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SUSTAINABLE URBAN MICRO-REGIONS

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POSING THE PROBLEM, STRUCTURE AND METHODS

Sustainable development, like economical growth, is a systematically reappearing leitmotif in documents of national regional development planning. The undeniable conflict standing between the two aims can be, only apparently, dispelled by the concept of sustainable growth. Expenses of growth have already surpassed its proceeds, proved also by means of economics.

Towns and urbanized regions are more inclined to implement aims considering 'development' while considering 'sustainability' to be of relevance only in rural regions. The same attitude can be noticed towards protected areas, which play an undeniable role in preserving the biosphere besides providing elemental resources of living for civilians of numerous settlements. The problem caused by lack of common responsibility can be perceived not only globally, but also in national, regional and even at micro-regional level.

My research was focused on urban micro-regions as one of the target areas of regional planning projects, **looking for possibilities to implement sustainable development principles by restoring mutual and bilateral interdependence between towns and their immediate rural regions**. Through towns and their respective regions becoming a kind of self-governing units, participating in the global relation systems in the nature of units, an efficient system might unfold that can contribute to the preservation of open areas, reduce the need for transportation and evolve sustainable consumer habits in Hungary - in line with the principles of Rio.

During my research **I explored a set of criteria,** which an urban micro-region as an ecological, economic and social unit, as far as providing an **optimal framework for implementing the sustainable development principles of Rio**, should meet. A **second system of criteria** I elaborated **supports the investigation of the resources sustainable development can be built on** in a certain urban micro-region.

In the model region (*See Fig. 1*), namely the Esztergom–Dorog Region[1], I analysed the **opportunities and limits of the evolution of an optimal regional association of settlements**. I revealed some representative elements of the resource supply that can establish sustainable development. I drew up a group of aims to be accomplished in order to activate and to increase the resource supply.

[1] Estergom-Dorog micro-region, a region of approx.100,000 inhabitants covering 600km^2 , begins directly on the western edge of the Budapest connurbation, continuing to the Slovakian border. The neighbouring Slovakian micro-region formed part of the historical Esztergom County before the First World War. At the moment, the model region consists officially of two seperate micro-regions, one with Esztergom, the other with Dorog as its centre, both looking for seperate scenarios for the future. For the last two hundred years Dorog with some neighboring villages had been serving as one of the most important brown-coal supplier of Hungary, up to the political and economic changes of the 90s. The region plays traditionally a leading role in chemical and building industry, and, since a decade in the auto-branch as well.

