RARĂU MASSIVE: THE RECENT EVOLUTION OF HUMAN HABITAT AND NATURE PROTECTED AREAS

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Abstract. The nature heritage conservation system in Romania is presently going through important changes: new regulations, new responsibilities, new structures and a completely new approach. In the same time, the Romanian society has a very dynamic evolution, with more powerful interventions on economically valuable natural systems, very often regardless of its status. In this context, the present nature protected areas management imposes the permanent retrospection to the areas of anthropogenic influence. The present study follows up the recent, global structural and functional changes within the human habitat, in and close to Rarău Massive, and the relations with nature protected areas, debating the problem of presently existent and future possible negative impact, underlying some important aspects related to their management and the local development planning.

1. Preliminary aspects
1.1. Challenges for the current management of protected areas in Romania

Nature protected areas are not isolated systems or just simple “areas”, most of the times representing ecological subsystems functionally integrated and only conventionally bounded, characterized by a specific regime of land and natural resource-use. Together with their inherent fragility and their character of uniqueness, accounting for the conservation status, the structural and functional systemic interactions within the natural supra-systems integrating them determine their high degree of sensitivity to variations within the complex of factors responsible for their inherent regulation. The relation protected areas-human society, needs first to all to consider these aspects and widen its vision upon integrated, sustainable development.

On its way to consolidation, the present system designated for biodiversity and nature heritage conservation in Romania passes through fundamental changes. The recently adopted European nature protected areas policy is currently supported
by international standards, administrative structures, technical-methodological and financial instruments. Romanian recently established Natura 2000 sites network involves additional responsibilities amendable by the European superstructures. Inspired by the international vision, based on sustainability principles, the present Romanian conservation policy proposes and promotes the idea of economic valuation of protected areas, changing the restrictive fortress conservation approach through a more flexible one, opened to public participation and effective integration in the local development plans.

Protected areas are a valuable resource per se, sometimes representing an important part of communities’ local development resource pool, with a significant potential for economic capitalization and perspectives for social welfare and cultural patrimony consolidation (especially large complex protected areas as natural and national parks). The reconciliation of immediate human necessities, at community level and nature conservation involves compromises on the both sides. People’s response to restrictions and limitations related to conservation is determined by their needs related to their livelihoods, by their interest for benefits, by their educational and cultural background. In order to balance the rapport needs-limitations, protected areas management has to be correlated with the development policies. A functional and efficient conservation system needs to offer financial compensations and effective means for sustainable economical capitalization.

The current imperfections of the Romanian conservation system and society’s unpreparedness for such an approach make the relation people-protected areas transform into a resource-conflict very difficultly reconcilable, especially in the traditional communities, whose livelihoods involve local natural resource exploitation. Changing peoples’ vision and attitude towards protected areas should be supported by education and information increasing their knowledge and awareness, helping them to understand the conservation objectives and acknowledge their role. This should represent a primary interest for all the actors empowered and involved in the management process: local administrations, custodians and civil society.

The development of economic activities sustainable valuing, promoting and protecting in the same time the values of the natural and cultural patrimony primarily necessitates a coherent vision, a high capacity of intervention and partnership. Thinking of the local development process as a result of the multiple and complex interactions between different actors, operating at different levels in often opposite directions, the role of local authorities and protected areas managers is that of redirecting the human interventions and minimizing their negative effects. The often modest level of development of the rural mountain communities in Romania and week capacities of elaborating and implementing integrated medium and long term development projects, determine the risk of failure in prioritizing
and integrating conservation objectives in their development plans and emphasize the need for adopting the precautionary principle in decision making.

1.2. Natural heritage and protected areas in Rarău

The variety of lithologic and biogeographic elements of special interest for conservation, integrated in a unique landscape dominated by the exo-carstic morphology contribute to the creation of a unique nature complex with a significant landscape and scientific value, which justifies the establishment of all the types of nature reserves: botanic, forests, geologic, paleontological, complex and a scientific one (Table 1).

