



Study of Landuse and Landcover Analysis of Panchaganga Basin

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Introduction:

In a river catchment area is natural environment and human-induced environmental changes are of concern today because of deterioration of environment. The study of land use and land cover changes is very important to have proper planning and utilization of natural resources and their management. Traditional methods for gathering gazette information, censuses, and analysis of environmental samples are not adequate for multicomplex environmental studies, since many problems often presented in environmental issues and great complexity of handling the multidisciplinary data set; we require new technologies like satellite remote sensing and Geographical Information Systems (GISs). These technologies provide data to study and monitor the dynamics of natural resources for environmental management.

Present study area of Panchaganga river is rapid changes during past few decades in terms of cropping pattern, Vegetation, Mining, Waterbodies, etc. The main objective of this paper is to detect land use land cover analysis of Panchaganga River³ using satellite imagery and topographic map.

Key words – Landuse and Landcover

Objectives:

While studying the above subject for the specific research Paper, objective have been considered to study land use land cover analysis of Panchaganga River

Methodology-

In the present study, we have used mainly satellite images and topographic map data. The remote sensing data of georeferenced and merged data of LISS III and Thematic Map in the digital mode are obtained from the National Remote Sensing Agency (NRSA), Government of India, Pune, are used.

The topographic map is georeferenced with longitude and latitudes using the ArcGIS

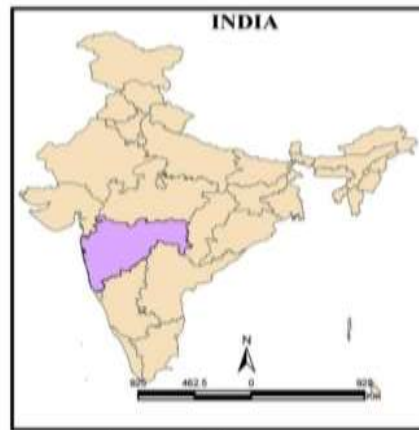
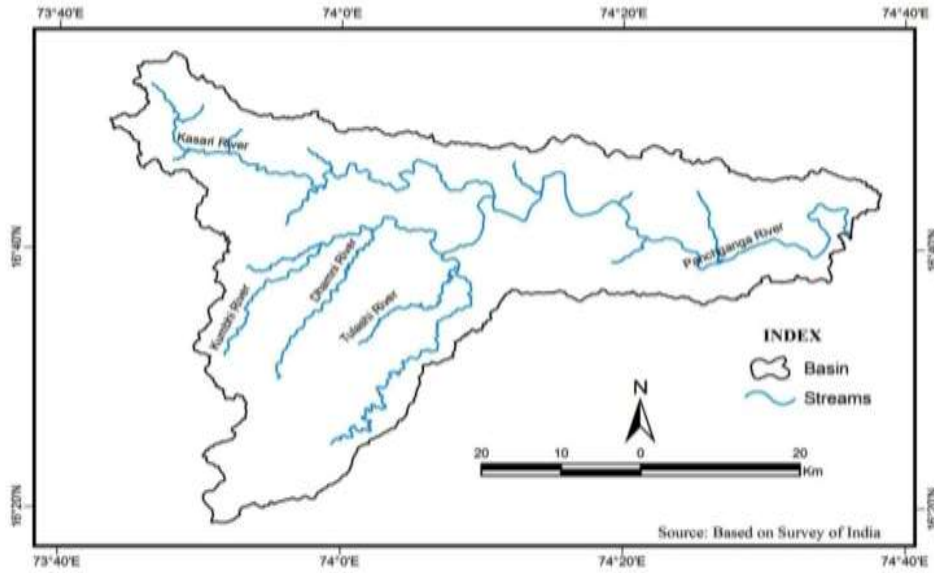
software and spatial analyst tools and demarcated the boundary of study area.

Location:

The Panchaganga river is one of the major rivers of the westerly regime of the Krishna drainage system spread within the 16° 20" 22" to 16° 55" 4" to North Latitude and 73° 45" 33" to 74° 35" 3" East Longitude.

The length of this easterly flowing river is 80.73 km occupying an area of 2571.02 km². The entire catchment area of Panchaganga basin falls under Kolhapur district of western Maharashtra with Warana and Dudhganga river basin lying in north and south are respectively.