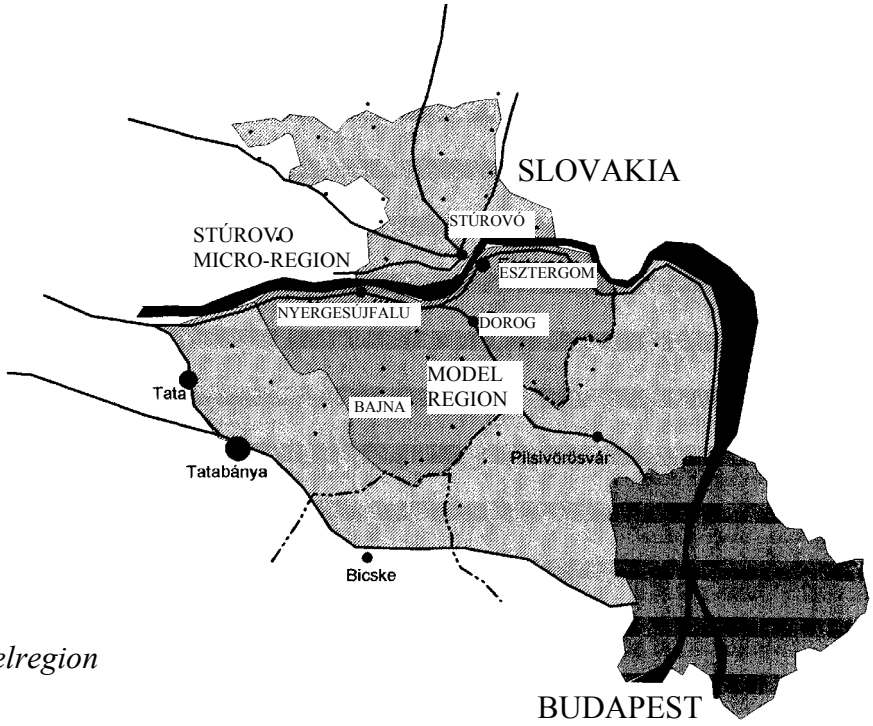


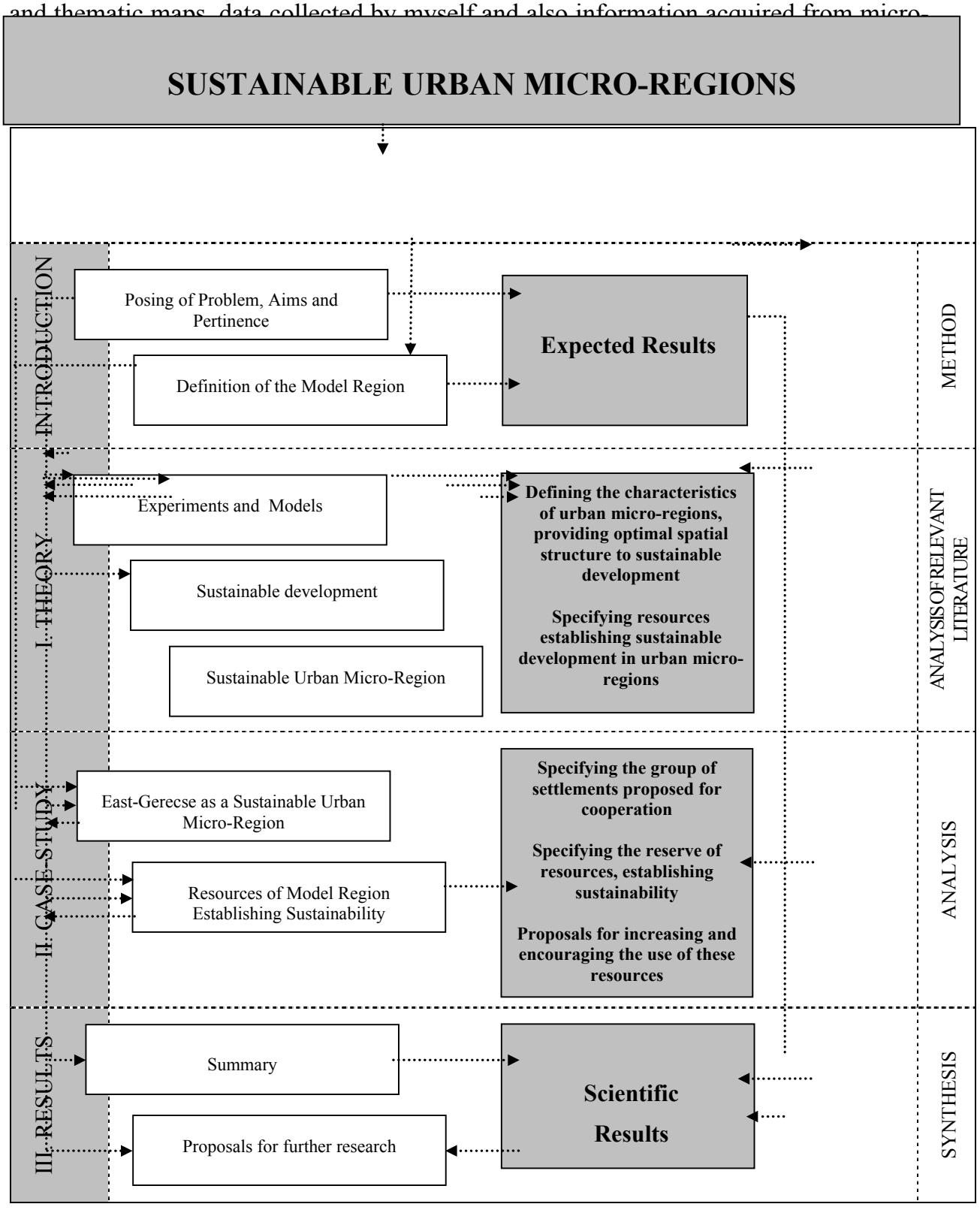
Figure 1: The modelregion

Contrary to indicator systems measuring the results achieved in the sustainable development process, I put the emphasis not on results, but **possibilities**, although, in many cases, the two cannot be separated since results are considered to be resources in the following phase of development. Therefore, in my thesis, I wished to answer the following questions:

1. What are the optimal characteristics of an urban micro-region, as an ecological, social and economic unit, in terms of sustainable development?
2. What resources are available in urban micro-regions for establishing sustainable development?
3. Which settlements of the model region should theoretically form an economic, social and ecological unit in order to achieve the most advantageous conditions for realizing the principles of sustainable development
4. What resources of sustainable development are available in the model region? How can their use be encouraged and how can the supply be increased?

The principal result of the research is a planning aid that can contribute to the implementation of Rio principles of sustainability in development and physical plans of urban micro-regions. This aid **along with my statements** provide scientific base for elaborating Local Agenda 21 Action Programmes of urban micro-regions, expectedly come as early as possible to pass, and for increasing the harmony among development programmes and principles of sustainability in general.

The thesis consists of a theoretical part (Part I), a case study (Part II) and a part summarizing the results (Part III). Its structure and also the context among the individual parts and chapters are shown in Figure 2. The theoretical part was made on the basis of research of the current relevant literature. For completing the case study I used site analysis and plans, databases of the region and the settlements, topographic and thematic maps, data collected by myself and also information acquired from micro-



SCIENTIFIC RESULTS

1. DEFINITION OF BASIC NOTIONS AND PRINCIPLES

Sustainable development is a process by which humanity can succeed in ensuring the quality of life for each member of present and also of future generations, within the frame set by the biosphere. Basic principles of sustainable development:

— Changes in the state of environment and the social-economical development are interrelated,

— Global and local interests are approached in an integrated fashion,

— Use and preservation of resources are considered in parallel,

— Resource management is autonomous,

— Social and economic functions form a subsystem of ecosystem.

All natural, social, spatial structural, land use and economic features, their systems and functional mechanisms of a certain region are considered to be **resources** which the local society, in a given period, finds useful for its own purpose and also uses in a way and scale suitable for their system of values, knowledge and opportunities. **Resource management** covers the qualitative and quantitative preservation, reproduction and usage of resources.

I call **resources of sustainable development** all those by which settlements and regions can become capable to join actively in the process of sustainable development. Accordingly each factor can fit in the resources group of sustainable development by which, supposing a limited use, quality of life of regional or local inhabitants can be improved while the total use of the biosphere is decreasing and approaching the ratio of global ecological performance proportioned specifically to the certain region. A method of **Ecological Footprint Calculation** can help to estimate the proportional part of global ecological performance whose practical importance and also applicability are mentioned in my work.

Quality of life – a complex system of material, mental and spiritual needs – is, in addition to the state of biosphere, one of the most important indicators by which sustainable development can be deduced. The quality of life of a human expresses the level his or her demands are satisfied at the moment of the survey. Much the same can be applied to a certain society, as a whole. Thus, quality of life fundamentally differs from standard of living, which expresses the degree of accessibility to marketed goods, as an indicator of growth-oriented economy, and its growth or reduction is proportionate with the market value of one's accumulated wealth and also one's actual income.

In compliance with the national adaptation to European Union standards, each region I called an **urban micro-region** where at least 80 % of the population lives in a settlement with a higher density than 120 person/km2. Urban micro-regions potentially provide the smallest-scale geographical and social space for rehabilitation of urban and rural relations.

Specific characteristics of Hungarian urban micro-regions are that, while differing in scale and distribution, they simultaneously have to face the typical social, environmental and economic symptoms of structural changes in the agrarian and the industrial sectors as well as those of urbanization, which can either strengthen or compensate each others' effects.

A micro-region can be regarded sustainable, if

— it is capable of avoiding or becoming less subservient to widely unpredictable interests of the global economy and systems of re-distribution by exploiting its diversity of resources and its complexity of internal connections, and of becoming an equal member of the social and economic processes of the wider region, and potentially those of the global level as well.

— it minimizes its reliance on resources lying outside its competency, the use of which would negatively impact the concerned society, and maximizes production- consumption cycle based on endogenous resources.

— it is able and also ready to undertake all the missions and duties set out by the principles of global social and environmental responsibility.

In terms of sustainable development, **optimal micro-region** can only be defined in a particular geographical space. During optimizing, I aimed at specifying a region's size and composition (number of settlements, size of population, size of area etc.) most advantageous for establishing the conditions of sustainable development. On the basis of the present conditions, interests, values and interdependent cooperation, a group of neighboring settlements can make use of their resources in the most efficient way along the principles of sustainable development for the region. An optimal utilization of space can only be established if the proposed change in present spatial division does not cause unfavorable changes within the neighboring micro-regions.

According to Agenda 21, the functioning of a sustainable region is based on the principle of **autonomous resource management**. Autonomous resource management is based, as far as possible, on independent cycles. The economic management system is based on self organisation and self regulation established by social contracts from regional, national to global level. In this system, individuals and communities, in accordance with the principles of subsidiarity and reciprocity, can make decisions about the use, preservation and development of their own resources, namely about the method of their management, at each respective level. Interpretated as such, autonomy is independent from its original political definition. Political autonomy such as the nation state can afford no guarantee for the kind of autonomy introduced in Agenda 21. **Horizontal and network-like relation systems must take priority**, as opposed to vertical systems, to provide the basic conditions for autonomous resource management.

2. ELABORATION OF PLANNING AIDS

Based on my research and analysis, I developed **a planning aid consisting of two closely connected and supplementary systems of criteria**. The purpose of the detailed planning aid is to enable the principles of sustainable development to be applied in regional development and physical planning. The indicator systems measuring sustainable development serve a similar purpose, but while the indicator systems are designed for measuring achieved results, my system **focuses on possibilities**. My research was **concentrated exclusively on urban micro-regions** and therefore my results can only strictly be applied to regions corresponding to the criteria of the urban micro-region.

