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Section: Sustainable Urban Development

## Urban Sprawl and the Problems of Changes of Land Use on the Fringe Areas of Towns

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### Abstract

Authors paid special attention to the transformation of the use of land located in the areas characterized by urbanization pressure. They made an effort to confirm the thesis: there is a need for special procedures to manage areas located in transition zone – landscape interface between town and country. These procedures should include set of planned activities concerning agricultural land.

This issue was considered from two points of view:

1. Static view – authors analyzed the influence of town's development on areas located in the distance of its direct impact.
2. Dynamic view – authors presented procedure of making decision process concerning spatial development of this area.

As the variety of units managing this space and in space is realizing various economic and social purposes, there is a need for such procedures. Otherwise, diversity of aims causes increasing chaos in spatial development of particular areas. Conflicts arise especially over arable lands located within and out the borders of towns. Detailed researches concerned the outskirts of Olsztyn – town located in north-eastern part of Poland. Authors suggested 3 groups of activities in areas with agricultural functions: group I – adjusting areas to the new quality of neighborhood, group II – improving defective structures in land located directly next to urban areas, and group III – forced or protective activities.

To solve or decrease such conflicts, open and dynamic plan of spatial development, strictly connected with rural property management activities, should be introduced. Authors presented algorithms of rational rural real estate management. According to authors, planning land use should be more strictly connected with assessing property value. Moreover, rural real estate management tasks should be incorporated into planning procedure. Researches lead to conclusion, that effective spatial planning requires wide economic and social knowledge concerning both towns and the smallest administration units – communes located in the neighborhood.

**Keywords:** urban outskirts; rural property management.

### 1. Introduction

Urban areas in Central and Eastern Europe (CEE) have been dynamically increasing (urban expansion). In Poland, about 1.6 million hectares have been built-up or destined for building, what is 4.9% of whole country. In 2000–2010, about 42.5 hectares were daily transformed into urban land [1], what was typical in this part of Europe. Urban development means quantitative, qualitative and structural changes in land use that occur in particular time and space. This development is accompanied by spatial diffusion – succession, from the centre of the town to its outskirts. Such transitions are called transurbation. This term relates to intensive urban-settling and investment processes in the neighborhood of developing town or in new areas, usually in new economic regions. If single urban function is spreading uncontrollably toward open areas, mainly agricultural, it is called urban sprawl. This process usually disturbs spatial order of areas. On contrary, if town develops with the use of undeveloped areas within the city borders, it is called smart growth (compact city).

Recently, in the majority of post-socialist countries, the share of urban population has been decreasing, although the total number of towns has been increasing [2–3]. It is usually caused by economic crisis and job loss in the town, natural decrease of population in particular countries and moving to outskirts (suburbanization). Suburbanization, and its specific version – urban sprawl, is caused by:

- regional planning: plans promote urban growth instead of harmonious development, and consequently – fragmented land is an obstacle to integrated regional planning;
- motorways and moved away from urban areas large supermarkets;
- building and residential policy: it 'pushes out' medium class to the outskirts;

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- increasing competition for tax benefits;
- changes in the life style.

Proper way of urban management in Poland is nowadays widely described in relevant literature [4–5]. However, number of publications concerning areas under urbanization pressure seems to be insufficient. Researches over urban sprawl are mostly conducted in USA, what is mainly caused by the scale of problem. In CEE urban sprawl is less common, however, it can be observed. The causes and processes that shape land use patterns are often poorly understood, sometimes due to a lack of research, but often because of the format, and unavailability of data that represents land use patterns [6]. Fundamental dilemma for future urban development is decreasing “food supply areas” – as urban infrastructure always “cuts off” land from rural area. Therefore, in transition zones two characteristics can be observed:

- mix of competitive functional zones,
- dynamics of such zones, that means strictly residential functions on agricultural land and “isles” of agricultural land beyond the borders of typical compact agricultural areas.

As the result of various connections and feedbacks among town and its neighborhood, transition zones have very specific characters. Researches conducted by authors revealed, that transition zones are in half built-up with houses for one family, and the rest consists of open areas undeveloped in urban way. Territorial urban development causes constant grow of transition zone toward rural areas. Agricultural functions are discriminated against industry or residential functions and communication, and rather low rural architecture is replaced by higher houses and commercial buildings typical for urban style [7–8]. Along with this changes constant degradation of natural environment can be observed, such as cutting of trees, enlarged areas and number of wastelands, waste dumps and air and water pollution. Thus, term ‘transition zone’ means areas close to town, where small density of buildings, gardens and orchards, insufficient communal investment, dispersed industrial and storage objects, and recreational areas can be observed. These areas can be treated as temporary (transitional) form of land use, prior to more intensive urban development.

