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Patterns and drivers of medium-term agricultural landscape transformation in Kyunsu township, southern Myanmar

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Abstract

Kyunsu township in southern Myanmar comprises coastal regions and a multitude of small islands covered by vast tropical evergreen forests, mangrove forests, and a large water body in the Adman Sea. Due to population growth, residents are increasingly expanding their agricultural areas. Understanding the patterns and drivers of medium-term agricultural landscape transformation in this area is crucial for local policy making to foster sustainable crop production.

Landsat datasets were used in a comparative post-classification approach to investigate agricultural landscape transformation over 40 years. Iso-cluster unsupervised classification, supervised random forest classification, compilation of classified data, and digitisation of Landsat datasets from 1978, 1989, 2000, 2011, and 2020 were performed using ArcGIS software and GEE platform. A minimum of 58 training points and 65 training polygons for each class were used for supervised classification.

The overall accuracies of the classification were 96 % (1978), 97 % (1989), 97 % (2000), 97 % (2011), and 97 % (2020). As expected, the results did not indicate notable changes in water bodies (+0.11 %) within the last 40 years. However, major changes were noted in lowland rice fields (+90 %), open forests (+81 %), settlement areas (+115 %), aquaculture (+1594 %), and other land uses (+188 %) while closed forests shrunk by 45 %. Also, minor changes occurred in mangrove forests (-9 %) and in plantation areas (+11 %). Change detection showed that 54.56 km^2 of lowland rice areas were expanded to open forests, mangrove forests and plantation areas and 229.26 km^2 of open forests, closed forests, and mangrove forests were turned to plantation areas. A large proportion of closed forests (405.23 km^2) transformed to open forests. Population growth with settlement areas expansion could be the major driver of agricultural landscape transformation and consequent deforestation in this area. Local land-use planners and extension services should foster agroecological cropping practices to improve crop productivity per unit land area for livelihood security of the local people while making the policy to maintain natural forests for ecosystem services.

Keywords: Crop land expansion, deforestation, ecosystem protection, Kyunsu, sustainable crop production

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