Urban planning motivations and sustainable development of the territory

A. Bolshakov & I. Golovnykh
Irkutsk State Technical University, Russia

Abstract

Urban development aims to ensure a growth of the population’s welfare, on the one hand. On the other hand, it has to secure the ecological equilibrium and keep the historical and cultural “memory” of the territory. Urban activity is induced by motivations. Motivations are imprinted in corresponding territory structures called cityscape patterns. Motivations can conflict with each other, main conflicts being between: 1. economy and ecology, 2. the social and the private, 3. aesthetics and information, 4. the material and the spiritual. The conflicts are caused by contradictions concerning the landscape and its spatial design. The basis of sustainable development is the landscape. The basis of the landscape is the Earth’s crust surface and relief. The landscape features depend on the relief in the following way. The landscape ecological value depends on its biological productivity and increases from the top to the lowland. On the contrary, the ecological resistance increases from the lowland to the top. As a result, the following sustainable development criteria can be formulated for town planning.
1. In urban activities, all motivations should be realized. If at a given time the shares of the motivations realized are equal, we call such a development sustainable. 2. Proportions in the elemental landscape urbanization intensity must correspond to their values and resistance. 3. The historical and cultural landscapes should keep their uniqueness, authenticity and integrity.

Keywords: urban planning motivations, motivations conflicts and principles of their solution, elemental landscapes in sustainable development.

1 Introduction

Estate development is induced by a certain interest. Urban planning activities in a city area face multiple interest conflicts. The Town Planning Code of Russia
distinguishes a state, a public and private interest to the transformation of a territory. According to this code, sustainable development is the main goal of town planning. The problem of sustainable development in town planning is the following. On the one hand, urban development of a territory has to ensure a growth of the population’s welfare. On the other hand, it has to secure the ecological equilibrium, biological and cultural diversity, and to keep the historical and cultural “memory” of the territory. This conditions the necessity of creating the theory and methodology of urban development that would lead to sustainable development of the territory.

The point is that material interests do not coincide with the aims of the natural and cultural heritage protection. In order to explain the reasons of contradictions between the motivations and impacts of urban development on a landscape, a proper theoretical model should be worked out. It is also necessary to create a town planning methodology allowing solution of the conflicts and ensuring sustainable development of a territory.

2 Town planning motivations

Urban development is induced by the needs and values of the state, society and citizen. Human needs and values serve as motivations of an activity. As the analysis of town planning concepts and practice shows, there are seven basic motivations in town planning: 1. health, 2. wealth, 3. community, 4. beauty, 5. individualization, 6. information, 7. spirituality.

The motivation Health means providing hygienic conditions for a metabolism between the human being and his environment, and provides an environment meeting nature protection criteria. According to this motivation, natural laws of landscaping such as an ecological value and ecological stability are used as criteria to estimate land use effectiveness [1].

The motivation Wealth means providing maximum profit maximum profit to the investors of urban development. According to this motivation, the general criterion of the land use effectiveness estimation is minimum time needed cover a distance [2]. It concerns both the issues of functional effectiveness of the territory and those of profit maximization at a minimum expense.

The motivation Community means creating the conditions for a homogeneous and integral community, a common cultural idea existing in the public consciousness when the members of the society submit to a common idea of public benefit. According to this motivation, the criteria of territorial organization effectiveness are the following: the possibility to keep a public control of the standards of the community members’ behavior in land use and development; effective exchange of activities; collaboration and mutual aid [3].

Motivation Beauty means creating an aesthetic harmonic environment. Concerning the city, the idea of beauty incorporates diverse, chronologically different and heterogeneous elements of the city. According to this motivation, the criteria of territorial organization effectiveness are oriented to the uniqueness, diversity and integrity of the city space image.
The motivation Individualization is based on human values of rights and liberties. It is expressed in the society members keeping apart. It includes the idea of the sacred right of private property and private life. According to this motivation, the criteria of land use effectiveness are: possibilities of the elements isolation of the elements, breaking up the associations into smaller units, diversification and centrifugal tendencies of the territorial cells formation [4].

The motivation Information is based on overcoming chaos in cognition, in activities and the environment. It also involves information ordering. The territorial organization effectiveness criterion is optimal variety, which means that the variety of the elements should not be higher than the possibility of putting it to one order easily understandable to the inhabitants [5].

The motivation Spirituality consists in historical and cultural heritage conservation, which concerns the sources of the society self-perfection. According to this motivation, the territorial organization criteria are protection and effective use of the heritage in order to develop the spiritual life and cultural memory of the society and to integrate the spiritual heritage in the citizens’ everyday [6].