The **first system of criteria** *(See Appendix, Table 1.*), through the revision of present boundaries of statistical micro-regions, is **adequate for the defining social-ecological-economic units** offering the best conditions for sustainable development in a specific geographical space. Nowadays, with at a national level there being a trend towards administrative institutionalization of regions along with the micro-regions they are composed of, and development financing being directed to the regions themselves, the definition of what actually qualifies as a micro-region is notoriously surrounded by uncertainty; my system of criteria can satisfy pertinent needs.

The **flexibility built into the system** is not only a sign of the limits of objectivity but also an indispensable condition for developing the most favorable micro-regional formations suitable for all the neighboring micro-regions too.

The **second system of criteria** (*See Appendix, Table 2.a, b, and c*) can provide an **aid to reveal the complex resource supply of an urban micro-region**. In the interest of clarity and simplicity, I organised the criteria to a system of three levels to ensure the possibility of surveying step by step, depending on financial conditions. Classification is needed since the analysis requires close cooperation between a range of experts skilled in social, economic, technical, landscape and geographical sciences.

The exploration of resources of a certain region calls for an enormous amount of work, but preliminary filtering, as illustrated in the case study presented in the thesis, can reveal the most important, endangered, or potential resources. Knowledge of the resources establishing sustainable development is not synonymous with immediately profiting from them, but rather provides **a base upon which we can decide what to preserve and cultivate for future generations, what possibilities to leave open and what can be lost by prioritizing short-term interests**.

The case study has proved the applicability of the elaborated planning aid and, at the same time, it reveals which limits and difficulties might be faced during its application.

3. DETERMINATION OF SOME BASIC ATTRIBUTES OF URBAN MICRO-REGIONS REGARDED AS OPTIMAL IN TERMS OF SUSTAINABILITY

3.1. Reciprocal interdependence between towns and rural settlements within the region

In the **urban micro-region, utilizing a combination of the advantages of urban and rural regions** presents more favorable opportunities for autonomous resource management and also for putting sustainable development principles into practice, whether being in a rural region lacking urban or in an urban one lacking rural. **The essence of urban-rural relationship lies behind the carrying capacity relative to the population, as a reciprocal interdependence linked to complex resource use and maintenance.** The stage of development of small and medium sized towns depends significantly on the surrounding rural area's need for the services they offer, which in turn is largely determined by the rural area having an appropriate level of income that allows it to make use of these said services. The rural area's income should ideally be largely based on the services it can offer to the town or towns of its region.

3.2. Heterogenity of landscape, social and economic structure, homogeneity of values

I demonstrated that, contrary to common opinion **heterogeneous regions can provide better conditions for sustainability than homogeneous ones**. This also applies to landscape conditions, settlement systems and the composition of society and economy but not in the case of systems of value and the vested interests connected to resources. In the latter two, homogeneity provides a better base for sustainability. At the same time, the latter two are factors in determining the upper limit of the size of the micro-region.

3.3. A large density of horizontal network-like relations between small-scale settlements

In the course of optimizing regional spatial structure, importance must be attached to minimizing the demand for traffic and transportation. On the one hand it follows that we shouldn't dispose with the catchment area based concept, on the other hand **topological (dense-thinning) conditions of horizontal relation systems** must be considered on the same level of importance. An important proviso for minimizing the need for mobility is that regions gain the highest independence possible in terms of the availability of public and commercial services. Providing only a basic level of supply is insufficient, as the sustainability of such a system can only be achieved where **provision is made for choice**, a situation impossible to achieve within undersized micro-regions.

3.4. A water catchment-based institutional system of integrated water-management

The theoretical research and also the experience I gained in the model region drew my attention to **potential significance of water catchments as ecological, economic and social units**. Though the catchment-based planning pressed by the European Union concerns primary catchments expanding over more countries, during my research I came to realize that handling tertiary catchments proper for micro-regional scale as independent development and planning units would have the same importance.

Though catchments as complex self-controlled units could be considered today as an unrealistic goal**, I find the transformation of county based institutional system of today's water management into a catchment based one** and also the much higher **autonomy of regional-local water associations** indispensable in order to realize an integrated water management and also for the protection of water, one of the most endangered resources.

3.5. Spatial units shaped according to social belonging and use of space

Subjective elements are not to be neglected in the process of forming micro-regions. In spite of difficulties, these must play an important role in defining the optimal regional structure. They cover social and land use factors appearing in the **mental maps of inhabitants**, areas connected to individual use of space and habits of spatial action, landscape and ethnic homogeneity defining consciousness of relation and belonging, common historic roots and common farming traditions. On the other hand, subjective elements can alter or be altered to a certain extent, some may strengthen, and others might decline. This presents an opportunity that present regional planning tries to use to its advantage. (strengthening local and regional identity, image development).

3.6. Spatial unit consisting of „Core”[2] és „Halo”

In terms of optimising regional structure, I considered as realistic efforts based on the possibilities of an emerging **'Hard Core' of settlements capable of a wide-range and long-term cooperation in social and economic activities** and a **'Halo' of settlements around this core, with a variety of bonds.** These so-called ‘halo’ settlements are in some senses in a more difficult, in other senses an easier position at one and the same time. Easier, as in most cases they have a variety of choices. More difficult, in terms of the well-known periphery effect and problems of identity, because they are more directly implicated in their interests and in decisions and carry a more ramifying responsibility.

4. DETERMINATION OF BASIC RESOURCES OF SUSTAINABLE DEVELOPMENT

4.1. Material and immaterial factors facilitating acknowledgement of individual and community interest in sustainable development

The most important resources of a region are the **ones determining the society's expected quality of life, ultimately those in harmony with the principles of sustainable development**. Ability to self-organise, communicate, cooperate and integrate found the basis for autonomous functioning, has the same significance.

[2] My interpretation of the notion of „core” differs from the terminus technicus applied in the context of natural conservation.

Namely these two groups of factors play an important role in influencing trends of orientation of the regional society's values and interests. Implementation of Rio Action Program is inconceivable without the formation of a global consciousness of responsibility that can develop along the discovery of individual and community interests. Protection, maintenance and strengthening of these types of resources must be one of the high priority tasks of regional actors.

4.2. Material and immaterial factors maintain and increase one's ability to act individually

Efforts for improving the quality of life must be intended to satisfy 'real' human needs. The ultimate purpose for satisfying all kinds of needs must be to maintain and increase one's ability to act individually, the limits of which are the need for individual action by other members of society and also the limits which the biosphere places.

4.3. Widespread knowledge and acknowledgement of 'real human needs' and nonmaterial 'means of satisfaction' of complex synergic effects

A public consensus-based evaluation of needs and all the products, services, activities and relations assumed to bring satisfaction, would be the first step to meeting the Agenda 21 requirements concerning of quality of life. That is the only way to **diminish the chance upon encouraging 'quasi-means', disruptive, or obstructive means of satisfaction**. Both in terms of economics and ecological sustainability it is very important to encourage more efficient ways of satisfying needs with the most synergetic results.