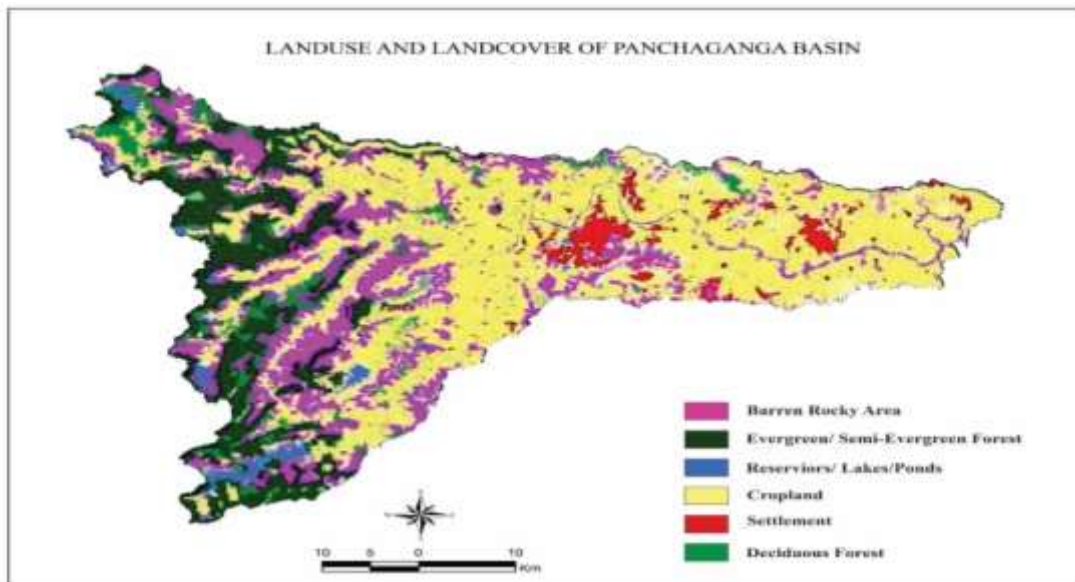
**LOCATION MAP OF PANCHAGANGA BASIN
(MAHARASHTRA STATE)**



Interpretation:

Land use and land cover of Panchaganga basin consists of Barren Rocky area, Cropland, Deciduous Forest, Evergreen/Semi Evergreen forest, Plantation, Lake, River, Rural, Urban settlement,

Scrubland and Scrub forest . This has been calculated from thematic map of NRSC. The Land use and Land cover sub-basin wise has been explained in detail in table format as follows.