The area designated for conservation in Rarău totals 2044.1 ha, representing about 41.98% of the total protected area in Suceava county, and about 12.4% of the total conservation area in Rarău. The nature reserves with the largest areas (The ancient forest Slătioara, Todirescu mountain hay meadows, Bat cave and Pietrele Doamnei-Rarău) are concentrated in the central-southern part of Rarău, on the maximum altitude level (fig. 2), being included in a Natura 2000 site. The other two reserves (The Aptychus deposits in Pojorâta and Moara Dracului Gorges) are disseminated in its northern part, at lower altitudes and represent much smaller geologic and paleontological reserves.

### Table 1 - Nature reserves in Rarău Massive (Law no. 5/2000)

<table>
<thead>
<tr>
<th>Cr. nr.</th>
<th>Name</th>
<th>Area (ha)</th>
<th>Type</th>
<th>SPA</th>
<th>SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The ancient forest Slătioara</td>
<td>1064,2</td>
<td>forest (secular, virgin)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Pietrele Doamnei</td>
<td>933</td>
<td>complex (forest, geologic, botanic)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>Todirescu mountain hay meadows</td>
<td>38,1</td>
<td>botanic</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>The bat cave</td>
<td>6</td>
<td>scientific</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td>Moara Dracului Gorges</td>
<td>1,3</td>
<td>geologic</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>The Aptychus deposits in Pojorâta</td>
<td>1</td>
<td>paleontologic</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The disposal of the largest and more important reserves in a compact area, and at a higher altitude (fig. 2) represents strength for conservation. In the same time, The
ancient forest Slățioara is the greatest reserve in the county and represents 52% from the total protection area in Rarau (respectively 97.7% together with Pietrele Doamnei), fact which underlies its regional importance.

According to the IUCN classification, nature reserves in Rarau correspond to the IV category: areas for the conservation of habitats and species, through management interventions.

The existence of many natural elements of Community interest (included in the annexes of Habitats and Birds European Directives), determined the designation of: The special conservation area Rarău-Giumalău based on the existence of the most important nature reserves in Rarău and The ancient forest Giumalău. It has a double status: SPA (2157 ha) and SCI (2498 ha), the two sites being almost overlapped.

The main ecosystems of interest for conservation are: siliceous subalpine grasslands, subalpine calcareous grasslands and mountain hay meadows. The SPA considers the protection of important bird species, considered as threatened at European level: Glaucidium passerinum, Picoides tridactylus, Aegolius funereus, Tetrao urogallus, Aquila chrysaetos, whose habitat is represented mainly by the forest. The establishment of a SCI is justified by the necessity of protecting the following habitats like: alpine and boreal heaths, siliceous alpine and boreal grasslands, subalpine calcareous grasslands, hydrophilous tall herb fringe communities of the mountain level, mountain hay meadows, calcareous and calciflorous meadows of the mountainous level (Thlaspietea rotundifolii), calcareous rocky slopes with chasmophytic vegetation, Luzulo-Fagetum beech forests, alluvial forests Alnus glutinosa and Fraxinus excelsior (Alno-Ation, Alnion incanae, Salicion albae) and species-rich Nardus grasslands, the last two representing priority habitats. The conservative value of these ecosystems and habitats is also emphasized by an important number of plants (Arnica montana, Swertia perennis, Gentiana clusii, Allium sibiricum, Asplenium adulterinum, Campanula serrata, Drepanocladus vernicosus, Leontopodium alpinum, Dryas octopetala, Erysimum wittmanii) and animals (birds, large carnivores and mammals: Ursus arctos, Canis lupus, Lynx lynx, Barbastella barbastellus and species of amphibians: Bombina variegata, Triturus cristatus, Triturus montandoni) listed by the European Habitat Directive.

In the calcareous rocks of Rarău, Todireșcu peaks, Piatra Șoimului and Piatra Zimbrului have been identified a great number of fossil Daonella, Halobia, Posidonia lamellibranchiate, Stephanoceras, Soninia ammonites together with belemnites and brachinopodes (Lobothiris) (Oancea D., 1983) with an important

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The special conservation area Rarău-Giumalău

scientific value. The endo-carstic forms are represented by the Bat cave (Peștera liliecatilor), formed through down falling, which nestles important bat species (Myotis bechsteini, Myotis blythii).

