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Shaping the Landscape of Rural Communes in the Aspect of Green Infrastructure Creation

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Abstract

Maintenance of ecological balance and creation of green infrastructure in the landscape are important features of sustainable development. This is strictly connected and correlated with the planning of land use and spatial management. The obligation of green structure creation has a legal basis (the State, European Union and international levels), EU development and conservation strategies and adaptation planes for climate change such as transition to a green economy. The aim was to present the needs and special approach, called the method of "ecological truss," to landscape green structure planning in rural areas in central Poland, in Tarłów Commune, creating better possibilities to reconcile nature and biodiversity protection with land use and economic management. Creating rich green infrastructure leads to "ecologisation" of the whole area and greater harmony of landscape. It supports strong opportunities and decreases endangerments indicated in documents of local development plans. Rich green infrastructure is a tool to approach closer sustainable development and give a significant chance, especially in peripheral and underdeveloped areas, for better living conditions for local people based on permanent use of natural and cultural values of the landscape rather than degrading them.

Keywords: rural areas, landscape planning, green infrastructure, sustainable development, Tarłów commune, Poland

Introduction

Since the United Nations "Earth Summit" Conference held in Rio de Janeiro in 1992, the principle of sustainable development has been widely introduced and implemented on legal bases in the European Union and many other countries. Maintenance of ecological balance, creation of green infrastructure in the landscape and inclusion of environmental protection in management and economy are main features of sustainable development, strictly connected with land use planning and adaptation to global climate changes. The concept of green infrastructure arrived in the 1990s as strictly connected with human environment shaping, in the United States (Benedict and McMahon 2006; Giedych, Szulczewska, and Maksymiuk 2012). Green infrastructure creation also has a legal basis, especially from the EU law,[1] assumptions of the new EU Common Agricultural Policy (CAP) for 2014–2020 (more green infrastructure required; among others: Regulation No 1307/2013[2]), action courses in EU development and conservation strategies,[3] data in environmental

1. See: Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Green Infrastructure (GI) – Enhancing Europe's Natural Capital [SWD(2013) 155 final]. Brussels, 6.5.2013, COM(2013) 249 final.

2. See: Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009. Official Journal of the European Union, L 347/608.

3. For example: Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020 [SEC(2011) 540 final] [SEC(2011) 541 final]. Brussels, 3.5.2011, COM(2011) 244 final.

reports,[4] and adaptation planes to global climate change like transition to a green economy (United Nations Environment Programme 2011).

According to Communication of the European Parliament and Council,[5] green infrastructure is defined as a set of areas of natural and semi-natural ecosystems. In this paper and as well as for the needs of "ecological" landscape planning, green infrastructure is more broadly understood as the system of natural and semi-natural ecosystems and other biologically active areas/objects resulting by human action, including plantings, bushes, green areas, patches of ruderal and segetal vegetation. Green infrastructure is recommended throughout the entire area of the European Union. In the authors' opinion, it is an exceptional chance for peripheral areas which are often not very much developed because of the long distance to economic centres and main infrastructure sites as well as difficult natural conditions for human existence. At the same time, peripheral areas often have high and unusual natural and cultural values.

The aim was to draw attention to the idea that creating green infrastructure may lead to a new chance in development of areas. The aim was also to present a special methodical approach to landscape planning regarding green infrastructure creation in rural areas, emphasising possibilities to balance nature and landscape protection with widely understood land use (including agricultural use) and management in the areas of rural communes in Poland. This approach to landscape planning is also useful in other terrains. Such a way of landscape planning gives a significant chance to local communities to have development based on permanent maintenance and use of high quality landscape especially by tourism (Fornal-Pieniak et al. 2014; Żarska 2006b; Żarska, Fornal-Pieniak, and Zaraś-Januszkiewicz 2014).

1 Method

The method of "ecological truss" is a way of landscape planning recommended especially for rural areas, including peripheral territories and areas of limited management conditions (Żarska 2005, 2006a). Some important terms connected with the concept of "ecological truss" should be explained. An ecological knot is a nature refuge occurring in the cross or in the end of ecological corridors (Żarska 2006a). An ecological corridor means an area to enable migration of wild species of flora and fauna, having good ecological structure and spatial management useful for movement of wild organisms (Pullin 2004). Landscape ecological sequence means a spatially distinguished layout of natural and semi-natural patches/ecosystems creating a stripe pattern in the landscape (Żarska 2006a). The concept of "ecological truss" means the way/method of landscape planning based on a systemic approach to nature protection, which is widely introduced from the second half of the 20th century; but planning of "ecological truss" means more than the creation of a main system of natural/protected areas. The main aim is the ecologisation of the whole area by multiplication of crossing landscape ecological sequences of various hierarchies. It is also called the "method of '3 × M' planning":

- maximization of nature refuge numbers
- maximization of ecological corridor numbers,
- maximization of the hierarchy of refuges and corridors (Żarska 2005, 2006a).

