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**FOREST ISLANDS IN THE LANDSCAPE  
OF THE MASURIAN LAKELAND;  
ECOTONES BETWEEN FOREST AND CROP FIELDS**

**INTRODUCTION**

Studies reported in the present volume are a continuation of the investigations on the role of forest islands in the structure and functioning of the agricultural landscape (see References). From the standpoint of landscape ecology, these studies have concerned the more extensive problem of the significance of forest islands for the landscape.

Undertaking of the studies in the Masurian Lakeland has been a direct consequence of the results of analogous investigations on the role of forest islands, performed in the most industrialized region of Poland, i.e. in the Rybnik Coal Basin in Silesia (Dąbrowska-Prot 1987). One of the signs of anthropogenic transformation of the local landscape involves cutting down of wide-spread forest complexes destroyed by the industry (as a result of gas and dustfall, perturbances in water relationships, or caving-in of the ground), and instead of them leaving small woodlots round industrial plants or among crop fields or else restoring forest habitats in the form of small-area forest shelterbelts.

The results obtained for the Rybnik Coal Basin have proved that forest islands are a very important element of the industrial landscape structure. It is due to forest islands that the industrial landscape is still characterized by high numbers and marked species diversity of plants and animals which, in the case of some groups of organisms (e.g. insects), even exceed those found for greater forest complexes.



In this connection studies of the role of forest islands in the Masurian Lakeland have been undertaken. In this terrain the agriculture is the dominant anthropogenic factor; the progressing deforestation process and the differentiation of the terrain sculpture (post-glacial regions) result in the occurrence of many small woodlots which either are a remainder of the old tree stands of mixed forest or develop spontaneously on the barrens of deciduous woodlots (Dąbrowska-Prot 1991a). They are a significant element of the agricultural landscape structure in this region.

These earlier studies have taken up the effects of the size, origin and localization of forest islands in agricultural landscape (see: Fig. 1 – outline of the



Fig. 1. Distribution of forest islands: 1-4 – Pino-Quercetum forests, 5-8 – birch-aspen woodlots



terrain) on: the transformation and synanthropic process of the vegetation of forest islands (Wójcik 1991), formation of soil communities (bacteria, fungi, Protozoa) (Sztrantowicz 1991), and entomofauna, in particular the Diptera (Dąbrowska-Prot 1991b) and Coccinellidae (Gałęcka 1991), as well as the Araneae (Łuczak 1991). Functioning of the predator-prey system has been exemplified by the predatory ladybugs and their natural preys, i.e. aphids (Gałęcka 1991), and by population processes (e.g., reproduction process) in spiders (Tarwid 1991).

The results of these earlier studies have pointed to marked differences between the margin zone and interior of forest islands in the microclimatic conditions, and structure of the vegetation and animal communities. In the margin zone of forest islands the dynamics of some phenomena (e.g. changes in community structure) and certain processes (e.g. emigrations and immigrations of herbivores and predators) have testified to an intensive seasonal exchange of biological material between the forest and surrounding farmland. This prompted us to undertake the present ecotone studies of habitat transects including the interior and margin zones of the earlier studied forest islands and adjacent crop fields.

The present studies published in this volume deal with some important problems, e.g. the process of penetration of plant species alien to the forest habitat across the ecotone zone into the forest interior, which leads to synanthropisation of the plant associations and to an exchange of various invertebrate groups between the field and forest habitat. In particular, it was attempted to elucidate under what conditions and with respect to which animal groups the field-forest ecotone is either a barrier or a transition zone in their dispersion and migration in the terrain, as well as an attempt was made to determine in what measure the ecotones influence the biodiversity of the plant and animal communities.

It is stressed that in the present investigations the ecotone phenomena and processes were exemplified by various groups of soil and overground invertebrates which only very seldom are the object of studies of this type. They are particularly useful test organisms in the case of the ecosystems as contrastive as the forest and crop field. The forest-field ecotone, formed between the natural, stable forest ecosystem and the field ecosystem which is very changeable over time and in space, is a zone of a particularly intensive seasonal exchange of animals sensitive to substantial, often abrupt changes in the environmental conditions. Analysis of invertebrate groups differing in mobility (motionless soil Protozoa, slightly moving web Araneae, intensively flying Diptera) and in sensitivity to environmental factors allows for more complete evaluation of the importance of ecotones for ecologically dissimilar groups of organisms.

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