

# Urban Planning

## URBAN PLANNING MODEL OF WATERFRONT RECREATION ZONES IN THE ALTAI MOUNTAIN REGION

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### Abstract

**Introduction:** Over the past quarter of a century, the issue of urban development within regional settlement systems has not been a priority for most policy-makers and professionals. Much more attention has been focused on the issues arising from the expansion of major metropolises: Moscow, St. Petersburg, Yekaterinburg, Kazan, and several others (seven in total). In the meanwhile, the urban development of unique natural landscapes in other regions has been progressing on its own, without major supervision or proper attention from the professional community. For instance, the pristine land along Lake Baikal has undergone urban development without proper planning documentation; vast areas in the Irkutsk Region have been sold off for logging; and the Altai Territory and the Republic of Altai are seeing intensive development of unplanned recreation hubs. **Purpose of the study:** The study is aimed to create an urban planning model for unique natural landscapes. **Methods:** We used such methods as multi-factor analysis, photographic footage, opinion poll, and graphical modeling. **Results:** Our study results in an original model that illustrates the optimal location of new recreation hubs, mindful of preserving the unique environmental qualities of the natural landscape.

### Keywords

Urban development, landscapes, recreation zones, environment, sustainable development.

### Introduction

Bearing in mind that urbanization is a cyclical process and the urban development vector might shift away from metropolises to dispersed regional settlement systems in the 21<sup>st</sup> century, there is a need for new models that would create a planning layout for major spaces and tie together the goals of preserving the local environment, on the one hand, and ensuring urban development, on the other hand (thus resolving the conflict between the environment and the economy). We recommend resolving the above by considering one of the most typical examples. The example in question is an area that lies in Siberia's southern settlement region, within the boundaries of the Republic of Altai (Chemalsky municipal district). It stretches along the river Katun, which forms a natural compositional axis. The river is the key terrain-shaping factor. Its basin is flanked by the upper peaks of the watershed mountain ranges, which have smaller rivers and streams flowing down them, feeding the Katun. This is the reason why we have decided to draw the boundaries of the target territory along the peaks of the watershed:

the eastern boundary is the top of the Iolgo ridge; the western boundary is the Seminsky ridge; the southern boundary is the Kuminsky ridge and the river Chermal; and the northern boundary is the administrative district line (Fig. 1).

The territory possesses unique natural properties that facilitate outdoor recreation, along with multiple landmarks that appeal to vacationers and wellness enthusiasts: the Tavdinskiye caves, the Kamyshlinsky waterfall, the downstream Katun rapids, the Chermal-Katunskaya dam (the oldest dam in Russia), the isle of Patmos and its monastery, the unique mountain lake Manzherok, the Che-Chkysh waterfall, the Karakol mountain lakes, rock art, and much more (17 major natural landmarks in total). The intensive development of recreational activity—from sports tourism and traveling by water and by car to educational tourism, from long relaxing getaways to short active field trips—has turned this land strip along the Katun banks into the “red line” of the Altai Mountains, attracting investments into the urban development of the valuable waterfront areas that can be used for even better recreation.

Several fairly large-scale projects have already been designed for the territory; they have involved the construction of various recreation complexes: Turquoise Katun (the left bank of the river Katun, from the Altai Territory side), an almost entirely uninterrupted chain of camping sites, vacation centers, and health resorts within close reach of the river bank, and the Altai Valley complex, located 25 km south of Gorno-Altaysk. Altai Valley was a major vacation facility that included a giant artificial lake, parallel to the Katun; its expected capacity was 94,000 people. However, this project is testimony to the disadvantages of super-dense recreational urbanization: it overloaded the surrounding natural landscape and was eventually shut down when its untreated wastewater polluted the river. With that in mind, we believe that the study's target territory is, to a certain extent, problematic, due to the dense

recreational development that overburdens the waterfront area. This is caused by the presence of massive transportation and communication axes, the Chuya and Chemal Highways, which pass along the narrow bottom of the Katun basin between the mountain ridges and create links between Novosibirsk, Barnaul, Biysk, Gorno-Altaysk (the capital of the Republic of Altai), and the local administrative center, Chemal. Easy access by transport encourages investors to pour more money into the urban development of the unique waterfront areas, which are perfect vacation spots but have a fragile ecosystem.

