

THE CONCEPT OF LAND USE MODEL IN LITHUANIA – THE TOOL FOR SUSTAINABLE DEVELOPMENT

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INTRODUCTION

Increase population in the world and discrepancy of interests between different groups are the most important reasons for unreasonable use of land. Namely for this reason and because of the fact that usage of land is not strictly controlled, many countries confront with various local and global problems. For example, in South America, scientists solve this continent relevant problem how to control destruction of forests in order to develop agriculture [Brando et al. 2013, Ceddia et al. 2014].

The most noticeable thing in the global context is the lack of food. Conditions of farming are different. Agricultural productivity is determined by place, soil characteristics and climate. International scientific literature emphasises that nature does not provide sufficient harvest; besides, agricultural development destroys forests, marine systems, etc. and thus has negative influence on biological variety. A suggestion to create a system, where more measurable social, economic and environmental parameters would be involved, was made and thus transformations of territorial usage would be controlled. It is necessary to seek for sufficient amount of food products, reduce poverty, seek for a healthy way of life and retain natural resources. Low or not adjusted irrigation is also considered the largest enemy of agriculture [Sayer 2013].

Considering global tendencies because of climate change and increase of population, various international strategies and agreements are made. Some Western countries emphasise the importance of an individual for development (USA), but in Europe the balance between an individual and public interests is more preferable. General plans of the largest Lithuanian cities and towns as well as surrounding territories have been studied by many researchers [Bardauskienė 2007, Dringelis et al. 2011, Kavaliauskas and Šabanovas 2011].

Scientists of various fields try to present models on how to achieve sustainable development. Many of them refer to the model “from bottom to top”, i.e. in decision making, the greatest attention is paid to population needs and requests. Other theorists are categorical as chaos and disputes occur. Currently, it is possible to state that territorial planning is carried out on request of investors. Scientific research has proved that a number of designed territories intended for residential houses in suburban territories is larger than needed [Gaudėšius 2014; Gaudėšius 2013]. Unreasonable usage of land and unconsidered conversion of agricultural land into other landed property (build-up) will not only change landscape but generate economic damage, e.g. fertile soil and melioration systems are destroyed [Aleknavičius and Gaudėšius 2011].

Of course in Lithuania are lot of problems related with land usage and some of them are the same like in other countries, so it is very important to create accurate model of land usage in Lithuania, which solve problems in national level.

The main aim of the article is to offer a solution how to resolve irrational land usage. The proposed mathematical model, which acts as a tool for the goals and objectives of the sustainable development strategy. The goals of sustainable development are known, but there is no methodology in Lithuania for achieving them in ;and usage planning process.

AIMS AND METHODS

The purpose of the research (concept) is to create (offer) sustainable land use model. The subject of this scientific work – territory of Klaipėda city and area around it.

Used methods: statistical data analysis, decision support systems methods, alternatives, synthesis and modelling (AutoCAD, GIS program). The data from National Land Service under the Ministry of Agriculture, Department of Lithuanian Statistics and State Enterprise Centre of Registers. It is important to note that this article is more overview, not an investigation.

DISCUSSION

General, special and detailed plans are documents, intended for planning of territorial development – building-up (Fig. 1). In Lithuania territorial planning is regulated by the Law on Territorial Planning. The purpose of this law is to ensure sustainable territorial development and rational urbanization, by determining requirements for system of decisions of territorial planning process as well as requirements for compatibility and interneccine effect of different level documents, and to allow consistency in natural and anthropogenic environment and urbanistic quality, by preserving valuable landscape, biological variety and values of natural and cultural heritage.

General plans of the city is very important for economic growth. For example, decisions of general plans improve land plot activity in real estate market. Depending on the purpose for which it will be used further, attractiveness of a land plot for financial investments can depend on its location, natural properties, territorial planning documents, price, etc.

The most efficient use of land plots can be determined with the help of a general plan which stipulates the measures for long-term territorial management as well as following analytical calculations. One of the calculation methods recommended for the optimization of prospective use of land plots is the multi-criteria assessment method applicable to real estate analysis.