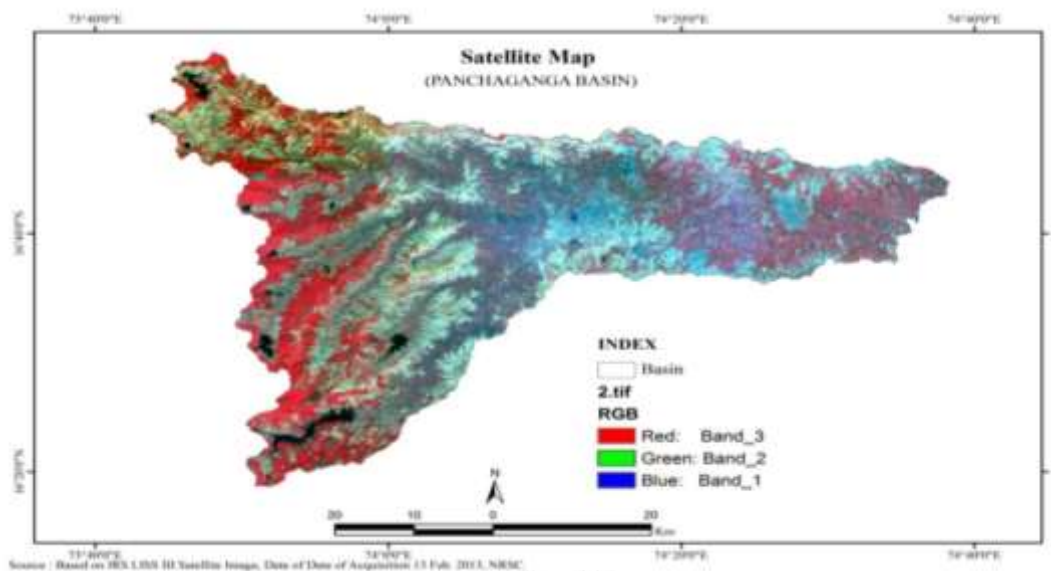


Table: 1 Land Use and Land Cover of Panchaganaga River Basin

LULC CLASS	Kasari	Lower Panchaganga	Tulasi	Bhogavati	Kumbhi	Dhamani
Barren Rocky Area	0	10.45	0.19	0.79	91.11	0.21
Cropland	246.07	508.87	99.48	226.42	96.01	47.68
Deciduous Forest	108.46	13.17	16.52	64.94	3.1	53.55
Evergreen/ Semi Evergreen Forest	84.38	0	0	25.63	30.14	2.19
Fallow Land	3.25	101.98	1.9	9.1	0	0.48
Plantation	0.1	0.17	0	0.41	0.52	0
Mining	0	2.97	0	0	0	0
Reservoirs/ Lakes/Ponds	8.74	3.24	5.88	17.52	5.36	0
River/Canals	5.91	6.64	0.04	3.79	2.93	2.25
Rural Settlement	5.34	12.09	1.65	5.61	1.55	0.65
Scrub Forest	4.26	11.09	6.55	5.62	13.47	2.09
Scrub Land	160.81	85.23	31.22	85.57	60.25	86.56
Urban settlement	0.08	75.18	0.66	2.46	0.49	0
Total Area of Basin	627.4	831.08	164.09	447.86	304.93	195.66

Source: Based on Thematic Map of NRSC.