Situated on the south-eastern side of Rârău, in the spruce-forest level, from 850 to 1458 m altitude, The ancient forest Slătioara represents the only vestige of the former virgin forests of Bucovina, with a high biodiversity, and complex (together with wood species like spruce, fir, and beech, there is a great variety of plants and herbs, algae, moss, lichens and fungi).

In the same time, the harmonious intertwining of beautiful nature and traditional living creates a complex with an intrinsic value and a great attractiveness for tourism.

1.3. Natural capital, social-economic valuation and areas of human influence in Rârău

The number and the density of population, the characteristics of human habitat, degree of dependence on local nature resources and their exploitation manners represent factors influencing the measure of human influence area and the intensity of anthropogenic impact. The structural characteristics and the spatial repartition of human habitat represent an expression of the manner and the degree of nature potential exploitation.

Globally, the anthropogenic ensembles situated at the limit of Rârău mountain represent rural mountain settlements with diversified economic activities (economically specialized in agro-pastoral, forestry, tourism activities, grace to the trans-Carpathian links), with a low tertia rity and a rather local then regional significance (Groza O., Muntele I.) and a real development potential.

The large valley of Moldova at the north, important natural "breach" allowing the north-trans-Carpathian circulation, the medium altitude relief, gradually increasing in gentle steps, facilitated the development of human settlements, the exploitation of natural ecosystem resources, and the progressive expansion of human habitat, inside the mountain, on the main valleys. Generally speaking, the greatest part of the mountain is covered with forest, mountain and subalpine meadows. The relatively compact forest area generally goes from 950-1000 m in the northern part (and 800-900 m in the southern and eastern part) to around 1500 m and more, at the upper most level being well represented the subalpine meadows. The meadows are used as pastures and hay meadows, and the subalpine grasslands are used mostly for seasonal pastoral cycling. Permanent inhabitation forms are going up to over 700 m altitude (Izvorul Alb valley) and around 850 m (Izvorul Giumalăului valley).

As a general fact, the northern part of the mountain is more dynamic, due to its highest accessibility, the existence of an urban centre (Câmpulung
Moldovenesc, 20,076 inhabitants) and historical factors, while the southern and the eastern part presents lower densities of population with a rural self-sufficient economy. Considering the latter ones, one of their main common characteristic is the former development (until the second half of the ‘90s) of local extractive industry. Its following regress determined the collapse of the local fragile economy, which had a strong negative demographic, social and economic impact, still visible in the present low local development rhythm.

The big number of national, local or forest roads (Fig.2), make Rarău very accessible, by all kind of means (car, ATV, motor-bike, snowmobile) both from Moldova and Bistrita river basins, most of them getting through to its upper level (around 1600 m), or going deeply inside of the mountain on the affluent valleys. Considering its natural potential, this aspect determined the development of tourism infrastructure (for accommodation and services) and consistent, increasing tourist flows.

The analysis of the spatial relation between nature reserves, human habitat and anthropogenic influence area, can take into consideration the extension of human habitat and the spatial extension of some buildings and structures of a permanent or temporary utility (hay repositories, shelters, stables, hunting huts and folds), the forest roads, which allow the exploitation of natural ecosystem and tourism resources (chalets, lodges, huts) or structures with a different utility (monasteries, meteorological stations, etc). This anthropogenic influence area in Rarău is correlated with the land-use and there could be identified some “specialized” altitudinal levels, with significant differences for the different sides of the mountain.

Thus, the permanent human habitat goes from 600-700 m to 700-850 m (less compact with higher altitudes), being continued by the grasslands and hay meadows-level, intensely exploited, fact proven by the great number and the high density of hay repositories (more often below 900 m and only rarely going up to 1200 m), together with a smaller number of structures of seasonal agro-pastoral utility: stables and shelters (related to the pasture exploitation). These are frequently going from the upper limit of human settlements to the upper limit of the structural plateau, around 1200-1450 m. The folds are situated on the upper plateaus, around 1100 and 1640 m, with a maximum frequency around 1200 and 1450 m, being concentrated especially in the central and western part of the mountain. The structures designated for tourism are situated on two levels: on the human permanent habitat level and starting from around 1100 m, with a maximum concentration at approximately 1540 m, in the subalpine meadows close to Pietrele.
2. The recent evolution of human habitat and resulting impact on protected areas

The expansion of anthropogenic influence area associated to the exploitation of natural resources within and in the close neighborhood of protected areas is one of the main direct threats for their integrity and viability. Although it refers to a wider area, its dimensions and dynamic is largely determined by the structural and functional changes within the habitat itself, having as a starting point the human necessities and means, resulting in the land and nature resource use characteristics.