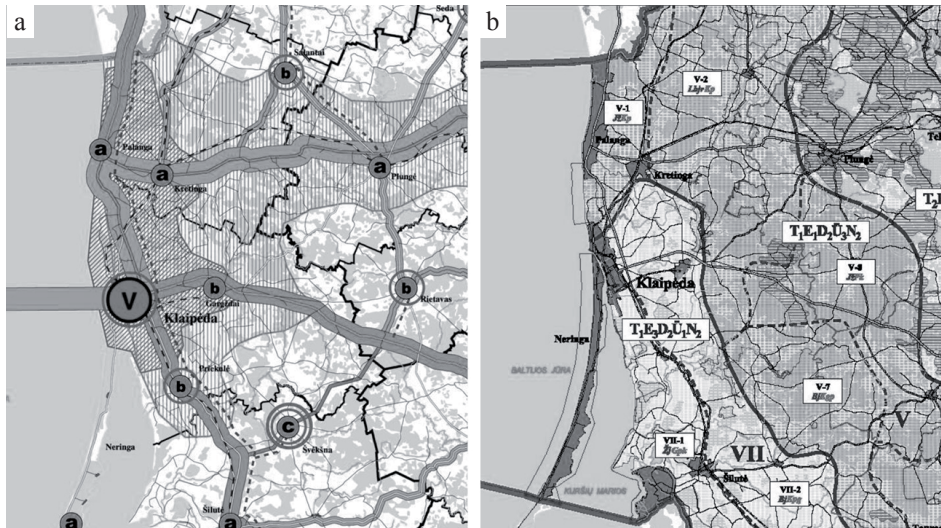


FIG. 1. The extract from the general plan of the Republic of Lithuania: a) planned agglomeration b) real urbanization

Source: [Gaudėsius 2015, 19–27].

Mistakes in documents of territorial planning and land management creating a lot of social, economic and environmental problems. So, to create a model of land usage, first of all must be identified common issues of the land usage in Lithuania:

- Fragmentation of land plots (Fig. 2),
- Unused land plots (abandoned) (Fig. 3),
- Large distances between houses and work locations,
- Chaotic urbanization (Fig. 4),
- Unformed territories which are using illegal (Fig. 4),
- Objects (shop, school, hospital etc.) in the city are located in inconvenient place.

In the scientific literature are three directions in definitions of sustainable development: social, economic and environmental. All these land usage problems create another, which are closely with sustainable development concept. If in future we use the proposed multi-criteria method, one important task of this model is indicators (Tab. 1), which are created (identified) by author, and which are related between directions of sustainable development and land usage [Sands and Podmore 2000, Alvarez-Rivero 2001, Danilishin and Veklich 2010, Tan and Fatih 2010, Wei et al. 2016, Dong and Hauschild 2017].

In land management and territory planning are using many different methods of decision support system: SAW, TOPSIS, AHP, etc [Memariani et al. 2009, Afshari et al. 2010,



FIG. 2. Newly planned residential area distribution: a) big and empty area b) empty space around the new houses.

Source: [Gaudėšius 2013, 72–80].

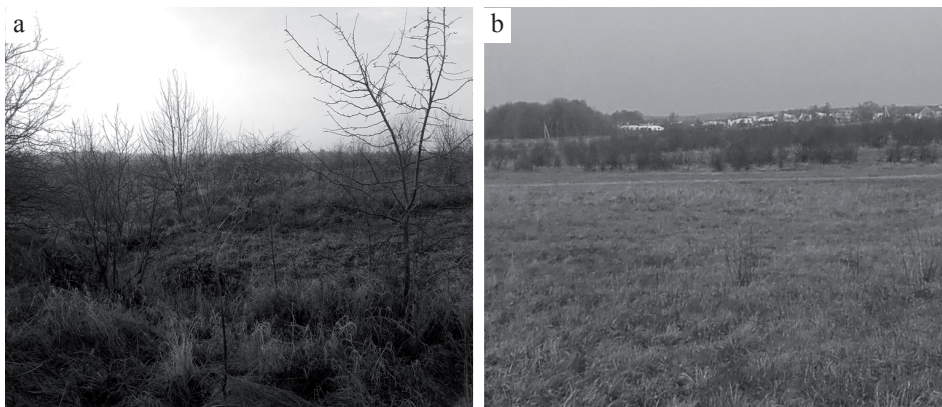


FIG. 3. Unused land plots (abandoned) in the city: a) closer, b) from distance

Source: The Author.

Anjomani et al. 2011]. Another task of model – to select the best method of decision support system, by using calculations of sensitivity analysis.

This is a very difficult task, because in calculations specialists using different criterias and their importance.