Land use and Land cover of Kasari Basin

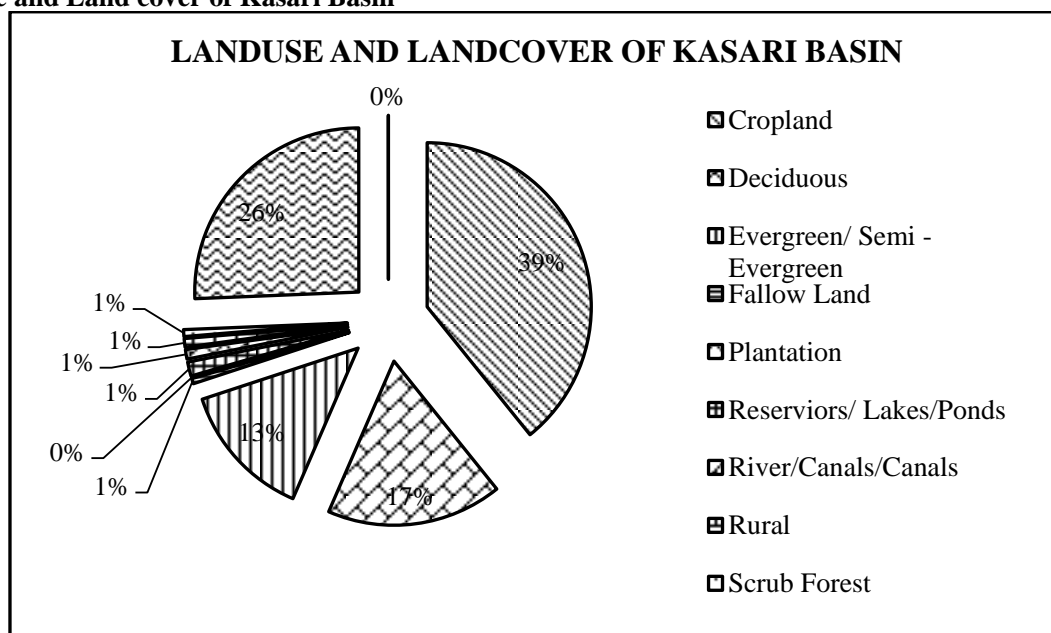


Fig.: 1 Land Use and land Cover of Kasari Basin

A major part of the Kasari basin (39.22%) is occupied by cropland which lies on both the side of Kasari river bank. A well-developed irrigation system has increased the area under cultivation. The main agriculture practice is sugarcane cultivation. Deciduous forest occupies western part of Kasari basin. Various species like *Jambhul*, *Amba*, *Nana*, *Sisum*, *ain*, *subhabhul* etc. are commonly found in deciduous forest, which covers 17.22% of Kasari basin. The deciduous forest is mostly found in foot hill areas. Scrub land and scrub forest usually occur in moderate to high relief areas, where lateritic soil is not favourable for the growth of large vegetation. About 26.31% of the basin is occupied by patches of the scrub forest and scrub land. Evergreen and semi evergreen forest occupies about 30.45% of the total area of the basin. This area receives heavy rainfall. Chandoli sanctuary is a evergreen forest in western

part of the basin. The vegetation includes *Hirada*, *Behada*, *Jambhul*, etc. The Kasari river and its tributaries are perennial, hence natural water bodies like lakes and ponds and artificial reservoirs occupy about 1.39% of the basin. This water bodies provide water for rural settlement and agriculture. Rural settlement occupies 0.85% of the total area in the river basin and is concentrated in small villages. 0.94% of the area is occupied by stream and river beds and artificial canals. Artificial plantation by the forest division and other organization is about 0.02% of the total area. The small percentage of the plantation is because most of the land in Kasari basin is used for agriculture. Fallow land is about 0.52%. This fallow land has formed due to different reason like high relief, no irrigation facilities and fewer amounts of rainfall and general non-use by human settlement.

Land Use and Land Cover of Lower Panchaganga Basin

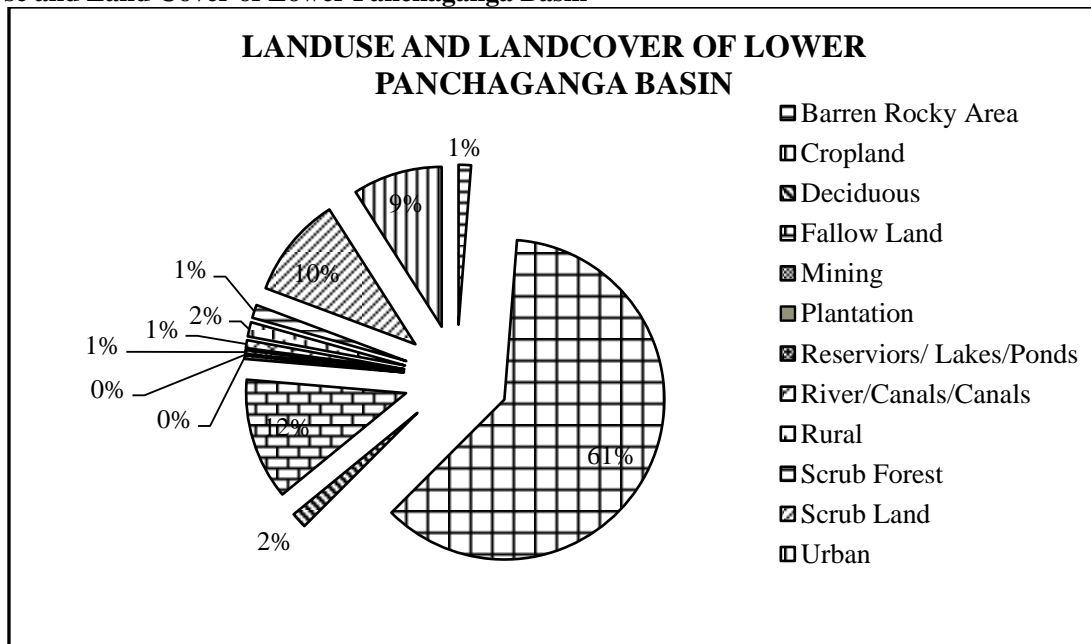


Fig.: 2 Land Use and land Cover of Lower Panchaganga Basin

The lower Panchaganga basin (61.23%) is occupied by cropland which lies on both the side of lower Panchaganga river bank. A well-developed irrigation system has increased the area under cultivation. The main agriculture practice is sugarcane cultivation. Deciduous forest occupies north and south side of lower Panchaganga basin. Deciduous forest covers 1.58% of lower Panchaganga basin. Scrub land and scrub forest usually occur in moderate to high relief areas. About 11.59% of the basin is occupied by patches of the scrub forest and scrub land. Barren and rocky land occupies about 1.26% of the total area of the basin. This area does not receive heavy rainfall, therefore, the evergreen /semi evergreen forest is not seen. The Lower Panchaganga River are perennial because five tributaries meet together. Natural water bodies like lakes and ponds and artificial reservoirs occupy