The key problem uncovered in this study is the contrast between the investors and developers' motivation to explore the most appealing recreation spots along the waterfront and the need to preserve the landscape for tourists and vacationers in the face

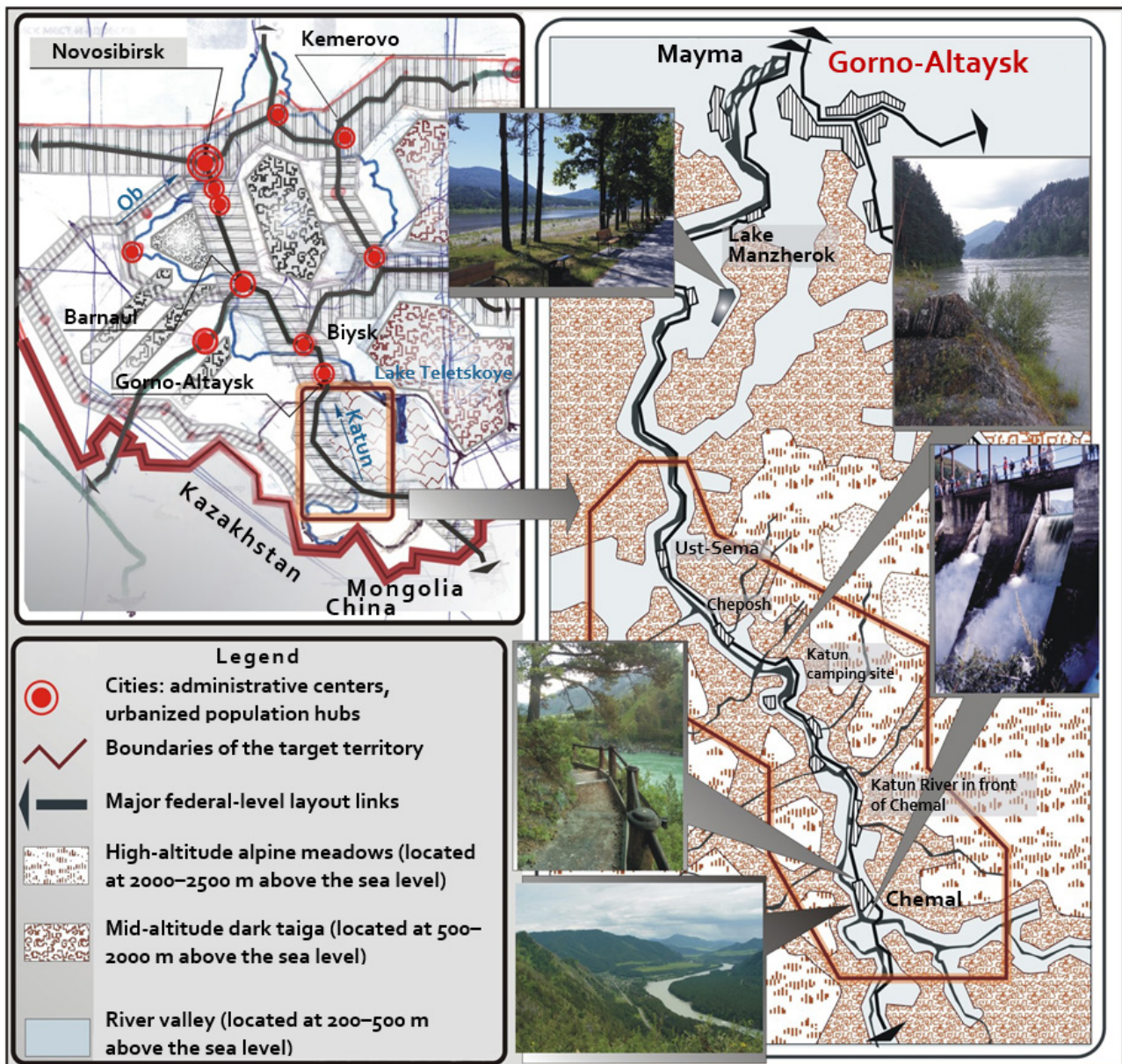


Figure 1. Location and boundaries of the target territory (all photos were taken by the authors)

of rapid degradation caused by urban development. This urban planning issue—the clash between economic feasibility and environmental integrity—is accompanied by a conflict of interest that concerns, on the one hand, investors and developers and, on the other hand, the authorities in charge of preserving the unique natural recreation areas.

