

Introduction

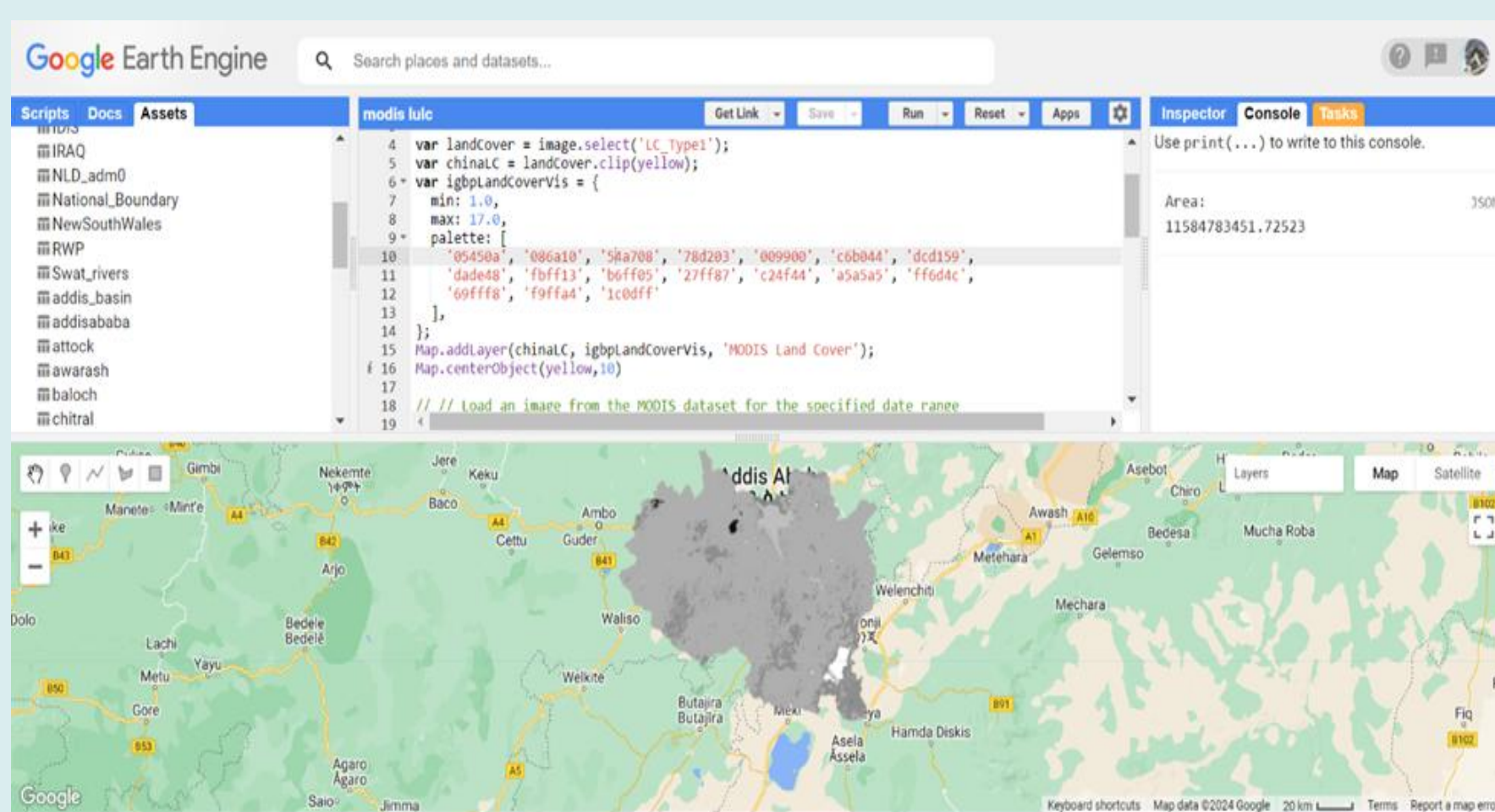
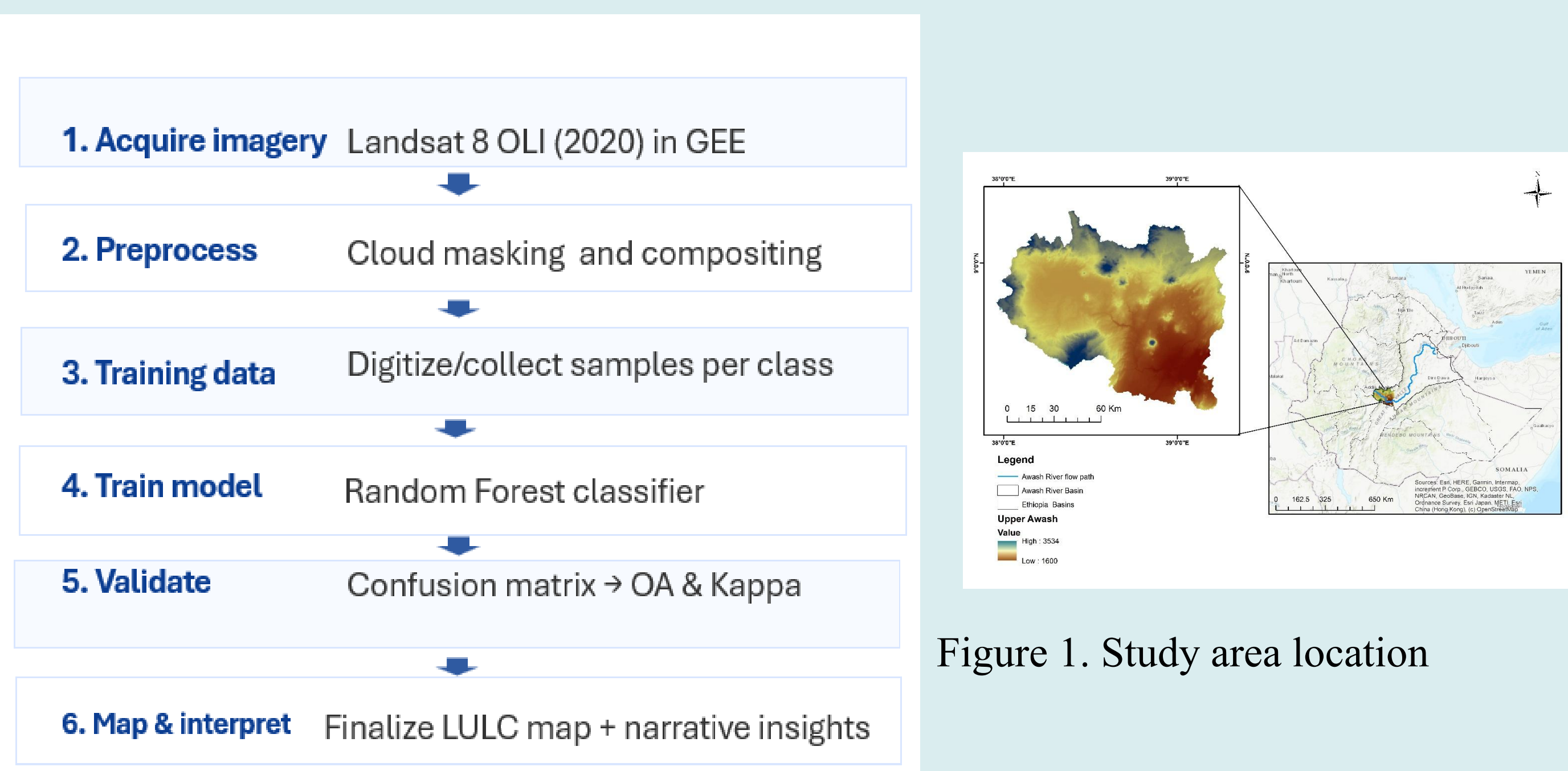
Land use land cover (LULC) explains the various land features present on the surface of the Earth, and its change implies anthropogenic and natural land surface modification (Vallet, A et al.,2024).

