

ECOLOGICAL CORRIDORS IN SPATIAL PLANNING

Abstract. In order to enable migration of plants and animals between various distant ecosystems, it is necessary to maintain ecological corridors between them. Spatial planning, especially that on the local level where spatial shaping methods are directly regulated, plays an important role here.

Key Words: ecological corridor, spatial planning

1. Introduction

The official definition of an ecological corridor is included in Art. 5 of the Nature Preservation Act of 2004 [8], which defines the ecological corridor as an *area that enables migration of plants, animals, or fungi*. Other formal provisions are included, among others, in the following documents:

- Art. 23.1. of the Nature Preservation Act, according to which *also a protected landscape area may perform the function of an ecological corridor*,
- Regulation of the Minister of Environment of 28 September 2004 [6], which specifies ways of preservation of wild animal species, consisting in:
 1. *establishing and maintaining corridors to enable migration*,
 2. *ensuring the passability of flows that constitute migration routes, including the construction of fish passes and canals*,
 3. *demolishing obstacles and constant maintaining of fish passes*,
 4. *installing passages for animals under and above public roads and railway tracks*.

The succinct nature of those definitions and provisions requires a broader discussion. According to R. Olaczek [2] "*main ecological links are the ecological corridors in the form of a strip of land, along which living organisms can move to far distances, and in which they have suitable environment and safety conditions. Natural ecological corridors include rivers and river valleys, sea coast belts, or mountain passes. Corridors may have national or international reach; the latter may include, e.g. bird migration routes. An ecological corridor is not always a linear structure, like e.g. a river. There are ecological corridors, which, although not having a structural continuity, still maintain their functional continuity, e.g. forest islands that are migratory birds' sanctuaries.*

*Places in which ecological corridors cross, or (more often) areas of a large extent of naturalness and accumulation of living organisms, from which they set for an expansion to the outside are called **ecological nodes**, or when they cover large ecologically diversified areas, **nodal areas**.*

According to the definition included in the US legislation [1], ecological corridors are defined as *...roads, along which animals of great spatial requirements, as well as plants may move, and through which genetic exchange may take place, and in which populations can migrate in response to environmental changes and natural disasters, as well as through which the populations of endangered species can be strengthened with specimens from other areas.*

According to the authors of *Korytarze ekologiczne w Małopolsce* [1], there are five types of ecological corridors in the landscape:

1. *main river systems and broad stretches of natural habitats between protected areas (which constitute ecological nodes or nodal areas),*
2. *riverside plants (Fig. 1),*
3. *hedges, baulks and other linear structures in an agricultural landscape (Fig. 2),*
4. *roadside plants,*
5. *forest connections (Fig. 3).*

Maintaining ecological links between ecosystems (i.e. ecological corridors) is essential, since it is one of the conditions of preserving natural balance and durability of basic natural processes, as one of the aspects of sustainable development.

However, maintaining those links is in many instances endangered by various obstacles – ecological barriers that partition ecological corridors and impede the migration of organisms. Ecological barriers may include roads of high traffic volume, railway lines, power lines, dams on rivers, sections of rivers of highly polluted water, dense development, long fences, or large areas of arable land devoid of infield trees and bushes.



Fig. 1. Ecological corridor in the riverside plants landscape
(fot. A. Rozenau-Rybowicz)

Therefore, at this background, the basic task of spatial planning is to outline and preserve ecological corridors in spatial development plans through the determination of limitations to the development and use of those corridors, indication of places and ways of passing through the existing ecological barriers, and avoidance of creating new barriers.



Fig. 2. Ecological corridor in the agricultural landscape
(fot. A. Rozenau-Rybowicz)



Fig. 3. Forest connection
(*foto. A. Rozenau-Rybowicz*)

According to the provisions of the Spatial Planning and Development Act of 2003 [9], those plans shall determine the scope and ways of action in matters pertaining to the designation of land for specific purposes and establishing rules of its management and development, assuming spatial order and sustainable development to be the basis for those actions.

2. Ecological Corridors in Legal Regulations Concerning Spatial Planning

The preservation of ecological corridors relates to the introduction into planning documents of limitations in the way of area development and utilisation. If implementation of such limitations is to be effective, it needs to be founded on strong legal grounds.

The basic legal instrument that regulates spatial planning issues is the Spatial Planning and Development Act [9]. However, it lacks direct references to the way of recognizing ecological corridors, so as regards ecological corridors the existing provisions of the Act may only be interpreted indirectly.