4.4. Spatial, social and economic factors establishing a certain region's complex population carriing-capacity and capability of exploitation of its endowments

A basic, but not the only condition of autonomous resource management is the carrying capacity of a region, in terms of the population and its resource use. Using this capacity in the production-consumption cycle has the same importance, but this can only occur if all business actors are able to integrate into the regional division of labour, namely, if they **bring micro-regional natural, landscape and human resources in motion and build up a remarkable internal-oriented market beside external interests**.

4.5. Vigorous conditions enable the regional actors to enlarge radically the rate of the use of renewable energy-resources available locally or at least neighboring micro-regions

Due to the enormous quantity of energy-resources needed, one of the key factors of autonomous resource management is the radical growth in the rate of utilization of renewable energy sources. The use of renewable resources, mainly locally produced or procured from close regions, would not only reduce defencelessness towards global economy trends but would also **result in local use of local resources, with financial benefits being enjoyed within the region**, new employment opportunities, new enterprises and profitable use of agricultural land.

5. DETERMINATION OF THE OPTIMAL GEOGRAPHICAL FRAMEWORK OF MICRO-REGIONAL COOPERATION IN THE MODEL-REGION

5.1. Iraditional intra-settlement relations, settlement-clusters

That Dorog and Esztergom–Nyergesújfalu Micro-regions are divided into separate units contradicts entirely the historically formed system of relationships, characteristics of the settlement system and the division of labour, and thus, is a drawback to both micro-regions, surely in terms of realizing the principles of sustainable development. The **present virtual borders, which in reality are non-existing, are overlapped by settlement-clusters in which the villages are bound by strong functional connections, landscape homogeneity and common interests** offered by spatial positions. The recognition of these settlement-clusters and the use of their possibilities can be an important starting-point for regional development.

5.2. Minimal population to develope funkcional complexity, maximal population to maintain efficient communication mechanisms

With a population of 100 thousand and a density of 180 people / km^2 the model region meets the supposed **minimum required for a functional complex urban micro-region**. At the same time, it can be interpreted as a **maximum**, as well: in case of a larger population, the ability of direct or **more-or-less direct relations between the lowest and the highest levels of decision-making needed for the regional autonomy** to operate as required can hardly be realized.

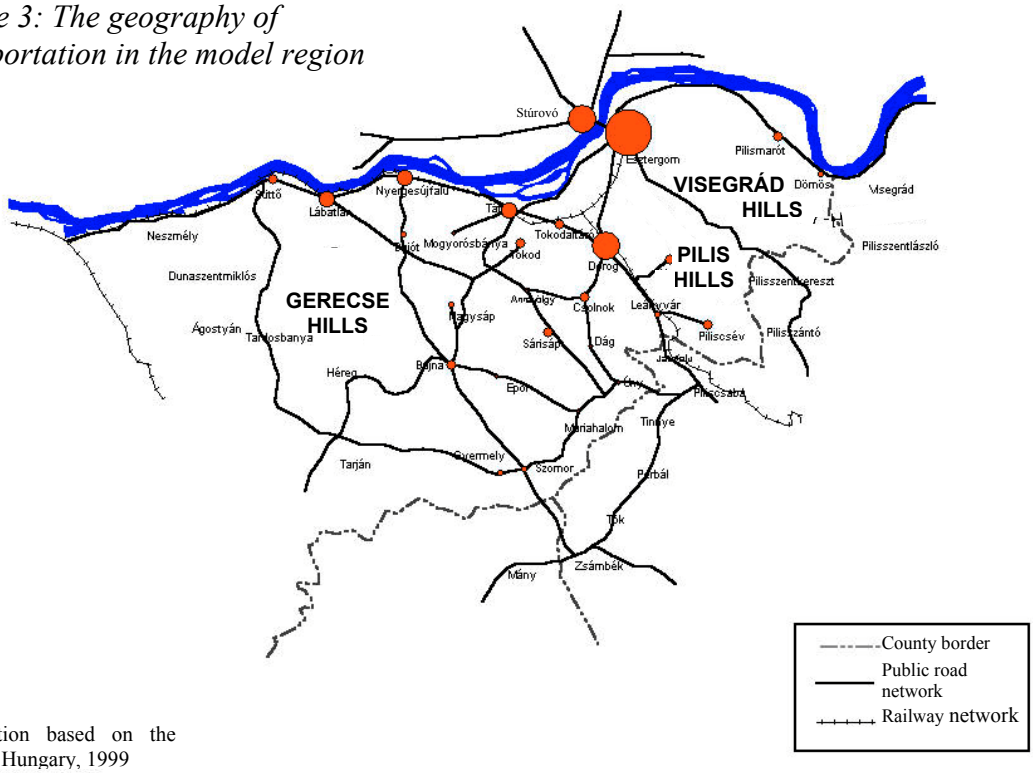
5.3. Boundaries set by physical geographical features

The Danube River to the North, the Pilis Hills to East, and the ranges of the Gerecse Hills to the West present geographical "obstacles" resulting **a relative clarity of the internal relationships of the region**, that is the transportation network, thus, in this region, it cannot be accidental that the division of statistical micro-regions is unusually well-adjusted to natural geographical borders. In the South, while there is less clear geographical definition, relatively clear connected relationships could be developed thanks to the centuries old stability of county borders (*see Figure 3*).

5.4. Complex carriing capacity due to the heterogenous landscape and spatial and economic structure

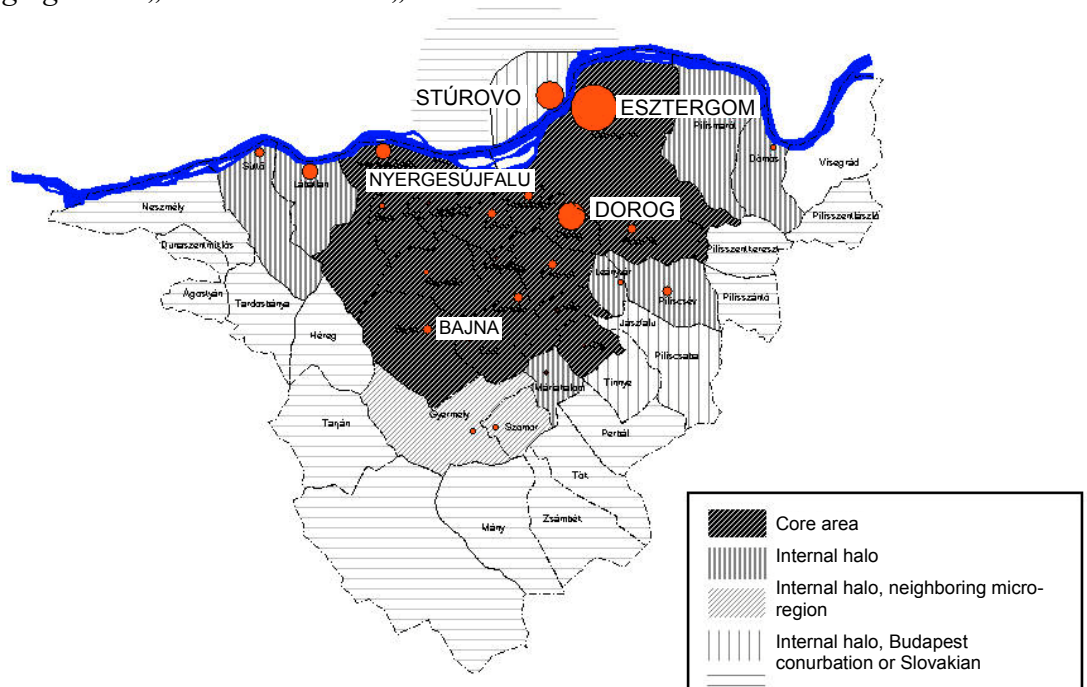
The heterogeneity that characterizes East-Gerecse Urban Micro-region in terms of landscape (junction of three geographical macro-regions), settlement system (5 well-separated types of settlement-clusters) and economy (determined presence of agriculture and a gradually upcoming tourism besides various industrial sectors of industry) can provide a highly advantageous opportunity for developing a sustainable urban micro-region with autonomous resource management.