about 0.39% of the basin. This water bodies provide water for rural settlement and agriculture. Rural settlement and urban settlement occupies 1.45% and 9.05% of the total area in the river basin are respectively. The concentration of rural settlement and urban settlement are more as compare to other basin because of the plain area and two major towns have been established in the basin. Artificial plantation by the forest division and other organization is about 0.02% of the total area. The small percentage of the plantation is because most of the land in Lower Panchaganga basin is used for agriculture. In this region mining activities cover 0.36% of the area. Fallow land is about 12.27%. This fallow land has formed due to different reason like high relief, no irrigation facilities and fewer amounts of rainfall and general non-use by human settlement.

Land Use and Land Cover of Tulasi Basin

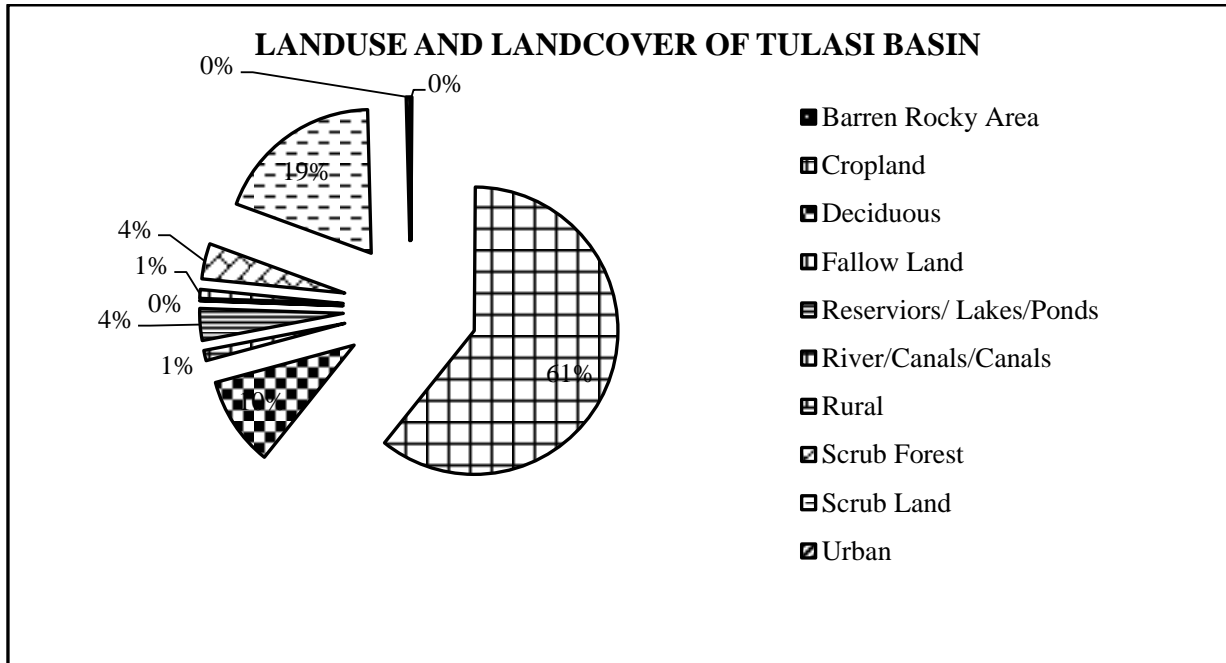


Fig.: 3 Land Use and land Cover of Tulasi Basin

Tulasi basin (60.63%) is occupied by cropland which lies on both the side of Tulasi river bank. A well-developed irrigation system has increased the area under cultivation. The main agriculture practice is sugarcane cultivation. Deciduous forest covers 10.07% of Tulasi basin. The deciduous forest is mostly found in foot hill areas. Scrub land and scrub forest usually occur in moderate to high relief areas, where lateritic soil is not favourable for the growth of large vegetation. About 23.02% of the basin is occupied by patches of the scrub forest and scrub land. Evergreen and semi evergreen forest occupies about 30.45% of the total area of the basin. This area receives heavy rainfall.

