success story!"
14. Aronoff (1989) "Geographic Information System: A Management Perspective", WDL Publications, Ottawa Canada.
15. Allen RG, Pereira LS, Raes D, Smith M (1998). "Crop evapotranspiration: guidelines for computing crop water requirements" Irrigation and Drainage Paper 56, United Nations FAO, Rome.
16. Allen RG, Tasumi M, Morse A, Trezza R (2005). "A Landsat-based energy balance and evapotranspiration model in Western US water rights regulation and planning" Irrig. and Drain. Syst., 19(3/4), pp 251–268.
17. Bastiaanssen WGM, Menenti M, Feddes RA, Holtslag AA (1998). "A remote sensing surface energy balance algorithm for land (SEBAL)" J. Hydrol., 212–213, pp 198- 212.
18. Chaudhary, R.S. and Sharma, ED. (1998). "Erosion hazard assessment and treatment prioritization of Giri River catchment, North Western Himalayas." Indian J. Soil Conservation, 26(1): 6-1.
19. Courault D, Seguin B, Olioso A (2005). "Review on estimation of evapotranspiration from remote sensing data: From empirical to numerical modeling approaches" Irrig. and Drain. Syst., 19, pp 223–249. Das N. N, Mohanty BP, Cosh MH, Jackson TJ (2008). "Modeling and assimilation of root zone soil moisture using remote sensing observations in Walnut Gulch Watershed during SMEX04" Remtoe Sens. Environ., 112, pp: 415-429. doi: doi:10.1016