The last task of the concept (model) – how to apply it in practice. First of all, it could be a tool of state control. Specialists could using this model when cheking special or complex territorial planning document. How prepared document meets the challenges of sustainable development. The same situation could be when is preparing general plan of the city. These planning documents are very important in local, municipality and national levels (Tab. 2), because they increase economic growth. Secondly, this process should be provided by the laws of land ant territory planning.

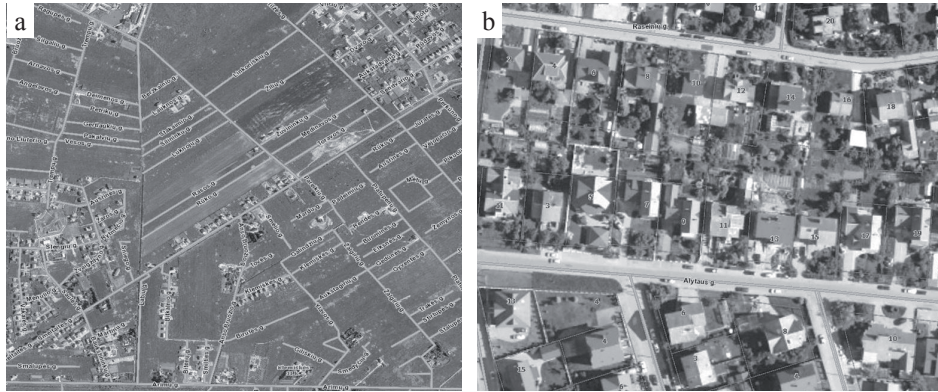


FIG. 4. Chaotic urbanization (a) and left free, unformed, but using illegal territories between land plots (b)

Source: The Author.

TABLE 1. Aims of future development in model creating.

Methods of decision support system	Indicators of sustainable development	Real use at land management and territory planning
SAW	social: location of buildings, population...	National Land Service under the Ministry
TOPSIS	economic: distance of roads, engineering networks...	local governance
AHP, etc.	environmental: soil, green areas...	land law, etc.

Source: The Author.

TABLE 2. Hierarchy of territorial planning documents in Lithuania (since 2013)

Level of document	Types of documents	
	complex territorial planning documents	special territorial planning documents
National	<ul style="list-style-type: none"> a general plan of the national territory and the general plans of the parts of the national territory (developed at the state level); municipalities (held at the municipal level) or their parts (in terms of locality level) general plans; detailed plans (in terms of locality level). 	<ul style="list-style-type: none"> land use planning schemes; forest management schemes; rural development land use planning projects; plans of protected territories; engineering infrastructure development plans; the depths of soil used plans; plans of the immovable cultural heritage protection, etc.
Municipal		
Local		

Source: The Author.

In any case it is necessary to take measures in order to strengthen the state control because of build-up of agrarian territories, considering real needs, but not plans of investors. Land management specialists must be involved (in villages) when making final decisions (by supplementing functions assigned by the National Land Service) because of build-up in appropriate localities.

CONCLUSIONS

Depopulation process in Lithuania makes to rethink land use policy, because today territorial planning is developing not by sustainability principles and not by needs of society. There are a lot of problems (social, economic and environmental) related with land usage, so it is very important to create the sustainable model of land usage in Lithuania. The continued usage of the land and land plot activity in real estate market could be determined by distances to existing objects, so planners must carefully determine the build up areas. Decisions of general plans influences not only land plot activity in real estate market, but and economic growth of city or country. Land use model should be based on Decision support system methods. These multicriteria methods are useful tool, because there could be used criterias of sustainable development. So, this model will be useful not only for land use planners (preparing general plans) but and for investors (identify the best land plot for investment). Also this model could be a tool of state control specialists, whom checking documents of territory planning.

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Summary. Urbanization process in the Republic of Lithuania has formed a strong visual, cultural and economic gap between rural and urban areas. Lithuanian villages face major social, cultural changes and economic difficulties, which result in increasing migration of people to cities and foreign countries. Everyone could self-realize only in a safe and comfortable environment. The right environment, in which persons feel safe and are able to realize their potential in activities, can be created by spatial planning. Lithuanian scientists talk much about problems in territorial planning, but no particular proposals are offered and state institutions do not take any measures in order to stop this chaotic urbanization. There are a lot of problems related with land usage, so it is very important to create the sustainable model of land usage in Lithuania

Key words: Sustainable development, land management, environmental engineering

JEL: C02, K25, O21, R14

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