The built up, less natural spaces are materialized through a structure of dynamic axes, with a specific rhythm of expansion in the affluent valleys which get into the massive (most of the times doubled by roads) and interconnected dynamic points, as, for example the one situated at the highest altitude level (where the existence of different functionality structures determine the permanent human presence).

As a general fact, the recent transformations within the human habitat are related to the increasing necessities of inhabitation space and chiefly to that of developing infrastructure for tourism.

The filed research reveals that the recent spatial evolution of human habitat has been made in three different modalities, very unequal as weight, their main causal factor being the development of tourism. Thus,

- **Outside the administrative limit of permanent settlements in 1990**, especially after 2003, there is a great number of new constructions, most of which are secondary residences, following the traditional axes (the majority of affluent valleys, especially Pojorâta, Mesteacănului, Valea Seacă, but excepting those in Slatioara river basin), up to distances of 1-1,5 km and a positive vertical deviation of 80-100 m, much more reduced in a transversal profile, valuing small fragments of terraces or gentle sloped flanks (Șandrului valley).

- **Inside the administrative limit of all the human settlements**, the evolution is done through both horizontal and vertical densification. As a consequence of these interventions (extensions of old buildings, constructions or extensions of new storeys and attics, new buildings in the same yard, on the same property, sometimes accompanied by the change of land-use destination) the pre-existent locative fund almost doubled. This is the most frequent and the most representative recent human habitat evolution form.

- **The former area of semi-permanent habitation**, with a significant density of hay repositories and shelters is characterized by a densification, slightly different
to the previous one and the growth of habitation structures, especially on the northern side or the mountain. Considerably lax through its own nature, this pre-existent network of modest, temporary habitation structures is gradually increasing its number of “cells” (their number being doubled or tripled) which are simultaneously extending their inhabitation area. Initially strictly related to the seasonal exploitation of hay meadows, these additional structures are becoming suitable for inhabitation for the entire (or almost the entire) time of the year, being sometimes (in only a few cases for the moment now) accompanied by a temporary residence. In numerous cases, such structures have a touristic function.

With a more modest socio-economic dynamic, and even with periods of demographic and occupational regress, the human small and medium size settlements in the adjacent area of Rarau, still have an important impact upon natural structures, which could soon become concerning or even clearly negative (locally), even after the abandon of environmental aggressive mining activities.

In the first two cases of human habitat evolution, the anthropogenic impact is mostly concentrated in the inner side of the human habitat, in the main valleys, affecting the natural resources existent in its immediate proximity. Its expansion rhythm is controlled by the natural environment’s favorability for living (altitude, climate, etc) and by the available fund of public utilities. The great majority of the new buildings reflect their predominantly residential and touristic functionality. In the present context of local economic reconversion, with a lower interest for the primary exploitation of natural resources, the human impact is more intense on the water, forest resources and road network.

For the last-mentioned evolution model, the human interventions and their impact have a rather scattered character. This kind of evolution creates the framework for the further extension of the human settlements, with its specific consequences upon nature.

Despite their relative character of comfort and economic efficiency, many of the recent forms of development and prosperity (farms, secondary residences, etc) don’t have the adequate equipments for the environmental quality protection (sewage network), contributing to the environmental factors degradation (by domestic water and residuum spills, the overloading of slopes with heavy constructions, air pollutants from the auto traffic, etc). These forms of impact (sometimes insidious and thus more easily disregarded) could be amplified and diversified by the amleness and the rhythm of extension of public utilities (gas, water, roads). Although the quality of access roads (with a major role for the local development, already confirmed by the above mentioned transformations), is presently low (many of them being degraded but still accessible for the car traffic), their modernization (in a close perspective) will represent an impetus for a more intensive exploitation of natural, especially tourism resources.
The immediate perspective of touristic functionality – a dominant motivation for the densification of human habitat - strengthened by the growing accessibility of the above mentioned public utilities, is normally expected to determine the diversification of the tourism infrastructure offer (ski slopes, cableways, etc), this fact being emphasized by the existent projects (the establishment of a ski slope on the northern side of Rârau, in the framework of the national program Superski in the Carpathians\textsuperscript{10}), etc.