Art. 1. 2. *Spatial planning and development shall especially take into account: (...)*
3) *Requirements of environmental protection, including those related to inland water management and preservation of arable and forest land.*

Art. 10. 1. *The study shall take into account conditions resulting, in particular, from: (...)*

3) *the condition of the environment, including that of agricultural and forest production areas, size and quality of water resources, as well as requirements of the preservation of environment, natural and cultural landscape, (...)*

9) *the existence of protected facilities and areas, based on separate regulations.*

2. *The study shall, in particular, determine the following:*

– *areas and rules of preservation of environment and its resources, nature, cultural landscape, and spas.*

Indirect references can also be found in two executory orders issued in connection with the Nature Preservation Act [8], concerning mandatory studies to be prepared for local spatial development plans. The first of them is the Regulation of the Minister of Environment Concerning the Ecophysiological Studies [5], which determines, among other things, the contents of an ecophysiological study, whose cartographic and descriptive parts should include the following:

1) *identification and characteristics of the environment's conditions and functioning, documented and interpreted spatially as regards:*

a) *particular natural elements and their mutual interrelations and processes developing in the environment, (...), as well as*

d) *natural links of the area with its wider surroundings.*

The second one is the Regulation of the Minister of Environment Concerning Detailed Conditions of Environmental Impact Projections Concerning Local Spatial Development Plans of 2002 [4]. In general, the goal of the projection is to assess the environmental consequences, including those affecting animals and plants, which may result from the implementation of the plan stipulations, as well as to assess the conformity of designed land use and development forms with conditions provided for in the ecophysiological study.

3. Provisions Concerning Ecological Corridors in Planning Documents

Despite the present day's lack of direct references to ecological corridors in legal regulations on spatial planning, the issue is included on all planning levels, although in different scopes.

On national level. The updated conception of the spatial development of Poland (October 2005) includes, *inter alia*, the following provisions that directly concern ecological corridors:

*In order to preserve in full the rich biological diversity of nature in Poland, as well as durability and balance of natural processes, the areas of supreme natural values shall be covered with legal protection (including the European NATURA 2000 network) and linked by a system of existing **ecological corridors**. (...)*

The ecological corridors of the Vistula, the Bug, and the Oder. Maintaining the function of European ecological corridors in relation to those three river valleys means a necessity to work out guidelines of natural environment management in those areas, with particular reference to the protection of biological diversity as the point of reference for all planning documents and investment projects, which concern those corridors.

The above-quoted provision, included in a document prepared on a nationwide basis is, *per force*, of a general nature, which is the result of the document's scale, but still it provides a guideline for introducing those issues into regional level documents.

On the regional level, the issue of ecological corridors is taken into account in spatial physical plans for administrative regions, though based on different approaches. For instance, spatial development plan for the Małopolskie Region is a document, which reflects the assumptions of the implementation strategy for ECONET-Polska national ecological network. Elements of the ECONET network, such as **nodal areas of international and national significance, as well as ecological corridors of international and national significance** were introduced into the plan.

As regards the directions of actions concerning the sphere of ecology, including the preservation of nature and landscape, the Małopolskie Region's plan assumes that *development of a spatial cohesive network of natural links in the Region, which takes into account the existing and designed protected areas included in the national network, and which is based on the assumptions and conception of European ecological networks, will be effected by means of the below measures that recognize local community's opinions: (...) – to put under protection those areas, in which there are protected natural habitats, positions of plants, animals and fungi that are endangered, rare, protected, endemic, or relict, which exist within the borders and reach of **ecological corridors** that link areas liable to protection, as well as nature sanctuaries (biocentres) of international and national significance. (...) – to establish spatial conditions for legal protection of unique and outstanding nature and landscape values, including the protection of rivers with their surroundings, as well as other area stretches being critical for the preservation of biological diversity.*

The Plan also formulates actions within ecological corridor stretches aimed at the protection thereof, and it should be noted that the adoption of the system of ecological corridors directly following the ECONET national ecological network that was prepared on a nationwide scale will result in areas of various urban development level being also covered by those plans. The layout and reach of those areas may and should be detailed in local planning.

