

Mapping the potential for recreation on a mountainous region: the case of

Marathasa region in the Troodos mountain range in Cyprus

Nicolas-George Eliades¹, George Kefalas², Roxanne Suzette Lorilla³

¹Frederick Research Center, Nature Conservation Unit, 7 Filokyprou Street, Pallouriotisa 1036, Nicosia, Cyprus (res.en@Frederick.ac.cy)

²International Hellenic University, Department of Forestry and Natural Environment, GR-66100 Drama, Greece

³BEYOND Centre of EO Research & Satellite Remote Sensing, IAASARS, National Observatory of Athens, Vas. Pavlou & I. Metaxa, GR-15 236 Penteli, Greece



Mountainous regions provide diverse ecosystem services

Mountainous regions (areas) are extremely valuable ecosystems, linked with a number of ecosystem services of significant importance for human life. Human well-being is strongly related to the integrity of ecosystems and the services they provided by mountainous regions such as food, water, disease management, climate regulation, spiritual fulfilment, and aesthetic enjoyment. Among the multiple services that well-functioning ecosystems could support, recreation, specifically in forest ecosystems, plays a significant role in developing sustainable management and planning strategies. In the mountainous regions of the Mediterranean islands, where rapid population decline and ageing is usually observed, such actions could be crucial to achieving a sustainable status.

➤ This study aimed to map the recreation potential of the Marathasa's mountainous region, incorporating the local assets and the specific environmental characteristics.

The study area is located in the Troodos Mountain range in Cyprus, in altitudes from 94 to 1709 m, covering an area of 208 Km² (equivalent to the 2.2% of the island's area). The methodological framework was based on a multicriteria analysis, considering two main components, namely the biophysical and the cultural component.