Such landscape planning leads to a multiplied ecological network which can be compared with a truss pattern (fig. 1).

Recognition and analyses of the landscape ecological structure of the study area are the starting point to establish the concept of landscape planning according to the idea of "ecological truss."

4. For example: House of Commons Environmental Audit Committee. The UN Millennium Ecosystem Assessment. First Report of Session 2006–07. Report, together with formal minutes, oral and written evidence. Ordered by The House of Commons to be printed Tuesday 12 December 2006, available at http://www.publications.parliament.uk/pa/cm200607/cmselect/cmenvaud/77/77.pdf; Living Planet Report 2012. Biodiversity, Biocapacity and Better Choices, available at http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2012_lpr/; EEA 2010. Środowisko Europy 2010 – stan i prognozy. Synteza (Martin et al. 2010).

5. See: Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Green Infrastructure (GI) – Enhancing Europe's Natural Capital [SWD(2013) 155 final]. Brussels, 6.5.2013, COM(2013) 249 final.

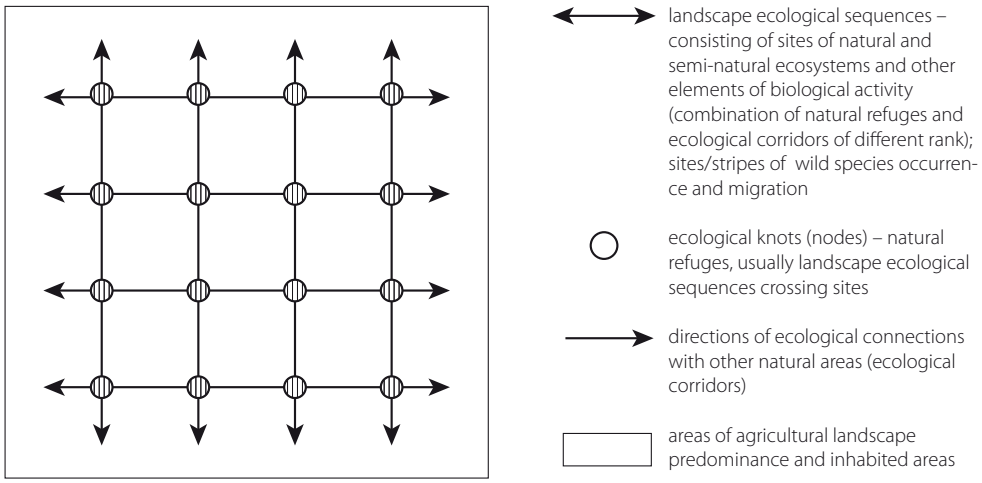

Fig. 1. Pattern of landscape planning according to the concept/method of "ecological truss" in rural areas in Poland — on the base of Żarska (2006a)

Such elements of landscape ecological structure and different rankings should be identified as: forests, aquatic ecosystems, river valleys and depressions, meadows, grasslands, peatbogs, arable lands, green areas, plantings and shrubs (accuracy depends on the scale of elaboration). The next step is the division of the area into spatial-landscape units (concerning land use and type of landscape). This division into units is made on the basis of two main criteria: (1) relief of the terrain, (2) cover of the terrain. As a result, units of relatively uniform type of landscape are distinguished. The boundaries of units should be designated to allow easy identification in the field (located along roads, forest borders, administrative borders, property borders). This division is useful to make the landscape inventory and analysis.

2 Use of the "ecological truss" approach in landscape planning and its compatibility with development strategy in Tarłów commune

The "ecological truss" method of landscape planning was used in landscape planning and analysis in rural commune areas in lowlands and uplands in Poland (Fornal-Pieniak et al. 2014; Żarska 2005, 2006a, 2006b, 2011; Żarska, Fornal-Pieniak, and Zaraś-Januszkiewicz 2014). It is the way of planning which meets biological diversity protection and sustainable development. Here the "ecological truss" approach in landscape planning has been presented on the example of a rural commune — Tarłów, located in Świętokrzyskie Voivodship, in physical-geographical mezoregions: Iłżeckie Foothills and Lesser Poland Gorge of the Vistula River (in the south-eastern part of central Poland). Tarłów is a rural commune of total area 163,77 km^2 and population of 5 961 people.[6] Forests cover 23,5%, arable lands — 58%, meadows and pastures — 3,7% and orchards — 2,4%.[7] The commune has a peripheral localization — in the north-eastern corner of the voivodship and far from main roads and Kielce — capital of the region. The research in Tarłów area was done in 2005 and 2013. The study commune area has the compound axial-mosaic (valley-forest) model of landscape ecological structure (fig. 2).