Figure 3: The geography of transportation in the model region



Author's edition based on the Auto-Atlas of Hungary, 1999

Figure 4: Determination of the group of settlements belonging to the „Core" and to the „Halo"



Autor's edition

East and Central-Gerecse uplands occupy the bigger part of the region (15 settlements out of 24 analyzed) and with the tertiary catchment area of Únyi Creek that covers almost the same area (13 out of the previous 15 settlements, and a total of 15 from the whole model region) this could provide possibilities for organizing a "hard core" (total of 17 settlements) based on ecological factors and a shared regional consciousness. In this harcore landscape management capable of enforcing the principles of sustainability to the highest extent could be realised here. The largest part of the region's productive land can be found in the hard core (*see Figure 4*).

6. DETERMINATION OF THE FACTORS ATTENUATING THE COHESION WITHIN THE MODEL-REGION

Due to the enlargement of Budapest Agglomeration along the Route 10 towards Esztergom and to the growing attraction of developing nodes linked to suburbanization next to the model region, **a disintegration process of the present yet relatively integer region can be detected**. The expansion of Budapest Agglomeration toward the internal areas of the region (its marks can be traced already) and Tatabánya (the capital of the county, a town of 80 000 inhabitants) would entirely overturn the region's relative ecological footprint balance. The initiatives of development trans-boundary relations with the Stúrovo Micro-region (based on historical relations) might be explained as compensating the effects of the disintegration process.

Of the region’s 24 settlements, 10 lie totally outside of Esztergom's gravity and in reality, the town could offer well-accessible services meeting the criteria of sustainable regions to only its 5 neighboring settlements. For the former ten settlements Tatabánya and above all Budapest can provide better alternatives, although further away.

The ratio of the region's fertile land, the level of density of its population, the present - though diminishing- functional integrity and the strength of Esztergom's regional bounds and dependency are at a point **where possibilities still remain to maintain an ecological-social-economic unit that can connect to regional and global systems as an individual and autonomous identity**. Though unimpeded continuation of recent trends would not preclude the possibility to implement elements of sustainable development, fundamental transformation of energy management in favour of renewable resources or the improvement of quality of life by developing public transportation to a higher extent. However the one-sided external economic orientation can result in the growth of the ecological footprint deficit and also in the maintenance of relative inequality of chances and widespread subserviency to external economic actors.

7. CONCLUSIONS RELATED TO HUMAN RESOURCES OF THE MODEL-REGION

Remarkable source of the region is tThe moderate increase of the population and its unextreme spreading over the whole territory is an undeniably remarkable resource of sustainability. Beyond internal development however, future changes in the concentration of population are highly dependent on the development of Budapest Agglomeration. It is also dependent on the population-retaining ability in those regions of the country and also the neighboring countries where there is a decrease in population, which the model region has minimal influence on. The predicted growth in population can only be advantageous for the region if **it promotes more efficient use of underused areas of the urbanized nodes.**

Through researching the level of self-organization as a social resource I concluded that the **number of environmental organizations in the region is high above the national average and the organizational level of free time and sport activities, positively influencing life quality, can also be considered significant**. The high number of industrial unions indicates the far-reaching impact of labour traditions originating in the industrial past. On the other hand, the total number of non-profit organizations stays far below the national average and there is an **especially large gap in the fields of social, cultural and educational activities, even higher in the field of research**. There would be a special need for organizations providing social, cultural and educational activities, especially in peripheral areas suffering from a lack of services. There is an absence of organizations operating at micro-regional level; links and communication among them have not been developed.

Only the initial steps have been made towards institutionalizing social communication. Up to the time this research was completed there had been no serious attempts at dialogue building for solving conflicts between Dorog and Esztergom–Nyergesújfalu Micro-regions. **Providing access to information society**, building the infrastructural conditions and long distance base for electronic micro-regional communication are at an early stage, as well.

Micro-regions as regional, social and economic identities have **limited possibilities to represent and enforce their interests at a higher level**. While developments concentrate more and more on regions and micro-regions, electoral constituencies have different borders so that the ones being elected could represent not more than a couple of settlements, but not a micro-region. **Hardly to find issues appropriate to motivate today's settlements to submit their partial interests to serve micro-regional ones**.

8. CONCLUSIONS RELATED TO THE SETTLEMENT-SYSTEM OF THE MODEL-REGION

The settlement system of the model-region consists mostly of separatecompact nodes stands under pressure, especially along its eastern boundaries, next to the Budapest Conurbation. Based on present trends of economic growth, it can be supposed that Esztergom–Dorog Region would attract, in the short-term, those want to migrate from other regions, and this growth will effect rural regions close to suburban areas. As an outcome of this, the present balance of rural and urban would be upset; the settlement system characterized by discrete points would grow to a continuous urban line.

The **riverside urban zone of the Danube** is predestined for the **development of especially high level of urban lifestyle**, realization of which can be guaranteed by integral development programs and physical planning of the whole urban zone. In the interest of the ecological network and protection of open land, development should be based on a landscape physical plan of the 30-35 km-long strip of Duna Valley and the program to reconstruct water transport and **public rail transportation among the outstanding nodes of the larger region**, using the already existing railway system. Because of dangers facing fertile land, the region must do everything to promote higher intensity of use of biologically inactive or underused areas.

The most important resources of **medium-sized rural settlements with 1.5 - 3 -5 thousand inhabitants, East to Únyi Creek** (the most important water-feature of the micro-region after the Danube) are **vine-lands** and other biologically active land. Settlements close to each other and to Dorog would offer **optimal conditions for uniting urban service standards and a lifestyle close to nature**. In open land, active ways of preservation like recreation, water management, nature protection, landscape preservation or production of renewable resources must be encouraged. Dorog and the settlement-cluster should come to **consensus on sites of industrial investments**, which should be more concentrated, **close to intermodal traffic junctions or on underused, biologically inactive areas.**

Characteristics of **medium-size rural settlements West to Únyi Creek** afford opportunity for structural change in agriculture and the decentralized development of **food and wood processing**, besides ecological network development. On the other hand, exploitation of opportunities would call for an **increase in service level** and a strengthening of polycentric character and **horizontal networks of the region**. Access to information technology and a development of consciousness of regional identity would play an important role in integrating the region.

