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THE ECOLOGICALLY IDEAL ROAD DENSITY FOR SMALL ISLANDS: THE CASE OF KINMEN, TAIWAN

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Abstract

The ecological system and natural resources of small islands are limited. Especially, their ecological system is very vulnerable to the invasion by alien species. The planning of development in small islands must be very delicate and advanced comparing with large islands or continental areas because there is no tolerance for experiments or mistakes in developing small islands.

This research is aimed to obtain the acceptable road density for small islands from the ecological point of view and taking Kinmen Islands (Taiwan) as an example. Three derivations of finding the acceptable road density for small islands were developed in this analysis. One method is to adopt the allowable density of roads for sustaining viable populations of wolves in continental areas to small islands. Since wolves are the top predators of a healthy ecological system and with sustainable wolf population the ecological system is believed to be sound, this road density could be the ideal one for a small island. However, the allowable road density for wolves was obtained in continental areas and it is not clear that if it is valid in direct application on small islands.

The second method is modifying the road density from model islands to fit the ecological characteristics of objective islands. In this research I took Okinawa (Japan) as the model island and derived a suitable density of roads for Kinmen. In the third method, I selected the largest small island as the model island and applied the derivation procedure of the second method to find another ecologically ideal density of roads for Kinmen.

The result has shown that the smaller islands have higher density of species but should have lower ideal road density. It was also found that the current road density of Kinmen has exceeded the results obtained by the three models. Although this research is focused on Kinmen, it is believed by the author that the same approaches could be applied to other small islands when reviewing their road-developing policies. The applications of this analysis on habitat islands or ecologically isolated zones in continent areas have been demonstrated. It has been shown that the procedures and results of the application are similar to those for small islands.

Key words: road density, small islands, ecological impacts, Kinmen.
(The full text of this paper can be found in *Ecological Engineering*, 2006.)