Why LULC mapping matters in the upper Awash basin

- Supports water allocation, irrigation planning, and land management in a high-demand basin.
- Detects pressures from urban expansion, agricultural intensification, and land degradation.
- Satellite + cloud computing enables repeatable monitoring at basin scale
- The objective is to examine the accuracy and applicability of selected machine learning (ML) algorithms and to employ these algorithms for the classification of land use/land cover (LULC) within the watershed.

Data and Methods

- Landsat imagery (30 m) in Google Earth Engine using cloud masking and annual composites. Spectral bands, indices, and terrain variables were used to train a Random Forest classifier with stratified reference samples for five classes



Landsat 8 (30 m)

Google Earth Engine

Random Forest

Figure 2. Methodological Framework

Results

The spatial distribution of land cover by class for the years 1990 and 2020 is shown in the tabulated data. One notable tendency is the progressive decline in vegetation and agriculture, which has coincided with a rise in metropolitan areas and bare ground.

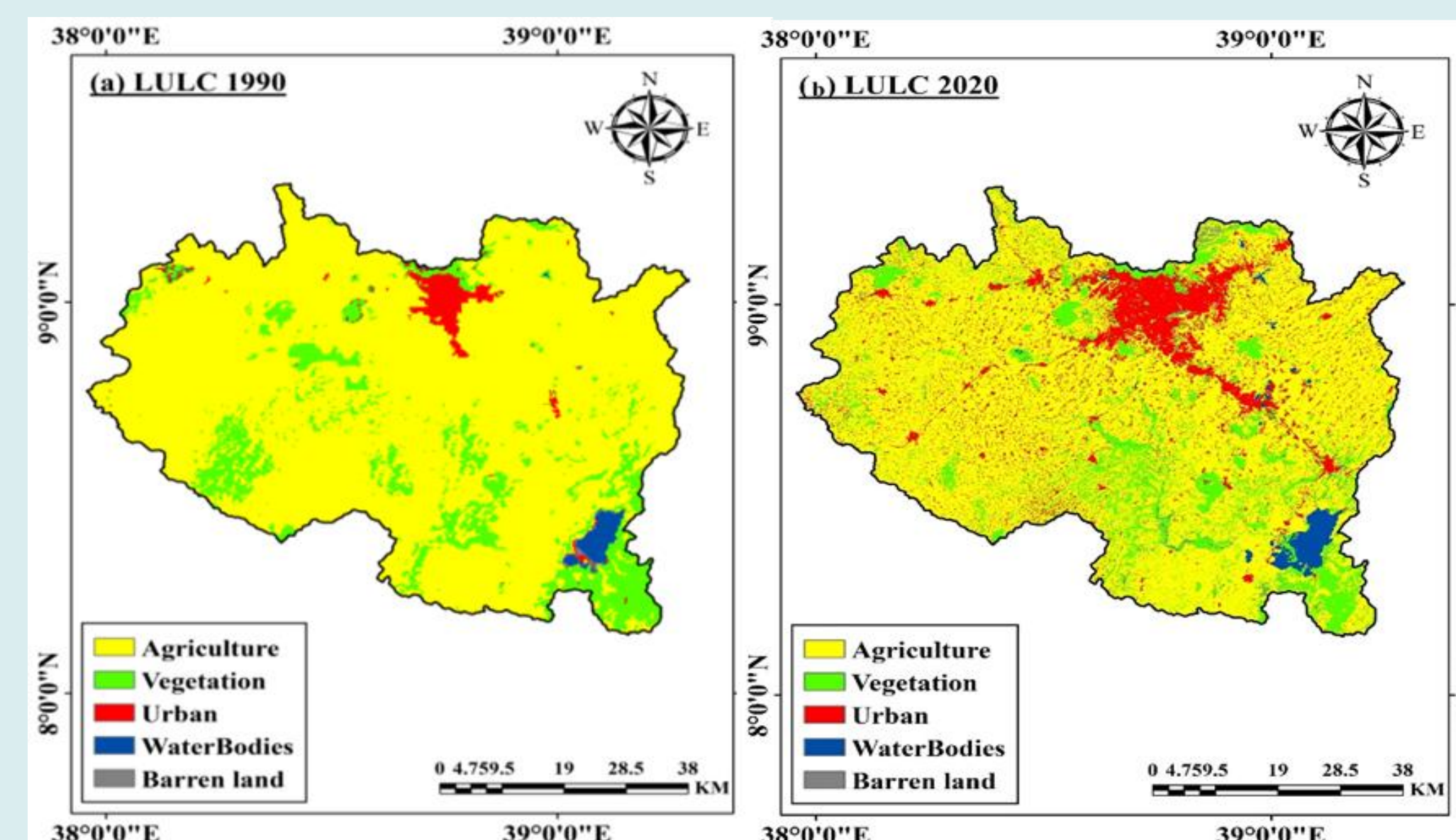


Figure 3. Land use land cover map of (a) 1990 and (b) 2020

Between 1990 and 2020, the Upper Awash Basin experienced major LULC transitions across five classes (Agriculture, Vegetation, Urban, Waterbodies, Barren land).