Our study's **goal** is to create an urban planning model for waterfront recreation zones that would help resolve these conflicts.

We propose the following **research hypothesis**: new recreation hubs emerge in intersection points of two types of urban planning axes, transportation axes and natural axes. If we trace the transportation axes and pinpoint where they intersect with the natural axes (rivers), it will be easy to determine where new recreation hubs emerge and develop.

The **object** of our study is waterfront recreation zones.

The **subject** of our study is the architectural and urban planning layout of the aforementioned waterfront recreation zones.

**The following tasks shall be completed:**

- making a multi-factor assessment of the target territory, for the purpose of determining the prerequisites and limitations for its urban development;

- analyzing the current methodological approaches to the architectural and urban planning layout of similar recreation zones;

- creating an architectural design and urban development model of the target territory.

The **methods** selected for this study include: detailed assessment, photographic footage, opinion poll, and graphical modeling.

**Results and discussion**

After a detailed assessment of the target territory, we single out segments with high potential for building recreation complexes. The assessment includes an on-site inspection: photographic footage and mapping of the terrain features and sites discovered, as well as the collection of cadastral data (usage permits, purpose), which need to be compared with the officially approved urban planning documentation (urban planning layout of the Chemsky District) (Ministry of Economic Development of the Russian Federation, Federal State Information System on Territorial Planning, 2010). The urban planning layout includes a potential long-term recreation zone along the Katun. The transit zones and zones for short-term recreation are planned further inland, along smaller rivers (Chemal, Elekmonar, Uznezya, Kuba, and Anos). The boundary segments of the area are meant to be protected zones where recreational development is restricted.

The Chemal area is currently the most interesting part of the territory. It is 4.5 km<sup>2</sup> in size, excluding settlements within the narrow strip that is 30 km long and up to 500 m wide, stretching between the

Chemal Highway and the Katun bank line. Over the past ten years, this segment has exhibited a maximum density of various recreation and tourism facilities (Fig. 2).

Out of the several hundred development sites located between the Katun river crossing in the Ust-Sema village and the local administrative center Chemal, we have singled out 34 relatively large facilities (eco hotels, camping sites, vacation centers) that provide accommodation and services for tourists and have their own land plots. All of the facilities that we have inspected share a very specific location feature: their land plots fall within the river bank line and the water protection zone. While their official purpose, as per cadastral documents, is “for building recreation facilities” and “positioning sites (territories) intended for recreation”, all of them are situated within specially protected natural areas. The total size of all the facilities' land plots is 70.9859 ha, or 0.7 km<sup>2</sup>, which is 15% of the entire target territory (4.5 km<sup>2</sup>). We have also calculated the total capacity of all the recreation facilities, which varies between 9 (Dacha in Uznezya hotel) and 225 beds (Nika camping site). This has allowed us to determine the actual recreation load on the area: over fifteen hundred tourists within a 0.7 km<sup>2</sup> space. The total capacity is 1667 people during the peak summer season. Therefore, the peak recreation load on the waterfront area is 23 people per hectare, which exceeds the load recommended by ecologists (7 people per hectare) (Pavlova 2015) more than threefold. Furthermore, the tourist influx dynamics only keep growing. The overloaded natural landscapes along the Katun, especially given the territory's very modest size, keep losing their recreational appeal, as the Chemal destination is transforming into an uninterrupted urbanized development area, and the buildings block out access to the waterfront. This calls for an urgent solution.

The next stage of our detailed assessment is to uncover the natural and geological factors behind the emergence and development of recreation-centric urbanization hubs, including such tourism complexes as Turquoise Katun, Tursib, Manzherok, Chemal, and others. We have noted a specific feature, shared by locations where recreation facilities are packed together most densely: the largest recreation-centric urbanization hubs emerge at the confluence of the Katun with smaller mountain rivers (such as Uznezya, Elekmonar, and Chemal), where the rivers also intersect a major transportation axis, for instance, the Chemal Highway.