2.1 Cityscape patterns of urban planning motivations

Town planning motivations are imprinted in urban landscape patterns. Urban landscape is a special kind of anthropogenic landscape. It is a result of urban development impact on the nature basis of the territory. Urban landscape consists of three elements: the built-up area, the pavement and the green space. The density of built-up area, proportions of the open space and the built-up area and the way the open space is divided into green space and paved ones – all these are not arbitrary. These features depend on the town planning status, as well as on the functional destination and the urban development motivation of the territory.

The share of each element (building, pavement, and green space) in the total area is considered as the classification indicator [7]. For example, if the elements shares are equal, we have a built-paved-green landscape or, as we may call it, a “palace-and-park ensemble” cityscape pattern. If the built-up area is larger, than the area of pavement and green space, such a cityscape pattern is typical for the dense housing blocks. If the pavement plays the leading part in the spatial organization, it is typical of public center blocks, or big public institutions with busy squares. If the green space predominates in site, this cityscape pattern is typical of parks and city gardens. These basic elements form a city network. Besides their quantitative shares, the spatial design of the network plays an important part. If the built-up area is organized within one compact contour and the green space is formed as another compact contour, the cityscape pattern can be called as a polarized or contrast one. If the built-up area, pavement and green space are mixed as a number of small elements, the cityscape pattern can be called a mosaic one.

Town planning motivations influence the cityscape pattern in the following way. The biggest share of the built-up area implies the predominance of the motivation Wealth, as investments in building bring maximum profit compared with the investments in the other two elements. If landscape is predominantly
paved, this shows that the motivation Community oriented to the social activities exchange including public spaces for culture, trade and administrative functions, is of a primary importance. The green landscape in the city network shows that the motivation Health is predominant, with its recreational and environment-friendly functions.

The relationship of the urban planning motivations and urban landscape structure can be reflected by the following scheme. First, special human needs are defined, generalized and grouped in a special category under the title “Motivation”. Second, there is a territory with its anthropogenic and natural landscapes. Third, there are town planning tools of the territory organization which include the land use structure, zoning, layout, building, landscape and engineering facilities. Forth, a motivation sphere is defined as culture, market, ecological monitoring, etc. Fifth, there should be defined the leading criteria to estimate the effectiveness of the motivation realization. Sixth, there should be defined the leading criteria of the effectiveness of the territory organization according to the motivation. As a result, we have a territory structure considered as a cityscape pattern.

Each motivation is realized in a territory transformation tendency. The motivation Health means good conditions for metabolism between human being and nature, that is keeping the ecological equilibrium and biological diversity. For this purpose, a continuous network of the territory natural frames varying from local to regional and global is needed. The motivation Wealth means investment in the existing centers and business objects, as well as easy time-and-space accessibility of the urbanization centers. The motivation Community is realized consolidation of the territory cells in social territorial groups with a unified status and a centripetal relation to the center. The motivation Beauty is realized through an urban composition that corresponds to the uniqueness of the place, variety of the elements, and expressive emotional image criteria. The motivation Individualization is realized in cells’ detachment and differentiation tendency typical of deurbanization processes. The motivation Information is realized on the basis of an information-saving need. That is why simple, recognizable elements and ordered links between them dominate in the territory according to this motivation. The motivation Spirituality is realized through the protection of historical, cultural and architectural monuments as well as of historical landscapes from both desolation and distortion by modern buildings.

3 Motivations conflicts and the ways of their solution

The conflicts of the territory sustainable development are pairs of contradictions and the way they are solved in urban development of the landscape [8]. The Economy and Ecology conflict consists in incompatible claims laid on ecologically valuable valley landscapes, by the main functional urban frame, on the one hand, and the nature protection functions and the main ecological frame, on the other hand. The solution of the conflict is in a polarized (detached) coexistence of both kinds of the frames, the ecological frame occupying the
valley and the flood plain; the urban functional frame occupying the high river terraces and the watersheds.

The Public and Private conflict consists in the incompatible tendencies of housing landscape cells network formation. The public motivation is realized in enlargement and consolidation of the cells and in their centripetal organization. The private motivation is realized in deurbanization, in detachment and disintegration of the network. The solution of the conflict is in a flexible subcenters’ structure. On the one hand, these subcenters organize the detached cells; on the other hand, the subcenters are consolidated in a single complex system. The multilevel hierarchies of the landscape axes such as thalwegs and watersheds are the basis of the spatial design of the network.

The Information and Aesthetic conflict consists in a contrary attitude of the motivations to the diversity of the elements and to the strictness of the territory-organizing network order. The solution of the conflict is in combining of the picturesque city fabric with the ordered regular frame. It is considered as an optimal diversity principle.

Table 1: Sustainable development conflicts and the principles of their solutions.

