EFFECTS OF LAND COVER/USE CHANGES ON THE ETHIOPIAN FINCHA WATERSHED

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Abstract: The Ethiopian Fincha watershed suffered by dramatic Land use and land cover (LULC) changes in recent years. This study aims to analysis the LULCC in the Fincha watershed in the period 2005-2015. TM Landsat imagery were deployed to categorize a LULC map of the study watershed. The results indicate that there was a continuous and active LULC change observed in the watershed for the last 10 years. The settlement area, water body and cultivated land were increased by 1%, 3% and 36%; whereas grass land, shrub land and forest land classes were reduced by 4.7%, 10.9% and 25%, respectively.

Keywords: Finchaa Watershed, DEM, Landsat, LULC changes

Methods

The Fincha watershed is located in the Horro Guduru Wollegga Zone, Oromiya Regional State, Ethiopia, between latitudes 9°9′53″ N to 10°1′00″ N and longitudes 37°00′25″ E to 37°33′17″ E.

The basic spatial input datasets include the digital elevation model (DEM) and LULC data. A 30m grid DEM was downloaded from USGS(United State Geological Survey) website at https://earthexplorer.usgs.gov/.

The land use map of the study area was obtained from the Ministry of Water Resources of Ethiopia.

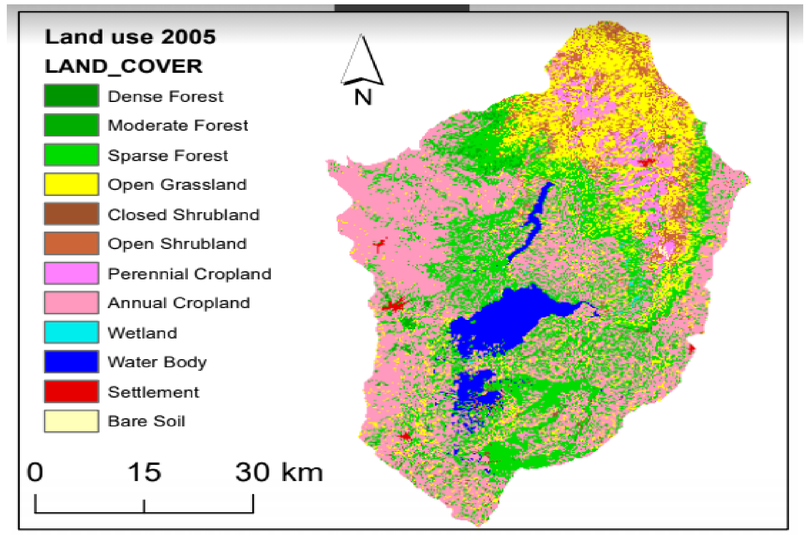

Figure 1: Classified land use/land covers of Fincha watershed in 2005.

Results

The LULC of the Fincha watershed between 2005 and 2015 periods are shown as Table 1. below

Table 1: Area of LULC for 2005 and 2015

Land use type	Area km2 @2005	Area km2 @2015	% 2005	% 2015	difference
Annual Cropland	1279.24	1427.1	42.7	47.6	4.9
Bare Soil	2.32	4.74	0.1	0.2	0.1
Closed Shrubland	17.56	7.13	0.6	0.2	-0.3
Dense Forest	0.2	0.09	0.0	0.0	0.0
Moderate Forest	32.84	12.71	1.1	0.4	-0.7
Open Grassland	460	134.34	15.3	4.5	-10.9
Open Shrubland	167.28	34.52	5.6	1.2	-4.4
Perennial Cropland	76.96	1008.27	2.6	33.6	31.1
Settlement	8.12	38.2	0.3	1.3	1.0
Sparse Forest	790.48	61.05	26.4	2.0	-24.3
Water Body	157.96	248.01	5.3	8.3	3.0
Wetland	4.24	21.04	0.1	0.7	0.6
Total	2997.2	2997.2	100.0	100.0	0.0

Conclusions

This study has quantified the LULC changes in the Fincha watershed incurred between 2005 and 2015. The result showed that more than half of the forest was converted to other LULC types, while agricultural land increased significantly.

Possible drivers of LULC changes in the area can be the expansion of subsistence and commercial agriculture, resettlement of population, unsustainable exploitations of forest products and forest fires, as well as the increase in human population, lack of proper execution of legal and institutional arrangements related to agricultural development and natural resources management

For the future, a proper and integrated approach in implementing policies and strategies related to land resources management should be considered.

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