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From forest conversion to climate-resilient agroecosystems: Impacts of land-use change on ecosystem services and local well-being in the Hyrcanian forest region of Iran

ZEYNAB HALLAJ¹, MASOUD BIJANI¹, ESMAIL KARAMIDEHKORDI¹, RASOUL YOUSEFPOUR²,
HAMED YOUSEFZADEHSERAJ¹

¹*Tarbiat Modares University, Dept. of Agricultural Extension and Education, Iran*

²*University of Toronto, Inst. of Forestry and Forest Conservation, Canada*

Abstract

Forest conversion to agricultural land as a form of forest land use change (FLUC) is one of the main drivers of biodiversity loss, ecosystem service degradation, and changes in human–nature relationships. Although agricultural expansion can provide short-term economic benefits and livelihood opportunities, simplified land-use systems may reduce ecological functions and increase the vulnerability of forest-dependent communities to environmental and socio-economic changes. The purpose of this research was to investigate the effects of forest conversion into agricultural systems on biodiversity ecosystem services (BECS) and human well-being (HWB) in the Hyrcanian Forest region of northern Iran. The research was conducted using a human ecological approach through a mixed-methods design, including semi-structured interviews with forest rangers, local resource users, and government officials, household surveys, and participatory assessments of perceived changes in ecosystem services. The results showed that the conversion of Hyrcanian forests to croplands and orchards was perceived as a major factor contributing to the decline of regulating, supporting, and cultural ecosystem services. Water regulation, soil protection, environmental quality and cultural connections with forests were the most affected elements of these services. The increased provisioning benefits from agricultural conversion were unevenly distributed among households. Communities dependent on forests, particularly those with limited access to land, forest resources and alternative livelihoods, had larger declines in perceived well-being and adaptive capacity. Results also indicated that FLUC effects were not only mediated by ecological changes but also by social inequities, such as unequal resource access and limited participation in land use decision-making. The results of the research confirm the strong links between FLUC, BECS and HWB and emphasise the importance of considering forest conversion as a coupled social-ecological process. Thus, post-logging-ban policies such as Iran's Forest Rest Plan should address not only the restriction of timber extraction but also the issues of livelihood security, equitable access to resources, and community participation in forest governance. An integrated approach of ecological restoration and social justice can lead to improvements in ecosystem recovery and the long-term well-being of forest-dependent communities.

Keywords: Ecosystem services, forest land use change, human ecology, human well-being, Hyrcanian forests, social–ecological systems

Contact Address: Zeynab Hallaj, Tarbiat Modares University, Dept. of Agricultural Extension and Education, Tehran, Iran, e-mail: zeynab.hallaj2@gmail.com