A study of watershed land use land cover in the Upper Kundalika river basin

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Abstract:

Water is life, in all forms and shapes. This basic yet profound truth eluded many of us in the second half of the 20th century. Water professionals and scientists around the world are ringing the alarming bells of an impending water crisis. Yet attempts to address some of the issues or to offer partial solutions met with limited success. The ever-growing Population and concomitant expansion of agriculture and industry have placed increasing demand on the limited water resources.

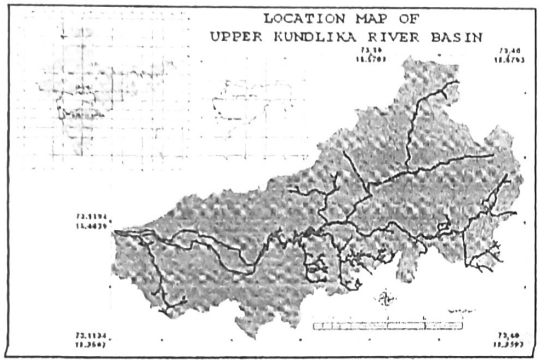
Introduction:

There is a water crisis today however; the crisis is not having too little water to satisfy our needs. It is a crisis of managing water so badly that billions of people and the environment.

– suffer badly' (World Water Council, 20

A geomorphic analysis of river basin is essential to solve water scarcity of the arid and semi-arid region through watershed management. But in 21st century water scarcity is gong to a huge amount of highly precipitation area before the prime monsoon stage (months of January, February, March, April, May and June) Many authors carried out morphometric analysis of river basins, but very few of them are studied the geomorphic analysis of river basins for watershed management using geospatial techniques. Geospatial techniques has become an indispensable scientific tool for mapping and monitoring of natural resources and has been used in geomorphic, land use and land cover analysis and watershed management

Study Area:



The latitudinal extent of the study area of Upper Kundalika basin is 18°20' North to 18°35' North and longitudinal extent is 73° East 73°11' East. This area covered in the toposheet no 47F/3, 47F/6 and 47F/7. The Upper Kundalika maintains straight course in E - W direction up to Roha and then follows as SE-NW trend.

Objective:

To study temporal changes and land cover of the basin.

Hypothesis:

Any watershed is a combination of physiographic and climatic characteristics of the area. Physiographic characteristics determines the types of watershed structures with land use land cover in the area, like dense forest , open vegetation , settlement, river and agriculture land shape of the watershed, slope, types of soil, geology of the area, hydraulic characteristics of the area etc Therefore, it can be hypotheses.

Methodology:

The Kundalika River basin covered in the Survey of India toposheet numbers of 1:50,000 scale. All toposheets are mosaiced and details such as contours of 20 m interval, drainage and district boundary will digitize in ArcGIS 9.3 software. Various maps are prepared including contour, drainage, stream ordering, slope and aspect. Create digital elevation model (DEM) of the Kundalika River basin in Arc GIS 9.3, ERDAS IMAGINE 9.2 or updated softwares. Location map of total micro watersheds and longitudinal profile of the Kundalika River mainstream is create using Advanced Space borne Thermal Emission and Reflection Radiometer (ASTER) DEM data of 30 m spatial resolution in Global Mapper v15.1 software.

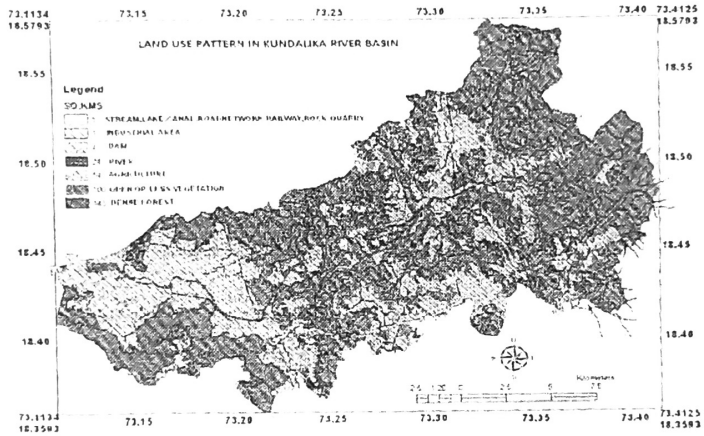
A comprehensive review of literature is carried out on geomorphic analysis, land use, land cover analysis, watershed management using remote sensing and GIS techniques. Secondary data

sources such as Socio - Economic Reviews. Regular visits will to the study area for field observations. During the field, survey of the study area geomorphic conditions, land use and land cover and present status of watershed development.