In 2009, one of the authors (N. V. Sergeeva) also applied the opinion poll method. The poll allowed us to make conclusions regarding the reasons why the tourist influx tends to gravitate towards territories with a specific terrain type. Visual diagrams make it possible to determine the most preferable types

of recreation and natural surroundings, depending on the tourists' income, job, and age (Pomorov and Morozova, 2009). Surveys have helped identify the frequency of visiting the Altai Mountains region (1–2 times a year). The stay duration ranges between three and seven days (67% of respondents). Notably, the visit frequency rises proportionately to the average per capita income. The most popular season for vacationing in the Altai mountains is summer. Many respondents (43%) travel with their families, but most prefer small tourist groups (57%). Interestingly, the predominant age group is young people under 29, who go vacationing with their friends. The preference for family vacations grows in older age groups. When it comes to vacation and tourism types, active recreation is the most

popular option (58%). Educational tourism comes second (20%). Most visitors prefer to spend their vacation in the woods, on the bank of a mountain stream (56%), enjoying a pristine natural landscape (mountains, woodlands, and water) in peace and quiet, with no other people nearby, and preferably far away from populated areas. Those tourists that opt for this type of vacation are vehemently opposed to living in large dormitories, preferring seasonal or year-round cottages. The third most popular option is a comfortable one- or two-story accommodation facility with few rooms.

The current layout of the vast majority of facilities that we have studied has a distinct peculiarity: it is linear, parallel with the bank line. The year-round core facility usually has two promenades branching