In the same direction, a very important fact, in the perspective of a future evolution, is the extension and the densification of the built-up area in the upper part of Rârau, in the close neighborhood of Alpin Hotel and Pastorala Chalet, in the western part of Râru-Pietrele Doameni nature reserve. This represents an area of convergence for all the roads and tourist paths, with a great landscape and a very high touristic potential and attractiveness at regional level, characterized by consistent tourist flows all along the year. This determined the construction of new buildings (fig. 3) or the improvement of some old ones (and a proportional growth of the accommodation capacity). As a consequence of the gradual improvement of the tourism offer and the great accessibility, the number of tourists is quickly increasing, most of them arriving by car or other auto vehicles.

The coexistence in this space of anthropogenic attractive structures (fig.3) and one of the most important nature reserves, represent a threat for the integrity and viability of natural protected systems, emphasizing the necessity of a consensus between tourism and conservation objectives. In this perspective, financially supported by financial investments of the local migrants in the EU and some private actors from the local communities and some other counties (e.g. Botoșani – on Izvorul Giumălaului valley), the anthropogenic impact on nature reserves is normally expected to become stronger. As a consequence, the resulting areas of interference will “slide”, up inside the mountain, making the reconciliation with the present conservation objectives more and more difficult.

3. Other forms of human impact on protected areas in Rarau and management problems

The viability of protected ecosystems needs to be analyzed in a wider context, considering the implications of land use changes in neighboring areas representing parts of the same ecosystems which have direct or indirect influences on the variability of important ecologic factors. In this respect, we emphasize the need for scientific in-depth research following their evolution and the implications upon protected areas.

\textsuperscript{10} Law 418/2006, M.O. nr. 961/29.11.2006
Protected areas management also needs to consider the direct connections between the land property regime, local communities’ rhythm and the level of development, the evolution of their necessities and the resource-use. These represent factors connected to the anthropogenic impact on nature.

In this particular case, the position of nature reserves in relation with the human permanent habitat represents a relative advantage for conservation. Excepting the village Slătioara which is in the immediate neighborhood of The ancient forest Slătioara reserve, the distances (measured on the main roads) between the upper limit of human settlements and the limit of nature reserve varies between around 7.5 km (for Chiril village) and 13-14 km (for Câmpulung Moldovenesc, on Izvorul Alb road and Pojorâta). The development of intense nature resource exploitation areas at lower altitude ranges (along the main valleys and in the hay meadows and grasslands level, as presented in chapter 1.3.), the existence of a buffer area of relatively compact forests around the main nature reserves (fig.3) and its property regime (98.4% state property\(^{11}\) for The ancient forest Slătioara) represent some of the limitative factors for the direct human interventions.

The existence and the viability of a complex ecosystem as the ancient forest Slătioara is strongly related to the topoclymatic and biopedologic conditions and their variability. Hence, apparently minor modifications, even in the areas outside the reserve could have irreversible negative effects. Thus, the numerous illegal loggings (even inside the reserve) determined the extension of the strict protection regime over the former buffer area.

In the meanwhile, the human activities related to the exploitation of subalpine meadows could be considered as a threat for their general integrity and floristic composition. The mountain hay meadow, the siliceous subalpine grasslands and subalpine calcareous grasslands represent both protected ecosystems of European interest, due to their species and vulnerability and important resources for the local pastoral activities. The pronounced vulnerability of these ecosystems and the increased sensitivity to the ecologic factors’ variation (compared to the forest ecosystems), emphasizes the need for an adequate use.

The sustainable management process is hampered by the different intensity of land-use activities, related to the land property regime and the specific necessities of the local communities, which determine a spatial variability of their associated impact. In the case of Todiurescu mountain hay meadows reserve, the property rights belong to the local communities, most of the area (34 ha, representing 77% of its total area) being private property of the people living in Slătioara village, while the rest of it is state forest. A similar situation is that of

\(^{11}\) According to the management plan
Pietrele Doamnei complex reserve, where a great part of the subalpine meadows is private or communal property, the forest is communal or state property, while the adjacent area of Alpin Hotel has the status of public domain, with recreational destination belonging to Câmpulung Moldovenesc town. Inside the nature reserves, the land-use rights belong exclusively to their owners, which are members of local communities.