Data Analysis:

Watershed management structures i.e. loose boulder structures, contour trenches, farm ponds, farm bunds, check dams and percolation tanks are propose. Structures are propose based on morphometric parameters, field observations, land use and land cover analysis, interpretation of different maps and use technical guidelines from various department and NGO's.

Land use and land cover pattern of the Upper Kundalika river is as follows

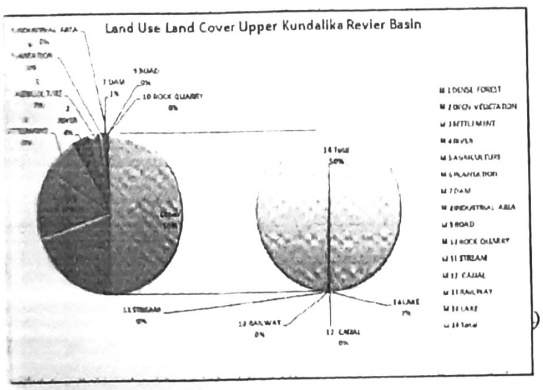


Map1.Land use and land cover pattern of the Upper Kundalika River

Table No. 01_ Land Use Land Cover Area in Esq.

Sr. No.	Land Use Pattern	Area In Sq Km	Area In Percentage
1	Dense Forest	143.0	40.09
2	Open Vegetation	100.6	28.19
3	Settlement	54.2	15.18
4	River	24.5	6.86
5	Agriculture	16.3	4.58
6	Plantation	7.0	1.95
7	Dam	4.3	1.19
8	Industrial Area	2.6	0.72
9	Road	1.5	0.41
10	Rock Quarry	1.0	0.28
11	Stream	0.7	0.2
12	Canal	0.5	0.14
13	Railway	0.3	0.081
14	Lake	0.3	0.073
	Total	356.7	100

Graph_ Pie Chart



In the land use pattern of the study, area is as above dense forest is 40.09%, which occupied teak, sandalwood, Rosewood, and pterocarpus tree. Open vegetation is 28.19% which is second largest in the study area in that open vegetation bushy trees are seen. Third largest land use of settlements, which is 15.18% in that settlement Kolad, and Roha are the big settlements. Paddy, cauliflower, and pulses this

type of agriculture seen in the study area that is 4.56% Kundalika is the major river and this river captured 6.86% area. Plantations are 1.95%, Dams are 1.19%, Industrial area having 0.72%. Road networks are 0.41%, Rock quarries 0.28%, streams 0.20%, Canals 0.14%, Railways 0.081%, and Lakes are 0.073% respectively.

Conclusions:

Dense forest is 40.09%. There classes are 1) hilly dense forest, 2) hilly moderate forest, 3) hilly sparse forest, 4) Pedi plain dense forest, 5) fluvial plain wet crops 6) Scrub vegetation and 7) plantation. These types of forest preset in the study area. The ruggedness of the terrain, deep water table and torrential floods are the hindrances for any successful farming conducted in this area. Crops are usually cultivated into two seasons, kharif and rabbi. In urban category, industries, rock mines, roads and railway lines and settlement form a major part. There are five big reservoirs, which acquire 1.19% area. Scrub vegetation appears along river courses where dissection by gullies is quite prominent. Above table interprets the full understanding of land use and Land cover patterns in the zone of Upper Kundalika river basin.

Recommendations:

The relation that is recorded among modern climatic, phytologic, and hydrologic data is used to speculate about the effects of evolving vegetation on the hydrologic cycle. At present the peak of erosion rates occurs in semiarid regions, whereas during pre vegetation time erosion rates rose to a plateau, the magnitude of which depended upon the erodibility and weathering characteristics of the rocks with the appearance of terrestrial vegetation.

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