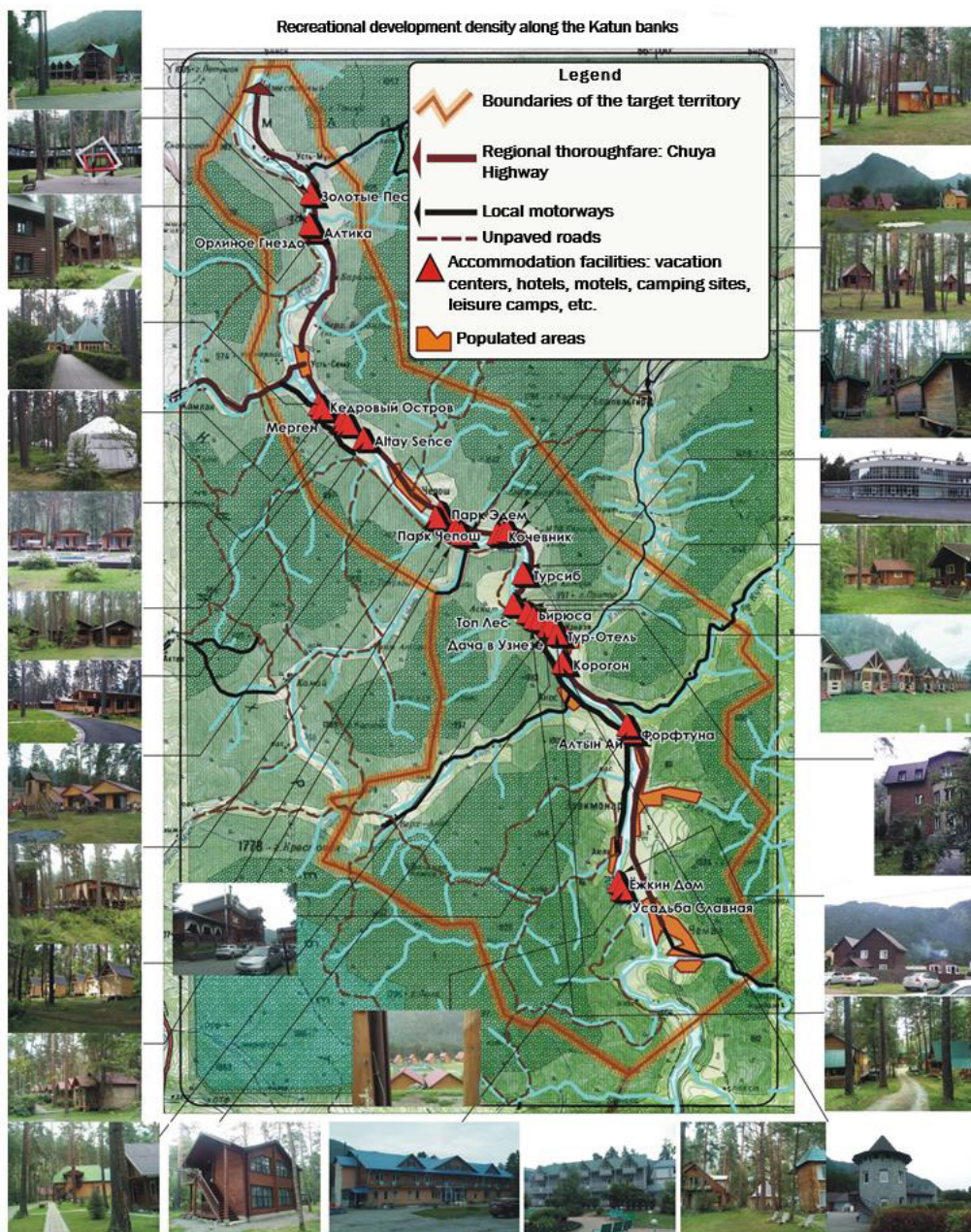


Figure 2. Development density along the Katun bank line in the Chemsksy District, Altai Mountain region (all photos were taken by the authors)

out from it in one or both directions. The promenades are lined with wooden summer cottages facing the river. We have several criticisms regarding the validity of this planning type, specifically where the intrusion into the natural landscape is concerned. There is the issue of untreated sewage spilling into the Katun, all the more urgent as all the facilities that we have discovered are located within the boundaries of a specially protected natural area.

It is quite evident that, with its current urban development experience, the Altai region has arrived at a point where a new model is necessary: an architectural and urban planning layout model for waterfront landscapes in the Altai Mountains region, including new recreation hubs (Morozova, 2012).

Having analyzed the current methodological approaches to territorial planning, we have opted for Walter Christaller's central place theory (Christaller, 1933), along with the methodological tools for urban development prediction, designed by A. V. Ryabushin (Ryabushin, 1983), and RAS member V. V. Vladimirov (Vladimirov, 1996) and Professor A. G. Bolshakov's (Bolshakov, 2003) eco method. By combining these approaches and applying them to the target territory, we managed to single out several segments that have not been explored yet but may potentially be transformed into recreation hubs:

- the left and right bank of Uznezya, a river that flows into the Katun from the east,
- the point where the Kuyum stream flows into the Katun (near the intersection with the Chermal Highway),