According to Razpotnik Visković [9] there are several reason for the marginalization of agricultural activity in rural-urban fringes:

- strong spatial pressures by various interest groups;
- spatial limitations on farms within settlements where they cannot expand;
- opposition from fellow residents due to the disturbances caused by farm activity;
- municipal spatial acts do not protect quality farmland or seek solutions for relocating farms to more suitable locations.

Land development on this area is a complex process with following participants and their tasks/interests:

- public administration workers: their task is to represent and protect public interest;
- landowner: is interested in getting the highest possible value of the land;
- investor: is interested in the quickest possible development of the business with the highest possible profit and the lowest possible cost;
- the actors that create space in terms of planning spatial structures and locating there functions: territorial self-governments, domestic and foreign private investors, the present and the former owners of real estate, inhabitants, and other groups;
- level of institutional development of self-governments (including professional skills and knowledge of employees, standards, procedures, approaches, codes, etc) which determines to large extent quality of management practices in many cases is not satisfactory [10].

Many authors underlined the need for well-educated professionals working as spatial managers and real estate market analysts. They stated that assistance in the development and updating of knowledge should be facilitated by constantly improving information technology, including geographic information systems – GIS and by using statistical analysis methods. Knowledge of these people have to provide a wider range of services, applicable not only in spatial planning but also in the real estate market [11–15].

## 2. Problems connected with urban pressure on its rural outskirts areas

Assuming inevitability of rising and dynamically developing transition zones, it is necessary to concern how to manage this process to provide stable development including spatial order [16]. It is very important issue, as dispersed fragmented well-invested land is difficult to transform into compact urban built-up area, neutral to agriculture and forestry. Need for specific rural real estate management activities in transition zones leads to the need for area delimitation and studies over changes in land use. Rural property management tasks and other protective activities should bring effects in short-term. Moreover, they should be aimed at minimizing negative impact and promoting such agricultural production, that is proper for natural, economic and social conditions. Urban spatial planning should include creating transition zone to prepare these areas for new quality of neighborhood. When qualitative and quantitative development eventually occurs, there is a huge need for tasks connected with monitoring and registering land use, realizing investments and describing borders of negative urban impact. There is also a need for preparing set of surveying works (partition and consolidation of land parcels, land exchange) to prepare agricultural land for new functions.

### 3. Impact of urban development on the agricultural land– case study of Olsztyn

Over last 10 years there was a significant change in land use in Olsztyn. Within the borders of analyzed town, agricultural land has still large share, however, this share decreased about 1%. Visibly decreased (–0.86%) area of natural green, as well as gardens and orchards (–0.67%), as it was replaced by residential building – multi-family (1.2%) and one-family (0.93%). Areas developed with communication and technical infrastructure increased 0.27%, and production areas 0.25%. Nowadays, transition zone is about 2 kilometers wide (in the narrowest place – about 0.5 kilometer). Data analysis shows, that agricultural areas were often irreversible transformed [7–8] and meadows were used as a grazing land. Spreading building areas and areas occupied by urban infrastructure caused specific changes in neighborhood – transition forms of land use, often increasing area of land temporary excluded from agricultural production, which changed into fallows and wastelands, i.e. uneven land after building gas or heating infrastructure, residuals after building materials. In some agricultural land so called ‘expecting activities’ can be observed, what means extensive development because of planned takeover area for urban development. On the other hand, field studies revealed stimulating impact of the city on transformation of agriculture toward more intense and highly productive forms. In Olsztyn transition zone increased area destined for orchards, gardens, fruit tree plantation and intensified vegetable cultivation (including foil tunnel cultivation). Moreover, some areas of fallows and wastelands were re-cultivated for agricultural production. Analysis of space transformations and land use structure allows to formulate conclusion, that rate and direction of changes depend mainly on role and function (current and future) of physiognomic city’s district neighboring its transition zone. Table 1 presents negative effects of city’s impact on agriculture located in its transition zone and suggested some solutions.