The main ecological axis is the Vistula River valley having high natural values (of national rank) and occurring along the eastern border of the commune. The Vistula River Valley in Tarłów Commune is a fragment of the very big area protected as Nature 2000 site — PLB 140006 "The Middle Vistula River Valley" (protection of birds and their habitats on the basis of European Union law). This predominating ecological structure is accompanied by a spatially distinguishing

6. [In the journal European practice of number notation is followed — for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style). — Ed.]

7. See: Plan Rozwoju Lokalnego Gminy Tarłów na lata 2004–2006 i 2007–2014 [Plan of Local Development in Tarłów Commune for 2004–2006 and 2007–2014] [document in Polish], available at http://www.tarlow.pl/cms_inc/cms_pobierz_dokument.php?id=34&dok_id=1.

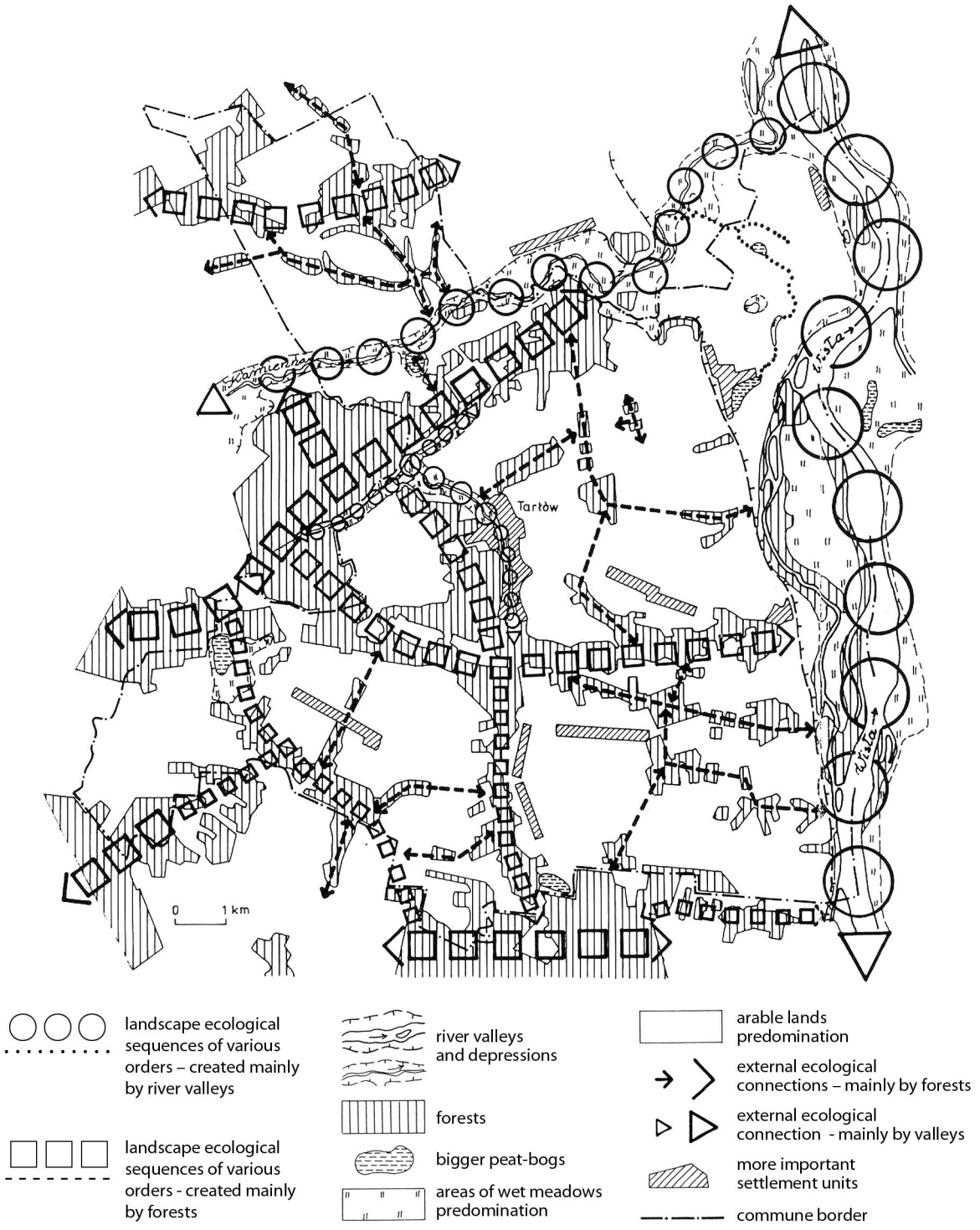

Fig. 2. The scheme of landscape planning in Tarłów Commune (Poland) by the method of "ecological truss." Big-sized and naturally valuable the Vistula River valley is the predominating ecological axis of the landscape along eastern border of the commune — on the base of Żarska (2006a)

mosaic of medium- and small-sized patches of natural and semi-natural ecosystems. The mosaic is created, in part by the Kamienna River valley, its small tributaries and local depressions covered mainly by meadows, plantings and wetlands as well as forest complexes of different size on uplands and lowlands. The multiplied "ecological truss" (dense ecological system) is composed of several landscape ecological sequences of various hierarchy. Some of these sequences are continuous and have high values (the Vistula River valley and the Kamienna River valley should be legally protected) and others are fragmented needing improvement of ecological structure by introducing,

for example, afforestations or plantings. The high hierarchy of the ecological network ("ecological truss") provides a possibility to pervade the whole area with ecological elements of different order from big forest complexes and big river valleys (natural refuges and corridors of the first rank) and ending with single trees, bushes and small ponds thereby improving the quality and harmony of the landscape.

Landscape planning according to the "ecological truss" pattern has met assumptions of the important strategic document titled "Plan of Local Development in Tarłów Commune for 2004–2006 and 2007–2014." According to this document, in the sphere of environment and tourism strong opportunities for Tarłów commune development have been defined as such:

- complex programme of conservation of scattered and minor values of the natural environment
- protection programme for areas endangered by flood (risk of flooding)
- programme for afforestations and mid-field woodlot introduction
- programme for the construction of water reservoirs (retention and recreation)
- programme for tourism organisation
- programme for tourist accessibility of natural and cultural values of landscape
- promotion and tourist information