In addition to the basic document, that is spatial development plan for the Region, there are also sectoral plans that are drafted on the regional level. An example of such a plan, also derived from the Małopolskie Region, is the monument preservation programme, called "Cultural Heritage and Landscape Protection Programme of the Małopolskie Region" adopted by resolution in 2005 [10]. That document in its section on *Development of Spatial Structures* assumes an action direction: *Development of cohesive space of natural link network in the Region*. The direction is to be implemented, among other things, through *preserving and making more clear the existing aesthetic and view values, promoting development patterns in relation to regional features, restoring the natural balance, increasing the biodiversity, organising and reconstructing cultural values, as well as reinstating ecological corridors.*

On the local level, spatial planning is an implementative planning, which directly regulates the way space is developed. **Three types of planning documents** of diversified properties are prepared on that level:

– **Study of Spatial Development Conditions and Directions of the Commune**, which is a document that includes the conception and policy of shaping the whole

commune's space but is not a basis for the issuance of project location decisions. Provisions of local physical plans must conform to those of the Study. That conformity is verified, first of all, in respect of designating land for various development functions and ways, so the reach of ecological corridors does not necessarily have to be identical in those documents. Due to the lack of mandatory, detailed guidelines, the studies of spatial development conditions and directions of communes are highly diversified as regards the way of formulating their provisions and figures, including those related to ecological corridors or stretches.

One of such studies, taken as an example, includes a provision concerning ecological corridors that are related to river valleys. It shows the need for implementing actions in the area, consisting in the preservation of spatial continuity of the valley ecosystem, protection of old river beds, riparian forests and wicker brushwood, meadow ecosystems, as well as reclamation and development of degraded valley fragments in order to preserve biodiversity and maintain a corridor for the migration of valuable plant and animal species.

– **Local physical plans**, which provide basis for the issuance of project location decisions, are prepared for whole communes, single individual villages or small area parts. Provisions of those plans directly translate to investment project opportunities or limitations. The problem of ecological corridors is reflected in the plan text itself, as well as in the plan drawing. The plan drawing most often shows ecological corridors as a zone imposed on land of various functions and development forms, e.g. on areas designated for various agriculture purposes or for various types of greenery. It is not always possible to avoid a situation, in which an ecological corridor runs in whole beyond developed areas. Regulations of a local physical plan that concern ecological corridors shown in the drawing are often very brief.

They include recommendations concerning infield trees and bushes, prohibition of constructing any structures, fences, technical and transport utility networks, as well as changes in land coverage and configuration, which might provide ecological barriers without solutions that enable crossing those barriers (openings, passes, etc.).

Imposing zones with such limitations upon areas designated for farming or for various-type "greenery" makes it possible to protect land from being developed as a result of various investment projects. In a situation, in which an ecological corridor has been imposed on partly developed areas, or upon areas which were designated for investment projects by planning decisions from previous local plans, when the withdrawal of those decisions might result in claims lodged against the municipality, proper development conditions applicable to that zone are formulated to protect that corridor. In the end, those areas continue to be designated for investment projects, while at the same time there are limitations imposed on them, resulting from the presence of the ecological corridor. Even if one manages to bring about a situation, in which gaps in development stretches shall be preserved as ecological corridors, they may be lost in next editions of the plan, because of the lack of expressly formulated legal grounds, or else they may be lost in the situation

that the plan has been rendered invalid and building permits shall be issued based on decisions on conditions of construction and site development (Fig. 4).



Fig. 4. Ecological barrier
(*foto. A. Rozenau-Rybowicz*)

– **Decisions on Conditions of Construction and Site Development** are issued in the event of the lack of a local physical plan. Such a decision may be issued only upon the fulfilment of conditions, as specified in the Law, if an investment project under consideration complies with separate regulations. In practice, when basic conditions are met, that is those of the neighbourhood, access to a public road, as well as declaration on the provision of utilities, and when there is not a requirement of a consent to be given to change the land designation from the farming or forest one into a non-farming or a non-forest one, decisions on conditions of construction and site development are issued also in cases when investment projects are implemented within ecological corridors. That is why, after several such decisions have been issued one by one, the ecological corridor may get narrowed or completely closed.

Figure 5 below, which shows a fragment of the local physical plan of one of the communes near Kraków, depicts a situation in which local authorities managed to introduce ecological corridor zones that protect gaps in development stretches, while in relation to other fragments of the same area, including those that comprise an ecological corridor, the commune council adopted a resolution on excluding them from the local physical plan. The result is that because of a strong settlement pressure, authorities issue decisions on conditions of construction and site development in relation to those places, thus making the corridor more and more narrow.