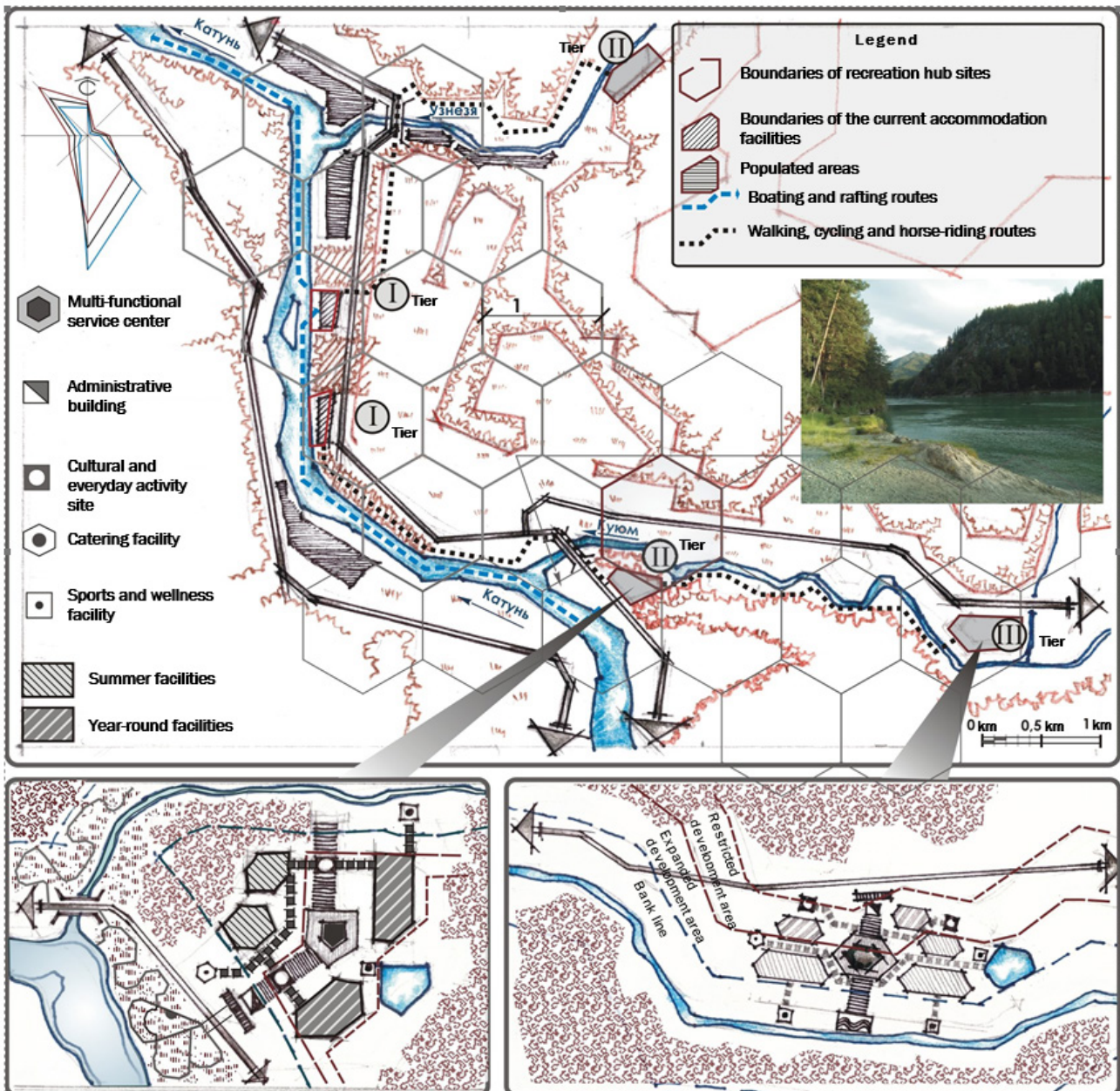


Figure 3. Architectural and urban planning layout model

- along the Verkhny Cheposh stream,
- in the direction of the Ust-Sema river (where a new bridge has been completed, in addition to the old river crossing).

These points are compliant with all the objective factors that impact the choice of recreation hub location (natural/transportation axis crossing). Our next step was to apply a layout grid, in increments of 1 km (10–12-minute walk). We managed to determine the optimal distance between the current dense recreational development areas (Korogon tourist complex, Svoya Usadba camping center), which we shall be referring to as the first service tier, and the potential sites for new recreation facilities, or the second and third service tiers.

That said, the officially approved territorial planning documents do not provide for new recreational service facilities, which is highly concerning, as it might be possible that the unique natural terrain and valuable ecosystems will continue to suffer from haphazard development. Therefore, it is vital to impose boundaries along the Katun bank line and ease the load by redirecting recreational development deeper inland, in relation to the main planning axis. A number of Soviet urban development experts suggested forming a recreational service facility network for resorts in the Baltic (V. P. Stauskas) or along the shore of Lake Baikal (Yu. B. Khromov); they considered this the most appropriate way of preserving fragile waterfront ecosystems. We shall build upon these ideas in the unique context of the Altai Mountain region, offering our own landscape and urban planning solution for the target territory. During the first planning stage—so that the development along the Katun does not merge into an uninterrupted line—we suggest splitting the development into localized sections with buffer zones in between. Such buffer zones are easy to create by planting trees (forest belts). Then we suggest prohibiting further construction along the Katun bank and instead designating development sites that would be perpendicular to the river, along smaller mountain rivers and streams (Uznezya, Kuyum, and Cheposh) that flow into the Katun. Our plan involves creating a distance of at least 100 meters between the development area and the small river bank, as recommended by Professor A. G. Bolshakov (Bolshakov, 2003), as well as positioning several small groups of recreation facilities perpendicular to the natural axis (river) rather than in parallel. Utilities are an area of special focus: sewage must not enter the water. Instead, it can be stored in underground vats until a residue condenses, and then removed by special transport.