Table 1. Negative effects of town impact on agriculture located in its transition zone and suggested solutions

	<b>Transformations of land management conditions caused by urban development</b>	<b>Set of activities eliminating or weakening negative impact of the town on agricultural land</b>
1	Decrease of farms size – worsened tract – dispersion of agricultural land	Creating sets of land requesting requirements of rational management through exchanging land between subjects – regulating borders, land transformations
2	Worse access to area (mainly because of linear investment)	Building new access roads, re-cultivating land temporary excluded from agricultural production
3	Land desolation	Arranging old roads and wastelands, elaborating detailed program of agricultural use of fallows, localizing gardens
4	Unprotected agricultural land (pollutions, noise)	Afforestation, building protective belts, elaborating specific way of cultivation and describing pollution-proof species of plants
5	Lowering soil productiveness – changing level of underground water (flooded or dried land): – breaking natural flow of surface water, – soil chemical changes, – more intense erosion.	Drainage, irrigations, improving soil fertility, turfing slopes, cultivation of plants weakening erosion
6	Depreciation of buildings	Elaborating detailed list of rights and limitations for owners connected with building and modernization, protecting against spontaneous and fragmented development
7	Unnecessary reserves of areas destined in plan for new investments	Strict connections between spatial plans and economic plans, rational land management, leasing uninvested expropriated land

Source: Own studies

### 4. Active plan of spatial management as an instrument weakening consequences of urban pressure

Scheme ‘prognosis – conception – program – plan – realization’, existing in Poland in legal regulations concerning spatial management [17] and introduced in practice, should be completed with prognosis concerning the results of planning decisions and information useful for plans and programs verification. In the next step verification of prognosis should be made, with the use of updated plan assumptions. Between these elements of planning, agricultural works must be adjusted, as they are necessary for smooth transformation from one functions to another, minimizing economic and social loss of excluding land from agricultural production. Activities solving conflict between urban and agricultural functions should be coherent with spatial management plan, mainly by underlining the protection over agricultural function of good quality soil in these plans, mutual flow of information, guidelines and conclusions.

Authors suggest 3 groups of activities concerning areas with dominant agricultural function:

Group I – activities adjusting area to the new quality of neighborhood with urban functions. Some specific activities within agricultural field and urban-project tasks: land transformations, delimitation and protection of areas valuable for agriculture, protection against erosion, technical protection against degradation, inventory and evaluation of changes in agriculture under impact of urban functions, favoring agricultural investments, agricultural counselling, ensuring adequate number of workers, etc.

Group II – activities improving improper structure of land use in direct neighborhood of the town. Some specific activities: improving soil fertility, changing structure of cultivated plants, re-cultivation and rehabilitation of degraded land, re-cultivation of land temporary excluded from production, rational spatial division, protection against uncontrolled changes of land use, regulation of demographic rates, etc.

Group III – forced or protective activities. Some specific activities: introduction of new techniques and technologies in cultivation, marking protective zones, rebuilding communication arrangements, etc.

Suggested scheme of connections and relations between prognosis, spatial management plans and agriculture activities is presented on Figure 1.