The most important resources of the **micro-settlements with 500 to 1000 inhabitants on the southeastern periphery of the region are individual initiatives**[3], which have a special significance in rural development. Political priorities are urgently needing to

[3] EcoVillage and Pensioner's House in Máriahalom, TeleHut and eco-farming in Úny, ethnic school in Dág, eco-farming in Szomor, rural tourism in Epöl.

be revised, as those concentrating on fast growth endanger long term interests. Initiatives for EcoVillage/TeleVillage Programs based on local crafts, home working and ecological farming would also play a significant role.

The basic interest of **Dömös and Pilismarót, 2 little villages sandwiched between the Visegrád Hills and the Danube River**, is to increase the capacity for local self-sufficiency especially on the field of the most important services in terms of power management, water management and quality of life. The two settlements could become one of the experimental centers of ecological landscape management by harmonizing projects of water or power management, nature protection, low impact tourism and aquatourism.

Opportunities offered by polycentric settlement system are absolutely ignored in the region. On the other hand, while (due to the historical processes) all the nodes are situated on the region's periphery, there is a **shortage on node serving the inner areas** of the region. Bajna settlement would be the most adequate for this role because of its geographical position in the traffic network, the historical role it had played in the region some hundred years ago, and also its provider function in its own settlement-cluster. Beyond expanding its function as a provider, the nodal role of Bajna could be based on the **establishment of a research-development and educational center, as suggested by the National Agri-environmental Program**[4], to promote agricultural structural change in the mezo-region.

9. CONCLUSIONS RELATED TO THE POSSIBILITIES OF DEVELOPMENT OF A CONTINUOUS ECOLOGICAL NETWORK EITHIN THE MODEL-REGION

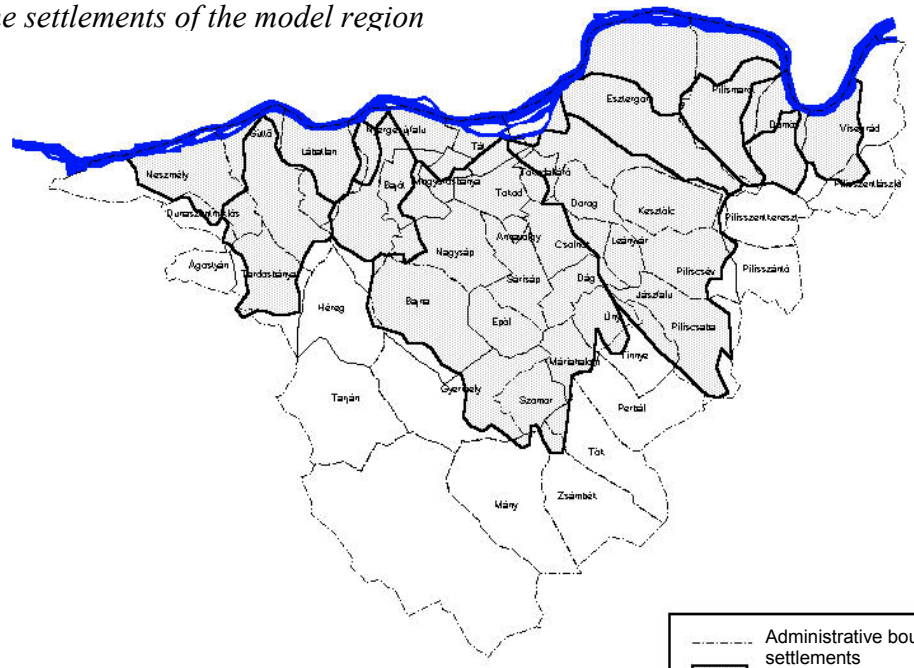
In East-Gerecse model region there **are still possibilities to develop a continuous ecological network**. Areas under protection by national laws or those proposed to become protected**, elements of surface water network, especially the Únyi Creek that extends over the larger part of the region** (*see Figure 5*), and existing or renewable biotopes ensuring the **ecological connection between the Duna Valley and the internal un-built hilly areas of the region,** that could form a base of the network.

Among open spaces ensuring ecological connection between the Duna Valley and the inner hilly parts, some can be considered specially endangered, development of which **could result in not only the physical fusion of two settlements but also of two 'micro-agglomerations**', resulting a continuous urban zone, isolating the Danube from the hills. **Environmentally sensitive drinking water aquifers** would also be protected as parts of the ecological network. The surface water network can only play its ecological role following the rehabilitation of the catchment.

[4] The National Agri-environmental Program proposed some 35 such centres all over in Hungary due to the geographical mezo-regions, but without stipulating specific settlements. My investigations has proved Bajna to be apropriate place to receive one of these centres.

After the level of karst water returns, as a result of the cessation of mining activity to the level measured in 1970, altogether 113 hectares of **barraged surface water reservoirs could be established**, as a part of the ecological network or corridors, which could also enlarge the possibilities of regional water management and also recreation. **Articulating agricultural areas by 7 to 12 % of biotopes**, as recommended by the National Agri-Environment Programme, would also help complete the ecological network.

Figure 5: Relations between water catchments and the settlements of the model region



Author's edition based on data from the Hydrological Map of Hungary 1962

10. CONCLUSIONS RELATED TO THE ANALYSIS OF THE MODEL REGION'S LAND USE SYSTEM

Starting from the ecological footprint theory, I concluded that **the model region possesses a deficit in terms of fertile land**. Concerning the increase in size of the ecological footprint due to damage derived from an **increase in traffic and transportation needs, involving the enlargement of inbuilt areas, and the growing fragmentation of biologically active areas**, it can be presumed that areas becoming inactive would prove more of a danger to the realization of sustainable development than a possible growth in population itself.

However, for it is not considerable, **can be compensated with the surplus of drinking water resource and existing and potential natural-like areas, furthermore by the activity of the hazardous waste management plant in Dorog, providing services on macro-regional scale**. By means of these compensations, adequate to the principle of sharing of common costs, the region in effect fulfils its global duty.

To avoid the increase of ecological footprint deficit, not only land important for nature protection should be preserved but also those so-called **regional supply zones**, capable of producing the basic, agricultural products requiring daily delivery on road and suited to the region's physical endowments.

The **vineyards partly belonging to one of the Hungarian historical wine regions**, have got a value beyond the provision of local needs and has been qualified worthy for conservation. Further safekeeping should be afforded **in highly urbanized zones for planting of forests fulfilling recreational and environmental protection purposes**, and other **open areas for intensive recreation**. Land-use functions improving the quality of life of urban civilians could provide an **active tool for safekeeping open lands**.