We present our model of an urban planning layout for waterfront areas (Fig. 3).

The model is based on the principles of eco-oriented land use, developed by a number of

researchers: Von Haaren (Von Haaren et al., 2008), McHarg (McHarg, 1969), Craig W. Johnson (Johnson and Buffer, 2008), Balkenhol (Balkenhol et al., 2016). This model implies creating parallel strips along the water edge (Skryabin, 2013). The waterfront is to be followed by an expanded development zone, where it is allowed to build year-round structure groups; after that, it is suggested creating a restricted development zone with small-capacity, summer-only facilities. On the layout axis perpendicular to the bank, we could place a multi-functional service center, with pedestrian links to sports and wellness facilities and catering facilities. As the mountain river is cold and poorly suited for bathing, it would be reasonable to create a shallow artificial pool within the recreation hub (Morozova, 2012).

An important feature of the recreation hubs within our model is their tier-based arrangement (Skryabin, 2013). The first-tier hubs will combine static year-round facilities and a row of seasonal cottages and small vacation homes. The second-tier hubs will feature portable structures that will facilitate the temporary expansion of short-term accommodation facilities. The third-tier hubs will include summer housing and portable accommodation.

Each hub will have its own designated zone of influence, where guests can walk and relax. We suggest making the size of this zone proportionate to the walking distance: 0.5 km (200 ha) for the first tier, and 1 km (60 ha) for the second and third tiers. The capacity norm for the hubs themselves must be compliant with the recommended recreation load (Pavlova, 2015): 7 people per hectare. In this case, there should be no more than 140 tourists vacationing in the first tier. The second- and third-tier recreation hubs, when located in the center of their zone of influence, will have a capacity of 420 people. The larger capacity of the second- and third-tier hubs will allow for redistributing the influx of tourists, i.e. leading it away from the environmentally vulnerable banks of the Katun towards the inland slopes of the Altai mountains, which are more resistant to recreational load.

The results of this study were discussed during the 12<sup>th</sup> International Conference on the modern issues of architecture and construction, hosted by the Saint Petersburg State University of Architecture and Civil Engineering. During a follow-up discussion, we received valid feedback from experts in urban planning theory and practice: Professor A. G. Bolshakov and Professor A. G. Vaytens.

### Conclusions

Due to the development overload on the Katun bank, which has unique natural landscapes, we need to redirect the stream of recreational development towards more resistant territories. Such territories, according to Professor Bolshakov's findings, include mountain slopes. Therefore, we believe it most reasonable to continue developing the area deeper

inland, perpendicular to the Katun bank. Our layout model is based on the rational positioning of new recreational development and aims to reduce the impact of economic and investment activity on the natural terrain.

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## МОДЕЛЬ ГРАДОСТРОИТЕЛЬНОЙ ОРГАНИЗАЦИИ ПРИБРЕЖНЫХ РЕКРЕАЦИОННЫХ ЛАНДШАФТОВ ГОРНОГО АЛТАЯ

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### Аннотация

За последнюю четверть века вопросы градостроительного развития региональных систем расселения не были приоритетными в широких кругах управленцев и профессионалов, больше внимания уделялось проблемам расширения крупных городов–мегаполисов (Москва, Санкт-Петербург, Екатеринбург, Казань и несколько других, всего семь). Одновременно, градостроительное освоение уникальных природно-ландшафтных территорий в регионах являлось самостийным, малозаметным процессом, оставленным без должного внимания со стороны профессионалов. Были застроены уникальные природные ландшафты побережья Байкала без разработки градостроительной документации, проданы под вырубку леса обширные природные территории Иркутской области, интенсивное развитие не запланированных рекреационных узлов наблюдается в Алтайском Крае и в Республике Алтай. **Цель исследования:** Разработка градостроительной модели планировочной организации уникальных природных территорий. **Методы:** Многофакторной оценки, фотофиксации, метод социологического опроса, метод графического моделирования. **Результаты:** Модель, разработанная авторами, отображающая оптимальное размещение новых рекреационных узлов с точки зрения сохранения уникальных экологических качеств природного ландшафта.

### Ключевые слова

Градостроительство, ландшафты, рекреационная среда, экология, устойчивое развитие.