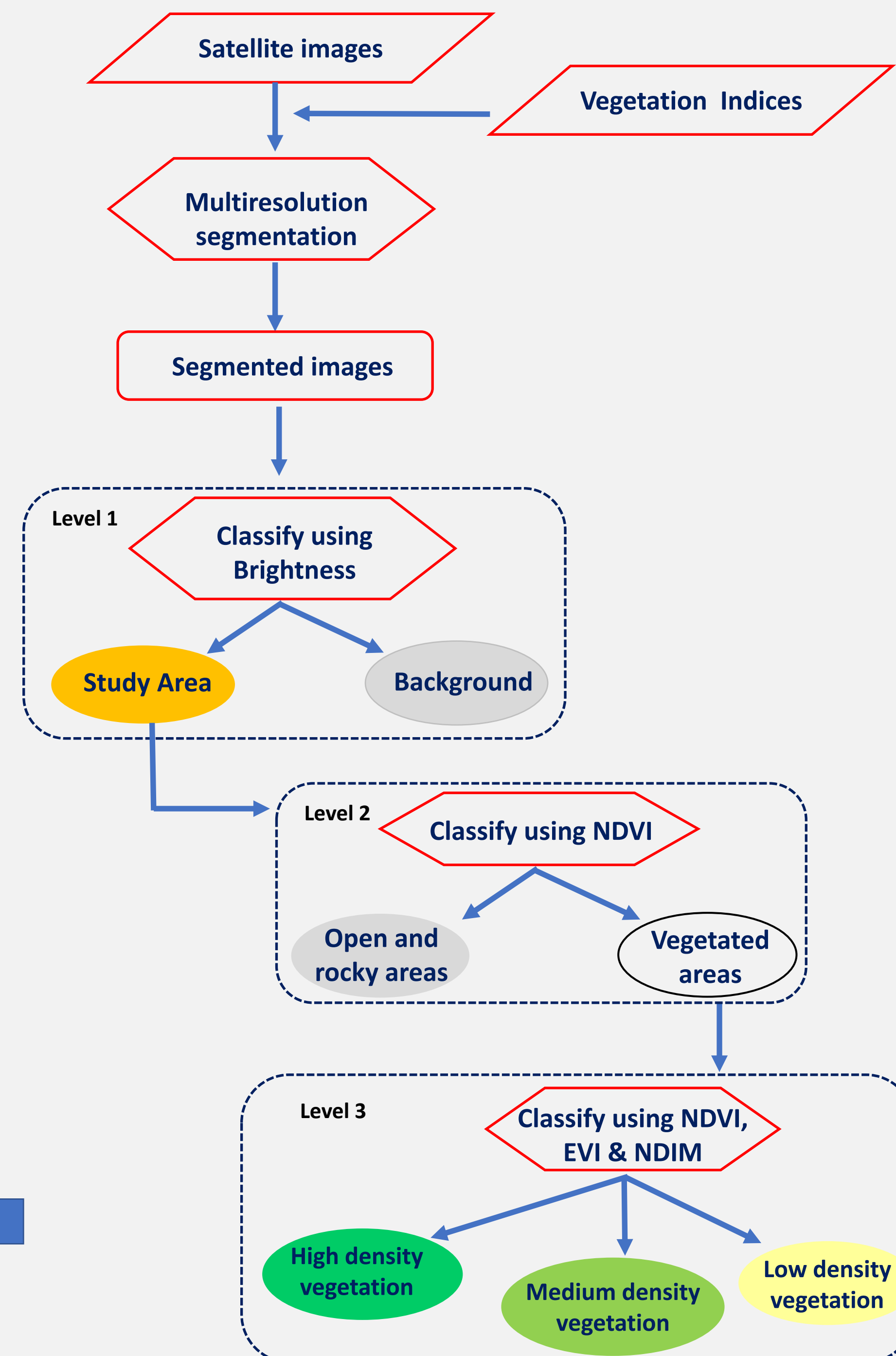
Methodology

The methodological framework was based on a multicriteria analysis, considering two main components, the biophysical and the cultural component. The former included three criteria of vegetation, landscape diversity, and surface roughness, while the latter combined information on tourist infrastructures, areas/monuments of interest (bridges and watermills), walking/hiking trails and villages.

❖ Landsat images acquired in 1990, 2000, 2010 and 2021 were analysed to identify the land use/ cover types (LULC) and detect changes within the study period of 30+ years. An Object-based Image Classification (OBIA) scheme was developed and applied for each study year to the various LULCs: *High density of vegetation*, *Medium density of vegetation*, *Low density of vegetation*, *Open areas*, *Urban areas*, *Water bodies*. As the use of multi-temporal images requires calibration and georeferencing to classify and detect changes, prior to applying OBIA, this study used images at Level 1 (geometric corrections in UTM WGS84 projection), and it applied an absolute atmospheric correction using Dark Object Subtraction algorithm (DOS) in ENVI 5.5 software.