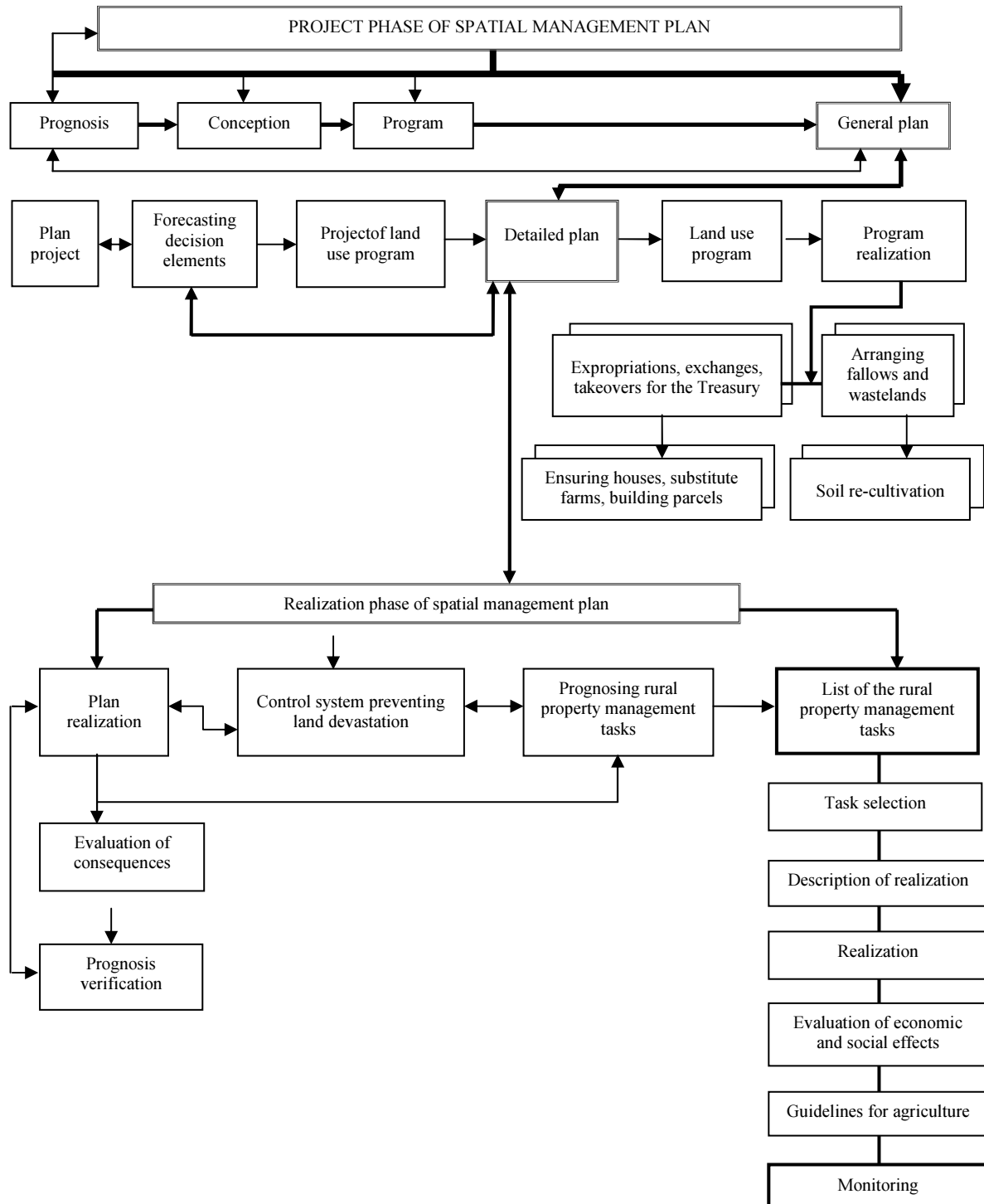


Fig. 1. Relations between prognosis, spatial management plan and rural property management tasks