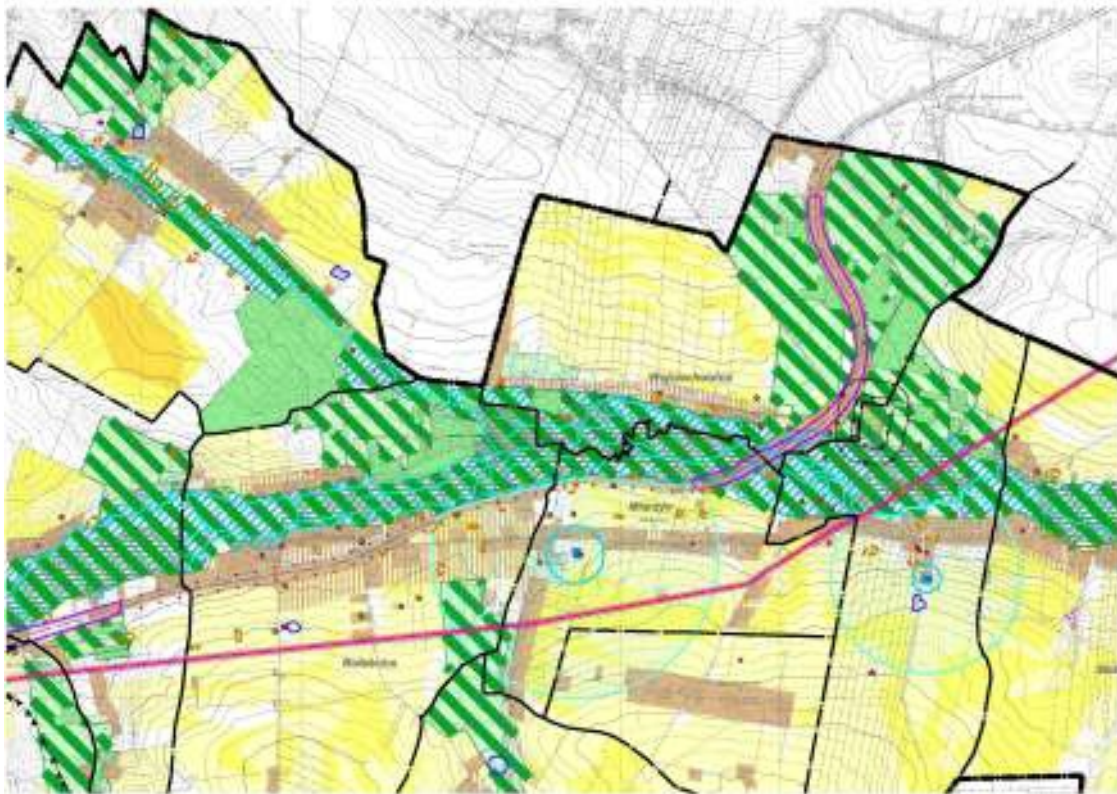


Fig. 5. Fragment of the local physical plan

4. Summary and Conclusions

In spite of the fact that ecological corridors are recognized today practically on all spatial planning levels, there are three major reasons, which cause that the protection of ecological corridors is not sufficient.

The first one relates to the lack of explicit legal regulations, concerning the protection of ecological corridors, to be included in the Nature Preservation Act, Environment Protection Law, and Spatial Planning and Development Act. It is therefore necessary to introduce changes in legal regulations that would:

- make more specific the notions of ecological corridors and rules of their preservation in the Nature Preservation Act,
- directly consider ecological corridors in ecophysiographic documents and in environmental impact projections of local physical plan projects – therefore, it is required that such provisions be introduced in the executory provisions of the Environment Protection Law,
- directly relate the provisions of the Spatial Planning and Development Law to ecological corridors, as regards the way they are recognized on all spatial planning levels, and, especially, on the local level.

The first steps towards that have already been taken, since the lack of direct provisions, which determine approach to ecological corridors and other areas of natural significance in spatial planning has been mentioned in the document titled Ecological Policy of the State in 2003-2006, including the 2007-2010 Prospects, which was adopted by the

Polish Parliament in 2003. The chapter on Ecologization of Spatial Planning and Land Use includes statements on the necessity of changes in the spatial planning system. Those changes should result in the inclusion of clear requirements in both the Law and its executory provisions, concerning specific recognition of areas and facilities covered and scheduled to be covered by nature preservation schemes (including the Natura 2000 network areas) in works on spatial development plans. Same requirements would apply to other areas and facilities of natural significance (marshes, forest and tree areas, game sanctuaries, and ecological corridors).

The second reason results from strong settlement pressure, quite often pressure on ecological corridors, in combination with the lack of ecological awareness among individual investors, local communities and authorities that represent them. It is therefore necessary to systematically increase the level of ecological knowledge within the society.

The third reason is the lack of factually documented routes of ecological corridors on a local scale. Therefore, one should initiate works on expanding studies of ecological corridors and making them more detailed. Thus those studies might become reliable grounds for planning documents and their decisions. Through that, it would be worth to revert to preparing natural documentation for communes, which practice was abandoned several years ago. Regional nature conservators should be the main actors in that regard.

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