The Tulasi River and its tributaries are perennial, hence natural water bodies like lakes and ponds and artificial reservoirs occupy about 3.58% of the basin. This water bodies provide water for rural settlement and agriculture. Rural settlement occupies 1.01% and urban settlement is about 0.40% of the total area in the river basin and is concentrated in urban and small villages. 0.02% of the area is occupied by stream and river beds and artificial canals. Fallow land is about 1.16% and barren rocky land is about 0.12%. This fallow land has formed due to different reason like high relief, no irrigation facilities and fewer amounts of rainfall and general non-use by human settlement.

Land Use and Land Cover of Bhogavati Basin

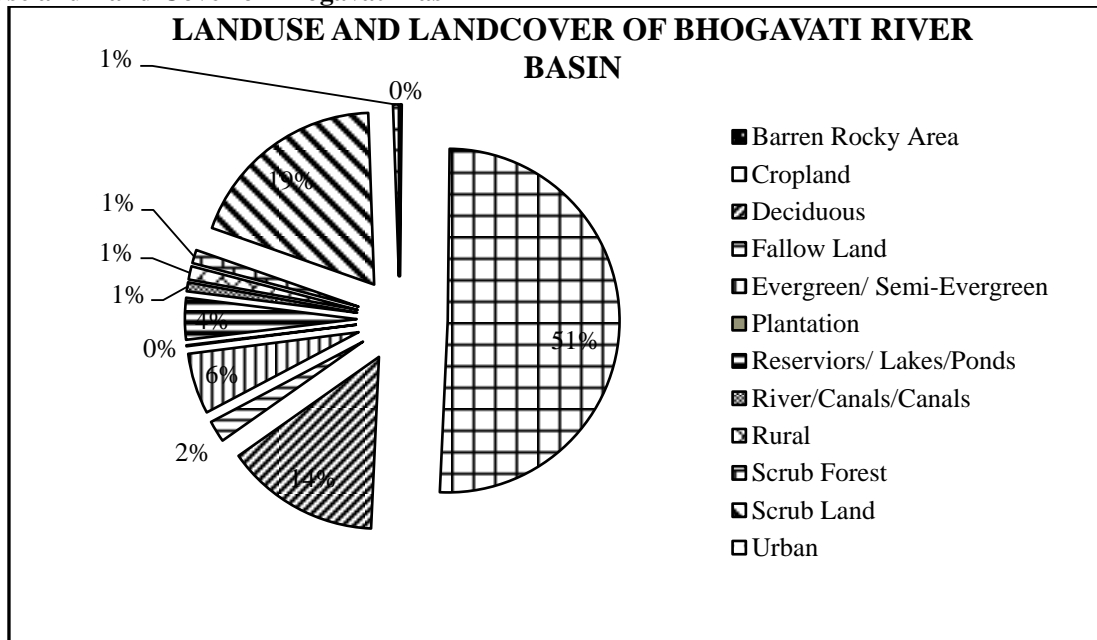


Fig.: 4 Land Use and land Cover of Bhogavati Basin

A major part of the Bhogavati basin (50.56%) is occupied by cropland which lies on both the side of Bhogavati channel. A well-developed irrigation system has increased the area under cultivation. Deciduous forest occupies western part of Bhogavati basin and covers 14.50% of Bhogavati basin. The deciduous forest is mostly found in foot hill areas. Scrub land and scrub forest usually occur in moderate to high relief areas, where lateritic soil is not favourable for the growth of large vegetation. About 20.36% of the basin is occupied by patches of the scrub forest and scrub land. Evergreen and semi evergreen forest occupies about 5.72% of the total area of the basin. This area receives heavy rainfall. Dajipur sanctuary is an evergreen forest in western part of the basin. The Bhogavati river and its tributaries are perennial, hence natural water bodies

like lakes and ponds and artificial reservoirs occupy about 3.91% of the basin. This water bodies provide water for rural settlement and agriculture. Urban settlement covers 0.55%. Rural settlement occupies 1.25% of the total area in the river basin and is concentrated in small villages. 0.85% of the area is occupied by stream and river beds and artificial canals.