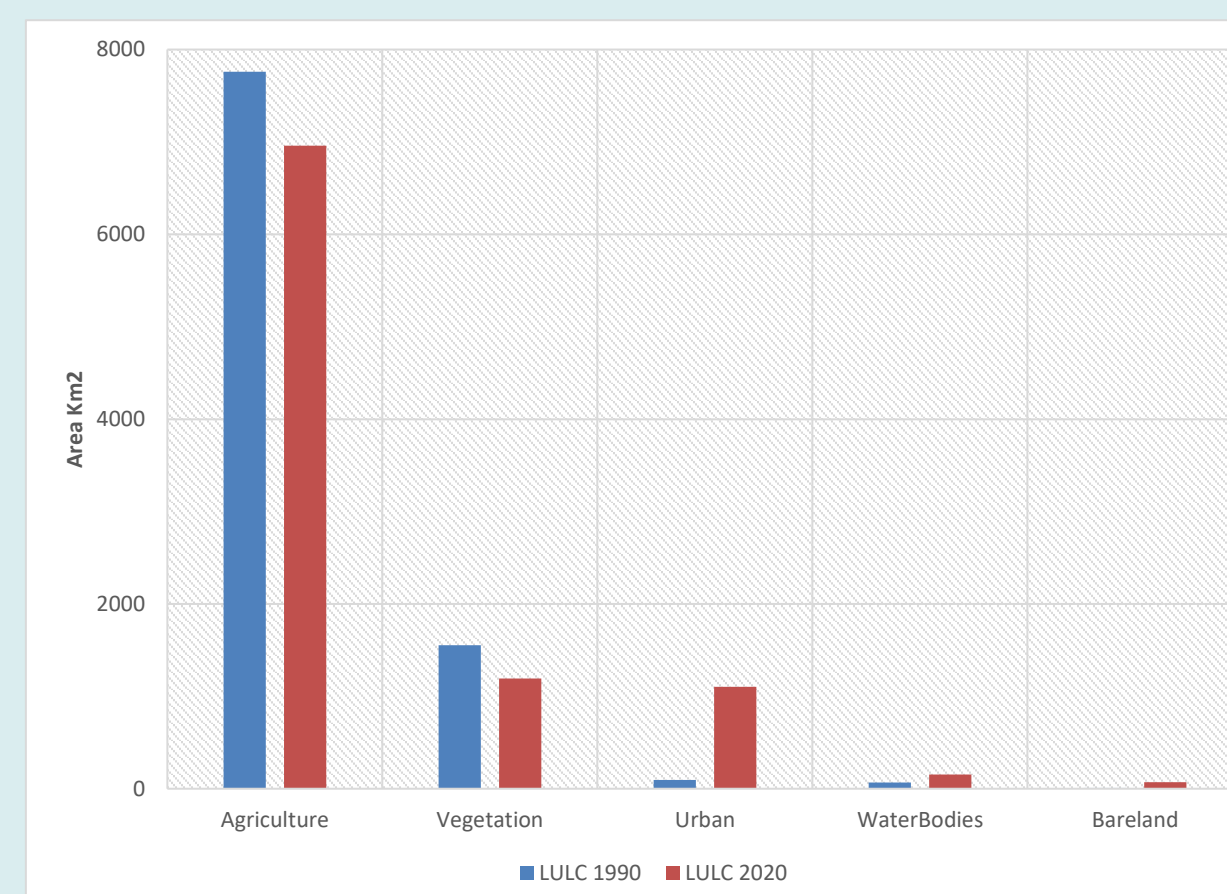


Table 1. Accuracy Assessment results

LULC Classes	Producers Accuracy	Users Accuracy	Overall accuracy	Kappa (k)
1990	91.16	88.76	0.87	0.86
2010	89.66	88.84	0.98	0.97

Conclusions

- The LULC analysis of the Upper Awash Basin between 1990 and 2020 indicates substantial changes in land-cover patterns.
- Agricultural land and natural vegetation declined, while urban and bare/barren land expanded, reflecting strong land transformation associated with urbanization and related development. Changes in waterbodies show interannual variability, suggesting sensitivity to environmental and hydrological conditions

Reference

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- Schirpke, U., Tasser, E., Borsky, S., Braun, M., Eitzinger, J., Gaube, V., Getzner, M., Glatzel, S., Gschwanter, T., Kirchner, M., Leitingner, G., Mehdi-Schulz, B., Mitter, H., Scheifinger, H., Thaler, S., Thom, D., & Thaler, T. (2023). Past and future impacts of land-use changes on ecosystem services in Austria. Journal of Environmental Management, 345, 118728. <https://doi.org/10.1016/J.JENVMAN.2023.118728>
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