<table>
<thead>
<tr>
<th>Type of conflict</th>
<th>Contradictions concerning:</th>
<th>Principle of conflict solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy vs. Ecology</td>
<td>Valley landscape as a natural territory frame.</td>
<td>Use of landscapes according to their ecological value and stability.</td>
</tr>
<tr>
<td>Social vs. Private</td>
<td>Homogeneity, openness and density of the city network cells; role of the centers; social value land use.</td>
<td>Diversification of the elements while keeping the integrity of the whole network through the development of the centers and subcenters system.</td>
</tr>
<tr>
<td>Aesthetics vs. Information</td>
<td>Variety, uniqueness and discreteness of the city network.</td>
<td>Optimum variety; Keeping the uniqueness while maintaining the system’s order.</td>
</tr>
<tr>
<td>Material vs. Spiritual</td>
<td>Historical and cultural heritage monuments</td>
<td>Keeping the authenticity and integrity of the heritage while modernizing the life-support system.</td>
</tr>
</tbody>
</table>

The Material and Spiritual conflict consists in a contrary attitude to cultural heritage including architectural monuments and historical landscapes. The laws of the capital growth demand the speeding up of the capital turnover including buildings and constructions. The capital growth also needs the technical progress including transport and traffic intensification. This contradicts the task of the monuments protection and the scale of the historical cityscape patterns. The solution of the conflict is investing in monuments restoration, keeping the
protection zones, integrating the modern building inside the historical protected zones, and modernizing the engineering facilities.

Reduction of the conflicts to the contradictive attitudes to the spatial design of the urban landscape and its elements results in the following table (see Table 1). Thus, sustainable development of the territory is the territory organization by means of cityscape patterns and land use regulations which allow the solution of the urban development motivations conflicts concerning the social welfare, the biological diversity and ecological equilibrium as well as the preservation of the historical and cultural heritage both for the current population and for future generations.

4 The role of elemental landscapes in sustainable development of the territory

The relief plays the leading part in landscaping of an earth surface plot. Independently of the size, the relief consists of three elements: the top, the slope, the lowland. According to the elemental landscape geochemistry theory created by B.B. Polynov 1915, the elements are characterized by three ecological regimes: eluvial (wash out), deluvial (wash away), and accumulative including alluvial (deposit). Hence it follows that the differentiation of the landscapes by their ecological value and stability depends on the landscape material movement on the relief elements. The ecological value (capability of the landscape to produce the air oxygen, water, soil and other natural environment components) increases together with the biological productiveness which depends on the height location of the relief. By the ecological stability we mean the resistance of the landscape to the anthropogenic loads such as pollution and the building load. The general natural law is that the ecological value increases from the top to the lowland. On the contrary, the ecological resistance increases from the lowland to the top. It is because the landscape’s self-cleaning capacity on the top is higher than in the lowland and the watershed indigene rocks are more reliable as a building bed than the lowland.

The analysis of the cityscape patterns in using the relief elements has shown the following.

1. The past experience and modern practice of town planning has a number of examples of intensive urban development of the flat top and watershed with a high quality of the functional, compositional and ecological solutions. At the same time, the valley and the flood plain are kept as a protected natural and recreational property.

2. The form and intensity of urban development of slopes concerning should be restricted in order to secure the slope stability. It is necessary because of the high geological dynamics of the slopes and the inconvenience of building across the slope. The slope has a good potential for exposing the city in its harmonic relations to nature. When the built-up area share becomes larger than the open space one, too intensive, the slope can lose its visual and ecological capacity.

3. The decision makers should take a high responsibility for locating cities on flood river plains and lowland with a high level of ground water. In Russia, the
annual damage caused by the flooding of settlements situated on flood river plains is 3300 millions dollars.

4. The tendency in the city waterfront districts transformation is that industrial enterprises and transit traffic are moved beyond the waterfront and instead of them, public and recreational complexes and waterfronts are created [9].

In accordance with the distribution of the ecological value and ecological resistance of elemental landscapes, the relief elements should be used in the following way. The flat watersheds within the territory of the real urban development should be used for most intensive building. The valleys and flood plains should be used as a protected natural and recreational property. Because of the big erosion process energy and high exposition value, the slope landscape should be used for limited urbanization combining open green space built-up areas.

5 Conclusion. The territory sustainable development criteria

As a result, the following criteria for sustainable development of the territory can be formulated. 1. All the above-mentioned motivation should be realized in urban planning. If on a given area at a given time, the motivations realization shares are equal, such development is considered sustainable. 2. The elemental landscape urbanization intensity ratio should correspond to the landscapes location by the relief height. The flat watershed should be used for intensive urbanization; the valley landscape should be used for recreation and nature protection; the slope should be used for limited urbanization. 3. In the course of restoration, reconstruction and reclamation, historical and cultural landscapes should keep their uniqueness, authenticity and integrity.

References