Beyond lands of special importance regarding sustainable autonomous resource-management, roughly 10-thousand hectares of land remained available, **low quality arables at the moment, however appropriate for various purposes**. Animal-feed cultivation, production of renewable resources (biological mass), cultivation of industrial crops and due to local conditions, local specialties rather than mass production, would be worthy of support.

11. CONCLUSIONS DEDUCED FROM REPRESENTATIVE INVESTIGATIONS ON THE FIELD OF THE SERVICE SECTOR, AGRICULTURE AND INDUSTRY

11.1. Availability of healthcare, social, educational, basic financial and business services [5] in the model region

The services intended to preserve and develop human resources cannot meet the sustainability criteria. Significant deficiencies occurred especially in Bajna and its surroundings and further in the southern and southeastern parts of the model region. The analysis of business services also proved that Bajna and its region have relative insufficiencies.

[5] I examined the availability of dentists, family-care, language school, banks and bok-keepers

11.2. The role of controlled ecological farming

The area of farmland qualifying as ecologically farmed reached the national average in 2001; it is even a little above this in Dorog Micro-region. However **it is far under the quantity we would minimally need to have ecological farming functioning at least in protected agricultural land and in those proposed for protection** (2044 ha, 7.5 % of the total land of agricultural use)[6]. Hence, the size of present controlled areas should be expanded approximately 10 times.

11.3. Role played by environmental industry and services

The county's environmental protection program considers Dorog as one of the important centers of environmental-technology –industry and –service sector. However it is only represented by the activity of hazardous waste management. The state of affairs concerning communal waste management, similarly to the Hungarian average, is undeniably critical, inspite of the fact that the population density and the settlement structure (potential transport distances) makes the region suitable for **an independent regional waste management system**.

Lack of progress has its roots in the **absence of education and research and also of actual experts with a suitable level of education**. There are arguments for both Dorog and for Nyergesújfalu as places of higher education. While existing environmental industry supports Dorog, Nyergesújfalu has better accessibility within the region and is far enough away from Budapest, to fulfil a role of real alternative. In both towns, such an institution with its regional gravity would play an important role as a catalyst of development. Launching of research and development and expansion of services should start from the **waste management activities** because of its roots in the region. Other high-priority fields are **the research-development and service tasks**, production and service activities related to **catchment rehabilitation and utilization of renewable resources.**

12. APPROVAL OF PRACTICAL APPROPRIATENESS OF THE RESULTS

By applying the planning aid, I defined the optimal regional framework within the model region in terms of sustainable development. I carried out representative surveys related to resources for establishing sustainable development, the organized results of which can be seen in the *Appendix, Table 3a, b and c*. Based on my research I drew up a package of proposals which could provide the basis for implementation of the conception of a sustainable urban micro-region. I stated short-term, medium-term and long-term goals. I made statements concerning the limits of the practical application of the planning aid and I gave suggestions for research projects serving to specify and deepen the results of the thesis.

[6] The EU expects 10 procent of the total agricultural land being cultiveted by controlled ecological methods in 2006.

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[7] VILLAGE, TOWN, REGION

APPENDIX

Table 1. System of criteria supporting size optimisation and determining of geographical position of sustainable urban micro-regions

CRITERIA	LOWER LIMIT	UPPER LIMIT	GEOGRAPHICAL POSITION
Physical and institutional conditions for autonomous resource-management	Diversity of accessible natural resources Management of homogeneous landscape, tertiary catchments as undivided units Appropriate conditions for a profitable institutional system operating autonomous resource-management	Appropriate size for a comprehensive, flexible resource management system and for the emergence of local characteristics	Overlapping different landscape types Avoid division of homogenous landscape and catchments
Harmony between population and regional carrying capacity	Opportunity to develop an urban supply zoneAppropriate conditions needed for a considerable diversity of economic activities	Demands of the neighbouring regions for fertile land, construction site, drinking water or other natural resources Disproportionate growth of transportation needs	Amount of accessible fertile land according to the demands of population Variety in settlement network: urban concentrations providing a promising market and a complexity of infrastructure, and also fertile and sparely inhabited rural micro-regions
Internal horizontal network based meeting non-material needs	Taking of existing network densifications in consideration Appropriate conditions for a profitable service-system Participation of larger settlements suitable for receiving institutions of mezo/macro-regional gravity.	Natural or artificial borderlines (rivers, mountains, highways etc.) forming physical obstacles Accessibility of centralized services by environmental-friendly transport, within acceptable time-duration Fair-minded sharing of significant supply centres, among micro-regions	Taking of clusters of densification and virtual borders into consideration Maintenance of existing relationships among communities Accessibility of centres and sub-centres from each settlement of the region, moderate distribution of centres and sub-centres in space
Regional autonomy: self-organization, self-regulation, implementation of the principles of subsidiarity and reciprocity	A relative entirety of life, Self-sustaining, ability of self-development, Sufficient area for local source formation Sufficient market-size	Opportunity for few levels of responsibility and decision-making, and for direct communication between the highest level of decision -making and the individual Efficient operation of communication techniques A relative homogeneity of interestsRegional bounds	Towns and villages ready for cooperation, existing or pre-existing clusters (fix cores of initiations) Taking of the existing networks of outworkers and subcontractors, co-operatives etc. into consideration Taking of the cognitive space (homogeneity of landscape, common historical and ethnographic roots and agricultural traditions), as well as spiritual and mental bounds into consideration

1. SOCIAL RESOURCES (15 factors)	
QUALITY OF LIFE	
FACTORS	**RESOURCES**
1.1. Security of existence	Basic facilities and intellectual conditions of self-sustaining Socially controllable, subservience-free services and infrastructure Menacing-free social and physical environment
1.2. Dwelling, residential environment	Availability of affordable and sustainable apartment within own place/ micro-region of living Good quality housing stock and residential environment whether technological or environmental hygienic aspects concerns Housing and residential environment types due to the large variety of social and cultural needs
1.3. Mental and physical health	Lifestyle-models sustain health and healthy environment An integrated institutional network in favour of healthy way of living, prevention of disease and healing Decentralized, problem-focused and open network of services
1.4. Knowledge, information	Regional institutional supply with comparable comprehensiveness to cities with similar population Integrity of sustainable development consciousness within the elementary and secondary education programs Acknowledgement of information systems as essential element of the basic service network
1.5. Work	Opportunity of meaningful, self-realizing, income-producing work which doesn't offend the principles of sustainable development The ethical/financial acknowledgement of informal activities which serve to ameliorate quality of life and protection of biosphere Possibility of home-work, family-friendly jobs: opportunity of part-time employment
1.6. Practise one's autonomy	Representation of each group's interests at the different levels of decision-making and responsibility, included that of the most vulnerable groups which are not able to achieve self-reliant initiations (alone) Opportunities for acquire methods and techniques of autonomy-practice in an appropriate level The configured information-channel and institution network of autonomy-practice
1.7 Identity	A society which handles tolerance and acceptance of diversity as general norms The institutional conditions of preserving individual and communal identity