Artificial plantation by the forest division and other organization is about 0.09% of the total area. The small percentage of the plantation is because most of the land in Bhogavati basin is used for agriculture. Fallow land is about 2.03%. This fallow land has formed due to different reason like high relief, no irrigation facilities and fewer amounts of rainfall and general non-use by human settlement.

Land Use and Land Cover of Kumbhi Basin

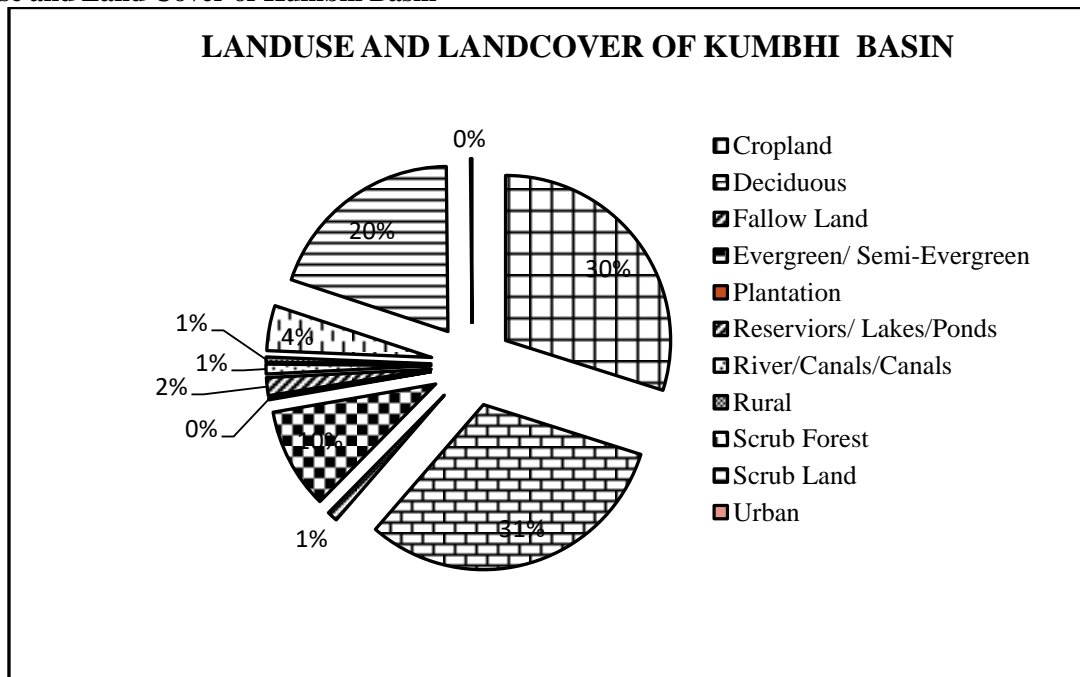


Fig.: 5 Land Use and land Cover of Kumbhi Basin

Kumbhi basin (29.88%) is occupied by cropland which lies on both the side of Kumbhi river bank. Deciduous forest occupies western part of Kumbhi basin. Deciduous forest cover is 31.49% of Kumbhi basin. The deciduous forest is mostly found in foot hill areas. Scrub land and scrub forest usually occur in moderate to high relief areas, where lateritic soil is not favourable for the growth of large vegetation.

About 24.18% of the basin is occupied by patches of the scrub forest and scrub land. Evergreen and semi evergreen forest occupies about 9.88% of the total area of the basin. This area receives heavy rainfall. Evergreen forest is a western part of the basin. The Kumbhi river and its

tributaries are perennial, hence natural water bodies like lakes and ponds and artificial reservoirs occupy about 1.76% of the basin. This water bodies provide water for rural settlement and agriculture. Rural settlement occupies 0.51% of the total area in the river basin and is concentrated in small villages.