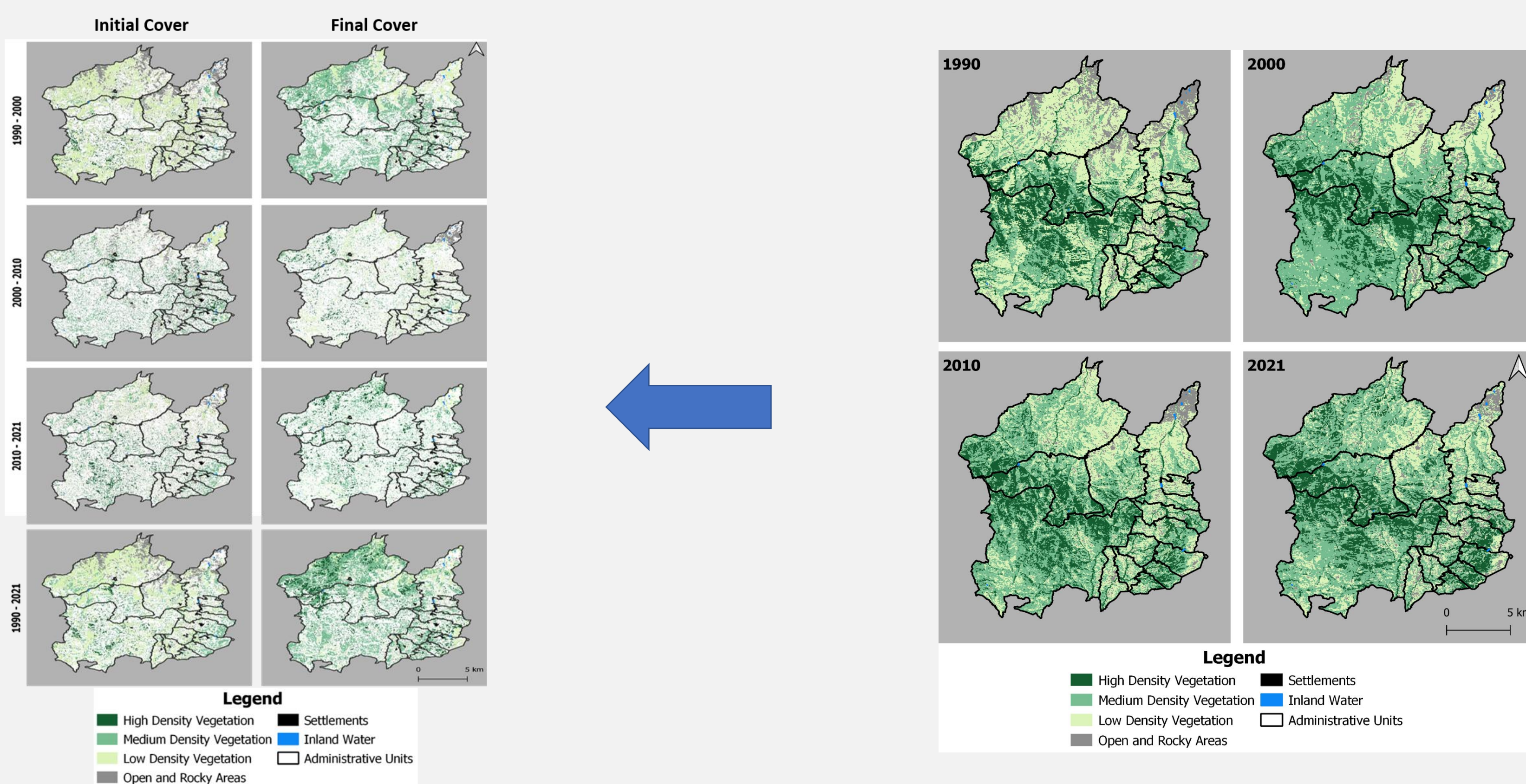
The cultural factor consists of four variables: (i) the existing tourist infrastructure for camping, (ii) the special points of interest (water mills, bridges, monasteries, etc.), (iii) the existing walking routes/paths, (iv) the settlements (e.g. villages, and touristic infrastructures).

❖ The available point and vector geographic data were analysed using Kernel – a density tool of the ArcGIS Pro software, from which gridded files of continuous values showing the density and proximity of the individual elements were extracted.

