

Integration and visualization of the ecological value of rural landscapes in maintaining the physical environment of Japan

Yoshitake Kato^{a, 1}, Makoto Yokohari^{a, 2}, , Robert D. Brown  ^b

^a National Institute of Agro-Environmental Sciences 3-1-1, Kannondai, Tsukuba, Ibaraki 305, Japan

^b School of Landscape Architecture University of Guelph, Guelph, Ontario N1G 2W1, Canada

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Abstract

A study was undertaken to map and evaluate the role of rural landscapes in maintaining the physical environment of Japan. Over 80% of the land area of Japan is used for agriculture and forestry, and while their economic value is well known, they have additional value in preventing landslides and soil erosion as well as in increasing the water retention capability of soils and purifying air. These roles, or 'functions,' were investigated through the use of a geographic information system and previously-validated land evaluation models. The study defined the 'ecological value' of rural land uses by mapping the differences between scores that land would receive with actively managed woods and farms and those same lands if the woods and farms had been abandoned. The results were illustrated at a national scale, on a watershed basis, and provided both inter- and intra-prefecture comparisons. A national map was developed that utilized elements of landscape structure to model ecological functions based on potential land use change. These elements (structure, function, and change) are central to landscape ecology, and this map has provided a step toward achieving landscape sustainability. This map will assist planners in understanding the relative importance of the various ecological roles of land uses in the watershed and will clarify what land use changes can and cannot be made. This quantification of the beneficial effects of woods and farms on the physical environment has come at a critical time, as rural land uses in Japan are being threatened by politics and economics. The results of this study will be of considerable benefit in landscape planning in Japan, but will also provide a prototype for the investigation of effects of open spaces elsewhere, especially in other Asian nations that share with Japan the characteristics of monsoons, rice production, and extreme physical environments.

Keywords

G.I.S.; Rural; Japan; Ecological functions; Asia; Sustainability