At a governmental and administrative level, the weak interest for the quality of mountain meadows is confirmed by the lack of updated silvo-pastoral management plans and scientific studies supporting the sustainable planning. Although the traditional pastoral activities are presently affected by a negative trend, due to their decreasing profitability, and the general regress of mountain agricultural activities, their possible future progress based on a more intensive use for the development of local traditional industry (dairy products) could have strongly negative effects on the natural ecosystems if the perspective development doesn’t take into account the conservation objectives, including monitoring.

The negative impact of the intensive grazing and the degradation of some of the pastures in Rarău have been pointed by different stakeholders (especially local NGOs), without being accompanied by scientific studies on the intensity, the spatial dimension and the consequences of this phenomenon. This is the case of Tihăria-Pietrele Doamnei-Colții Rarăului crest, most of which is part of the Pietrele Doamnei complex reserve, where, during the summer there are a lot of big folds.

The fragility of these ecosystems emphasize the need for scientific studies and precaution in decision making, even when there are no clear proofs of negative impact. The heterogeneity of the property regime and the associated land-use and management actions emphasize the necessity for a coherent, unitary approach of the sustainable use, for the integration of conservation and valuation objectives. In the same time, the conservation problems are related to the local capacity for development, and equally address local administrations, the private sector and the civil society.

Tourism represents an important alternative for the local development, its trend of progressive development being already presented. The auto traffic growth, tourists’ option for some transportation means as ATVs, motor-bikes and snowmobiles, even during winter, the associated pollution and noise, the waste abandon, the uncontrolled use of water resources by the accommodation structures, in the upper part of Rarău, close to Pietrele Doamnei, right inside the nature reserve, the growth of anthropogenic structures, are only some of the negative effects of uncontrolled human presence on nature and landscape – the main resources for tourism. The extension and the modernization of roads determine the fragmentation of natural habitat, increasing the areas exposed to the ecological limit-effect.
In the case of Slătioara commune, the ancient forest Slătioara and Todirescu mountain hay meadows cumulate 5.09% of the total communal area and even more of the village Slătioara. Although the ancient forest Slătioara is one of the oldest nature reserves in Romania (being established in 1907), being part of the community’s history and territorial identity, its management needs to be adapted to the local social and economic context. Although it represents a small community, with a modest development level, hindered by its isolation and the few economic alternatives, its development related necessities and its evolution need to be considered in a wider context. The restrictions for the natural resource exploitation in such isolated communities with few development alternatives, whose livelihoods are strongly related to nature could represent a source for resource-use conflicts and social negative impact, with further negative repercussions (illegal cutting, poaching). In this case we emphasize the need for viable economic alternatives and for cooperation between the multiple factors involved, which is the only way of controlling and anticipating the undesirable evolution.

**Conclusions**

The interpretation of field information (the results of observations, measurements, high scale GIS mapping and detailed surveys) supports the conclusion that the recent evolution of human habitat in the adjacent area of Rarau Massive and the prospective functional evolution of human settlements make the management of human-protected areas relations more complex and difficult. The difficulty level would be amplified by the presence in every season of an increasing number of population, most of it in transit, with no special affective connection with the mountain environment, with the life of local traditional communities, sometimes with an arguable civic and ethic conduct, but economically profitable.

The recent evolution of human habitat and the anthropogenic associated impact on protected areas, related to the natural resource exploitation, emphasize the necessity for an integrated approach of both development and conservation management. Only such a formal integration is not sufficient if not doubled by effective financial instruments, local partnership, a better planning and organization of tourism development, education and public awareness concerning the intrinsic value of natural heritage elements and the management objectives.

Stakeholders and planners need to consider the fact that the transformations within the human habitat and their social-economic determinative factors are less flexible to changes, less and more difficultly controllable, their dynamic is more lent, and less responsive to adjustments, which makes initial planning very important.
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