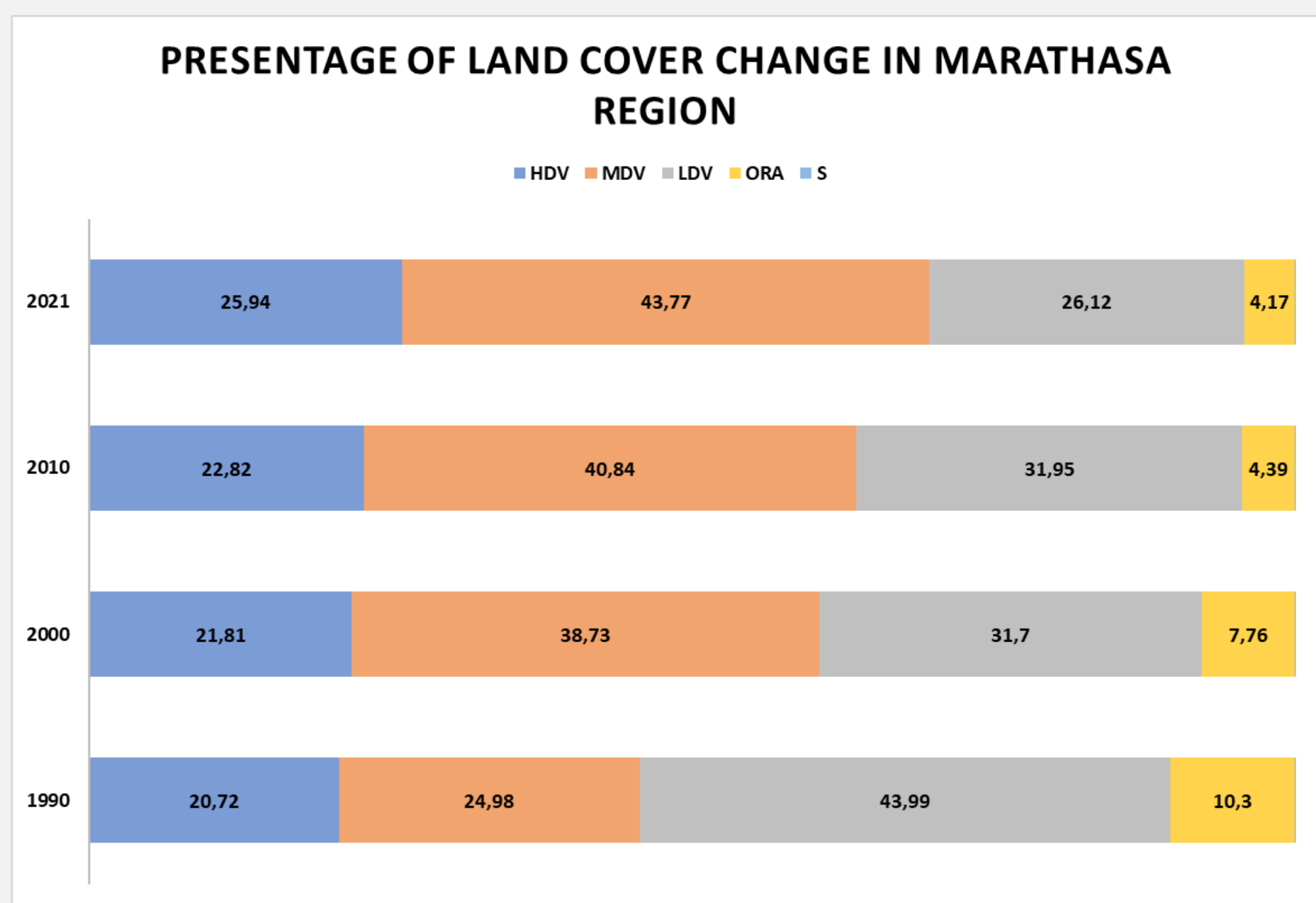


Hierarchical scheme of classification (filled ellipses are the final results).