These findings indicate that tourism is planned as an important function in the commune and natural values of the area are unappreciated, especially the natural and tourist potential of the Vistula River valley and Kamienna River valley are undervalued. In the same document, endangerments for Tarłów Commune development have been indicated:

- low income of the commune
- frequent occurrence of natural disasters (floods, droughts)
- peripheral localization of the commune area
- too small network of roads
- unfavourable demographic tendencies (aging of society)
- negative balance in migration of young people (outflow of young and educated people)
- high unemployment rate
- inadequate tourist base (accommodation) and not enough protected areas having high natural and cultural values

Landscape planning according to "ecological truss" enables us to strengthen and enhance strong opportunities and reduce some endangerments to the development of Tarłów commune. It leads to rich green infrastructure in the area which helps to create better conditions for tourism development through protection, creation and better exposure of high natural values, harmony of the whole landscape as well as utilization and visibility of cultural values. Thus the negative effect of periphery is decreased. Furthermore, the important benefit is that in the European Union area, in the Common Agricultural Policy (CAP) for 2014–2020, farmers will get direct payments (within the first pillar of CAP) in which agricultural practices beneficial for the climate and environment are demanded (so-called "greening" of direct payments) such as: crop diversification, maintenance of permanent pastures and maintenance of "ecological focus" areas (Regulation (EU) No 1307/2013)[8]. Having rich green infrastructure farmers will also get easier payments on the base of agri-environmental programmes (the second pillar of CAP).

Conclusions

Peripheral areas often have great values of nature and culture and, at the same time, obstacles in development for different reasons. So it is necessary to implement such a way of landscape planning which gives the possibility, from one side, to protect and create these high values and, from the other side, assure a new chance for development based on permanent use of these high qualities of landscape evolving tourist functions. Landscape planning according to the "ecological truss" pattern leads to creating coherent, a dense and compact ecological network (green infrastructure) which is very hierarchical and pervading the whole area. It provides better living condition for man,

8. See footnote 2 on page 47.

survival of wild species of flora and fauna, cultural values protection as well as better harmony and tourist attractiveness of landscape. The special benefit is that in the European Union area farmers receive direct payments for their farms "greening" and payments within agri-environmental programmes in the new Common Agricultural Policy. The wider implementing of the "ecological truss" method in landscape planning will help to approach sustainable development of the region.

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