Urban settlements cover 0.16% total area of the basin. 0.96% of the area is occupied by stream and river beds and artificial canals. Artificial plantation by the forest division and other organization is about 0.17% of the total area. The small percentage of the plantation is because most of the land in Kumbhi basin is used for agriculture. Fallow land is about 1.02%.

Land Use and Land Cover of Dhamani Basin

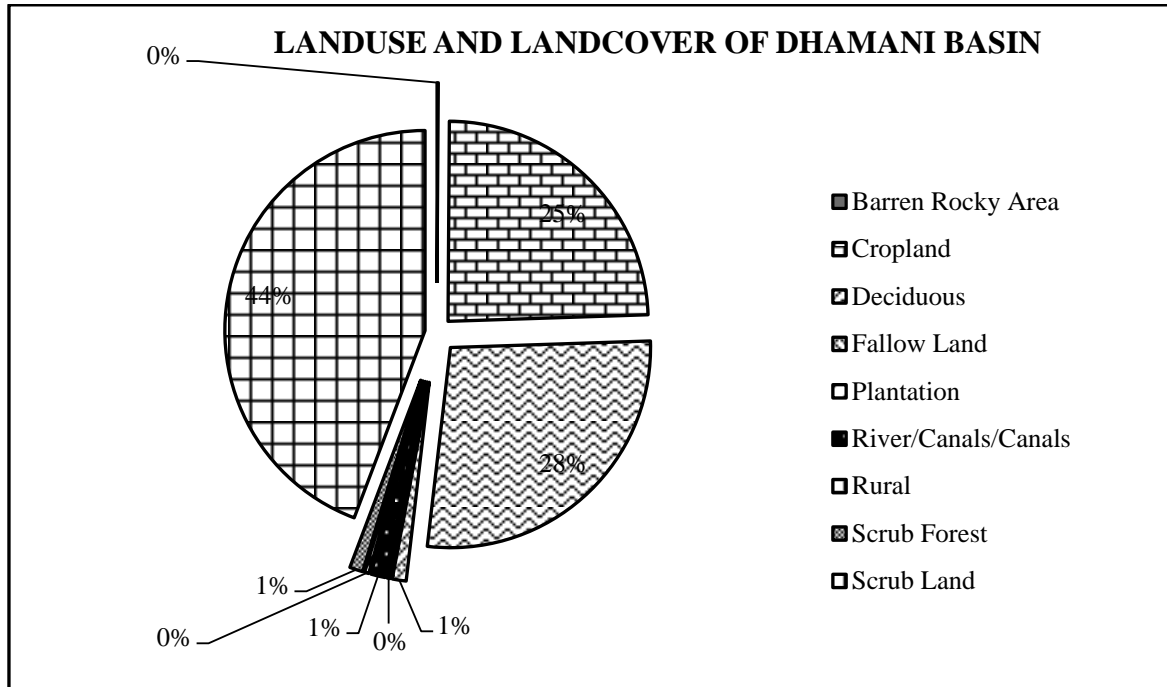


Fig.: 6 Land Use and land Cover of Dhamani Basin

Dhamani basin (24.37%) is occupied by cropland which lies on both the side of Dhamani river bank. Dhamani basin covers 27.37% of deciduous forest. The deciduous forest is mostly found in foot hill areas. Scrub land and scrub forest usually occur in moderate to high relief areas, where lateritic soil is not favourable for the growth of large vegetation. A major part of basin (45.31%) is occupied by patches of the scrub forest and scrub land. Artificial plantation by the forest division and other organization is about 0.25% of the total area. The small percentage of the plantation is because most of the land in Dhamani basin is used for agriculture. Fallow land is about 1.12%. barren land occupies 0.11% of the basin.

Conclusion:

Maximum area (46.01 %) of the Panchaganga basin is occupied by cropland which is rich and fertile. Secondly scrub forest is the major occupant of the basin (23 %). Thirdly deciduous forest (16.32 %) also shows major contribution in covering the Panchaganga area. Evergreen and semi evergreen forest covers (2.88 %) lakes, reservoirs and ponds occupy (1.78 %). In Panchaganga Basin, rural settlement (0.86 %) is less than urban settlement (1.67 %). Plantation, barren, rocky land and fallow land cover minute area of the basin.

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