Results



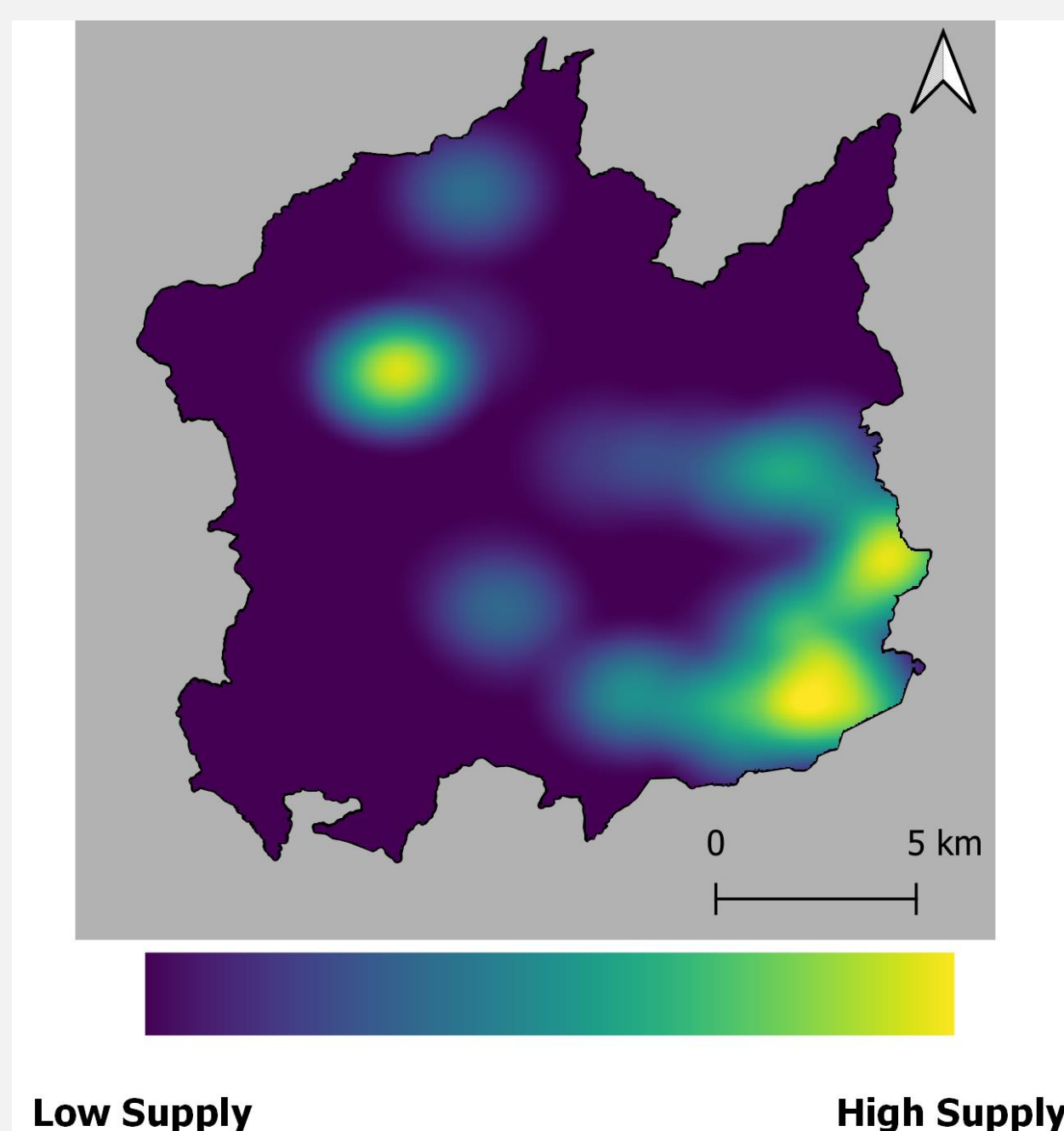
Land cover change in Marathasa region during 1990 to 2021.