Source: Own studies

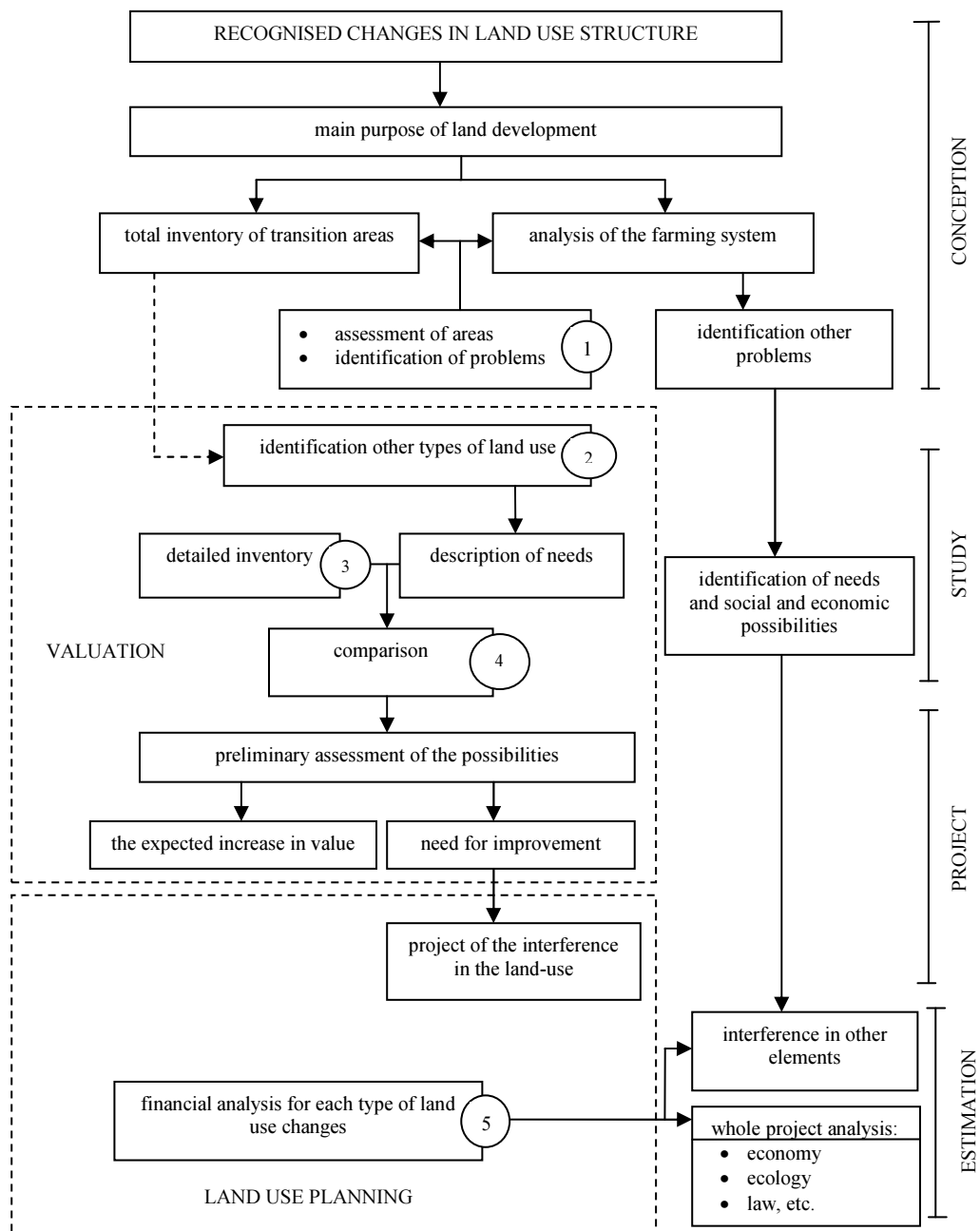


Fig. 2. The process of the kind land use selection for the fringe areas of towns

Source: Own studies

To introduce planned activities effectively, three fundamental conditions must be met:

1. Spatial development of the town and its outskirts must be treated as public interest issue.
2. Maintaining current functions of land located in the outskirts or planning them for other functions should be preceded by selection of their best use. Suggested procedure is presented in Figure 2.
3. Agricultural areas with potential for residential and infrastructural functions should be treated with special attention and be supported by protective activities plan and program for their transition (temporary) use.
4. Financial resources should be dedicated for activities protecting sustainable development of the outskirts.

## 5. Conclusions and Recommendations

1. Coordination of activities of subjects with different interests in use of land located in urban outskirts should be the priority for local authorities and other authorities responsible for regional development.
2. In elaborated program of application of activities protecting agricultural land should be completed with detailed realization terms of particular tasks, in accordance with legal regulations and necessary surveying activities, and delegation of tasks toward direct contractors. In many cases the analysis of economic and social effectiveness should be made.

3. 'Urban sprawl' and 'smart growth' should be agreed mainly by comparing the area of available land (including agricultural land) on the built-up areas and in the outskirts with the needs and possibilities for town and neighboring administration units (gmina) development. Thus, GIS possibilities should be used. The most demanded and useful information for managing urban and neighboring areas can be found mainly in the Land and Building Cadastres, the Real Estate Register, the Cadastre of Public Infrastructure and the Register of real-estate transactions. These registers should be the base for Integrated Land Information System. This kind of data, in connection with demographic and economic data, should comprehensively describe and present in graphical form the results of 'urban sprawl'.
4. Effective spatial planning requires deep economic and social knowledge on the city and neighboring areas. The most important is knowledge from following fields: law, public administration, the financial system on the local level, surveying, management of spatial information.
5. New challenges in city and its outskirts management needs modernization of educational programs for future professionals in spatial management.

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