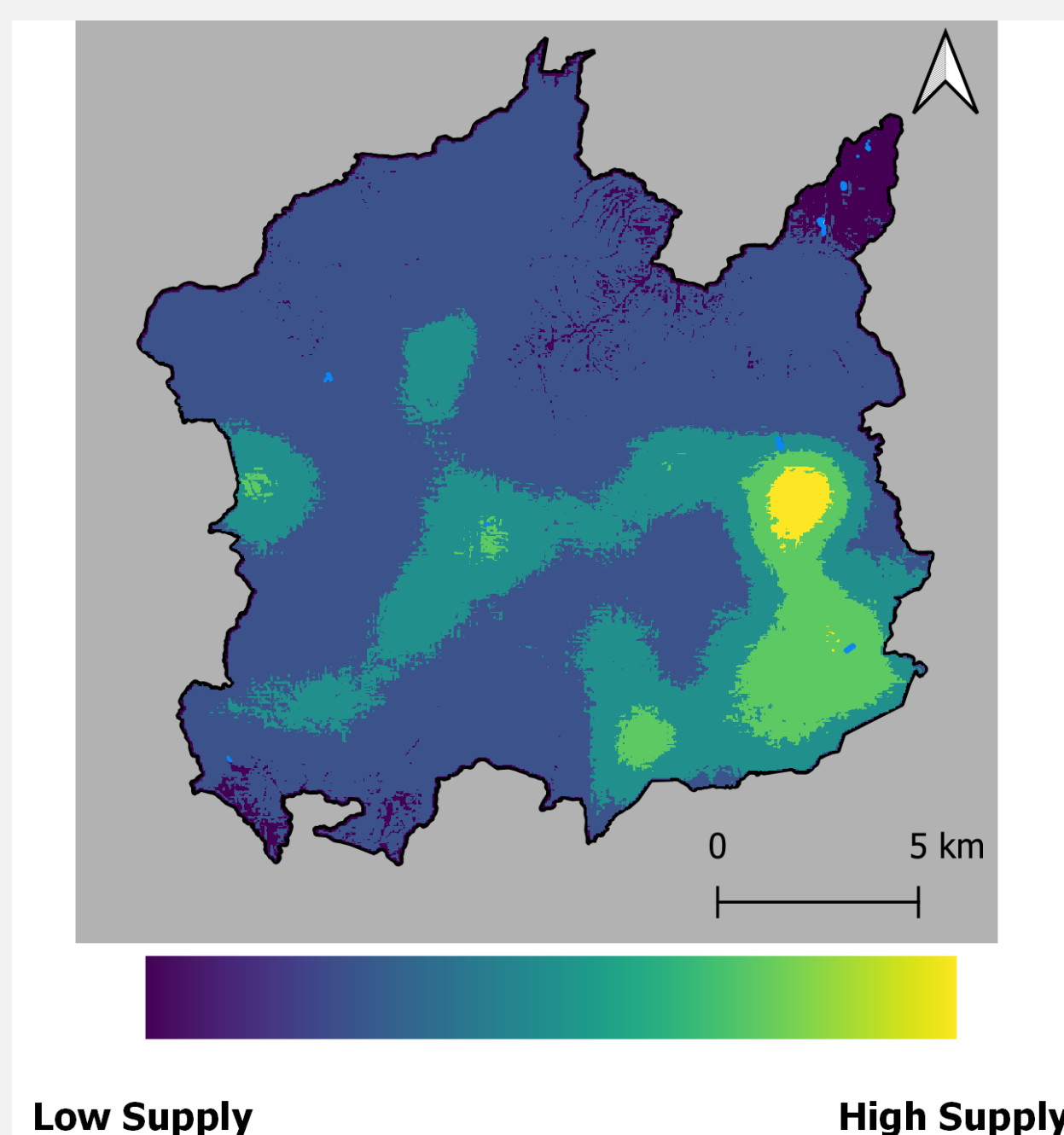
HDV: High Density Vegetation; MDV: Medium Density Vegetation; LDV: Low Density Vegetation; ORA: Open and Rocky Areas; S: Settlements

Land cover in Marathasa region during 1990 – 2021.

Mapping ecosystem service of culture factor in Marathasa region



Mapping the potential for water provision in Marathasa region.



Mapping the potential for recreational activities in Marathasa region.

Conclusion

Land abandonment and especially in mountainous areas can have both positive and negative effects depending on the local context, location and scale. The LULC analysis is a powerful tool for detecting the change in land cover in the temporal and spatial scale, in order to develop sustainable management and planning strategies. Mapping the potential for recreation on these areas is a form of ecosystem services that could directly lead to the sustainable development of mountainous (rural) areas.

Cyprus, being a typical Mediterranean island, the long-term effects of anthropogenic activities and natural processes have strongly shaped its landscape. The water bodies (lakes and rivers) and its archaeological infrastructures (e.g. bridges, water-mills etc.) are environmental and cultural inheritance elements, that could potentially function as resources for recreation. Therefore, conflicting pressures through different economic activities within the limited space of an island constitute major challenges for its sustainable development. Through this study, we attempted to show how mapping and promoting recreational activities can be used for targeted decision-making and improvement of landscape management, ensuring a balance between ecological integrity and social demand for natural resources.

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