ORGANIZATIONAL RESOURCES	
FACTORS	**RESOURCES**
1.8. Ability of self-organization	The appearance of global and local environmental and social interests in local/regional non-profit organizing Self-subsidized, informal networks organized for meeting needs (Local Exchange Trading Systems)
1.9. Ability of self-regulation	Appropriate institutional background of integrated autonomous environmental management
1.10. Ability of communication and cooperation	Institutionalised dialogue and cooperation between global and local actors of economy, among political actors, among societal groups, among non-governmental organizations, among cities, among rural settlements, and among all these spheres
1.11. Ability of integration	Integrity of economic and social actors arriving from outside into the local economy and society The integration capability of the region as an autonomous unit into the macro-regional and global economy and society
MENTAL, INTELLECTUAL RESOURCES	
1.12. Individual environmental and social consciousness and sense of responsibility	The knowledge and social acceptation of principles and norms of sustainable development Popularity of environment-conscious lifestyle, consumption-models and income-producing activities The social willingness to share social charges (based on the principle of subsidiarity) Propensity to support social organizations acting for the global environment and society
1.13. Professional background, Research and Development	Sustainable management secondary and higher education within the region Knowledge, transfer and utilization of regional economic traditions Operation of regional research-centres, research networks, scientific workshops
1.14. Planning	Regional and also Local Agenda 21 Action Programs of the economic, governmental and civil actors and of the towns and the rural settlements
1.15. Awareness	Running a regional monitoring-network, generating integrated economy indexes All-inclusive access of information

Table 2a. Resources of sustainable development in urban micro-regions: society

2. SPATIAL STRUCTURE AND LAND USE (11 factors)	
SPATIAL SRTUCTURE	
FACTORS	**RESOURCES**
2.1. Ecological Network	Pieces of land protected or proposed to be protected by nature conservation Spot-like and linear spatial elements appropriate to ensure the continuity of ecological network
2.2. Land Use	Forests and pieces of land preferable to be forested Water surfaces and pieces of land appropriate to transform into water-reservoirs Biologically active surfaces separating urban built-up areas Pieces of agricultural land appropriate to provide food, water, sources of energy and other raw materials satisfying basic micro-regional needs Other pieces of agricultural lands of remarkable quality
2.3. Transport and its networks	A transportation network safekeeping environmentally sensitive areas and urban built-up areas Present and future opportunities for rail and water transportation Fabric-like (rather than hierarchical) internal network, accessibility of micro-settlements among themselves Network of bicycle routes
2.4. Settlement network	Polycentric* network of settlements, consists of discrete points Harmony in scales of urban and rural clusters within the micro-region

* Proportional urban network capable to serve the whole region equally

Table 2b. Resources of sustainable development in urban micro-regions: spatial structure and land use

LAND USE: NATURE AND LANDSCAPE CONSERVATION	
FACTORS	**RESOURCES**
2.5. ESA and buffer areas, qualified cultural landscapes and areas of water-management	Institutionalised maintenance of local pieces of the European Ecological Network according to the international agreements Increasing scale of ecological farming, nature and landscape preservation aimed farming and 'low impact' tourism
LAND USE: PRODUCTION	
2,6. Areas of agriculture and forestry	Diversity and appropriateness of agricultural pieces of land 'Regional supply zone' ensuring rural self-sufficiency and the towns' supply * Articulation of agricultural land by biotopes network** Application of land use zoning system due to agricultural appropriateness Energy source production or water management on areas of low agricultural values
2.7. Areas of water production for various purposes (drinking water etc.)	Availability of the amount of water needed for the safety of micro-regional self-sufficiency Renewable resources: priority of surface water usage Land use according to safety–requirements of surface water and underground aquifers
2.8. Mines and quarries	Mines and quarries providing minerals meet the micro-regional needs Mines and quarries easily accessible by existing public roads and in the same time do not impact land significant because of agriculture, water management, tourism or nature and landscape protection activities
LAND USE: CONSUMPTION	
2.9. Urban nodes and other urbanized settlements	Compact built-up areas with a large diversity of function and a minimal need for travel Settlement segments of historical, cultural and ecological values Active green belt surrounding the cities (extensive recreation, areas of town supply zone) Continuous network of green space connected to regional biotopes network; any green spots and lines appropriate mosaics for a potential continuous green network Brown-fields, occurring interest of investors in Sites 'A'*** Unavoidable green-field developments in accordance with landscape and climatic conditions
2.10. Rural settlement clusters	Built-up fabric suitable for maintain household farming Texture of parcels, public spaces and constructions bearing landscape and historical values Constructions for housing, production, storage, trade, service, infrastructure and tourism preserving the integrity of landscape
2.11. Areas of transport and other infrastructure elements	Technical facilities providing the continuity of ecological infrastructure Rapid, safe and accessible transport of pedestrians and cyclists Technical solution providing priority for public transportation in the network Implementation of the principle of minimal soil cover

*„Regional supply zone" of an urban micro-region: production of fruits, vegetables, milk, poultry and meet, hobby-gardening, waste and waste water recycling and management (on the model of city supply zones)

** According to the National Agri-environmental Programme a min of 7-12% of biotopes per 100 hectares would be necessary for establishing sustainable landscape management

*** ABC Strategy: Site 'A' – junctions of local and long distance public transport, Site 'B'– accessible by public transport of long distance, Site 'C' – accessible by car

3. ECONOMIC RESOURCES (19 factors)	
ECONOMIC ACTORS	
FACTORS	**RESOURCES**
3.1. Global, European, national and macro-regional actors	Get implied with the local/regional economy and society* Work environment and employee rights correspond to European ones Active participating in the amendment of the populations' quality of life and the state of the environment Running an interior monitoring- and information system controlling the long lasting safety of the regional resources of sustainable development
3.2. Regional small- and medium-size firms	Operating of a producer-processor-distributor network for the gratification of regional necessities Particular highly processed products and services meet demands of external markets Work environment and employee rights correspond to European ones Running an interior monitoring- and information system controlling the long lasting safety of the regional resources of sustainable development
3.3. Governmental and municipal sphere	Exclusively supporting targets fit in the sustainable development programme of the region Running programs increasing the quality of life, and integrated employment programs of social and 'green' purposes Realizing "flagship" projects to advance achieving the sustainable region program
3.4. Non-profit organizations	Money-exertion and activities in favour of conservation and amendment of the biosphere's condition and increasing the quality of life
3.5. Employees	Employees' physical, psychological and mental capacities and their propensity to maintain and increase their capacities Level of exploiting and appreciating employee's capacities, resp. meeting the self-realising needs Position of sustainable development principles among the employees' values (e.g. choose of job)
3.6. Consumers	Demand for environment-conscious products, consumer attitude enforcing the defence of the biosphere Preferring products and services of local source (made by local manpower, few delivery demand) Repressing of the material consumption and increasing demand for services Consumer attitude enforcing equal market conditions globally
PUBLIC, COMMERCIAL AND BUSINESS SERVICES	
3.7. Human services**	Decentralized systems to assure the elementary and secondary services Cooperation between informal, non-profit, businesses and municipal sphere
3.8. Information services	Tele-hut network, integrated into the basic service network Expansion and complexity and quality of e-services and information-portals Assurance of proper use of informatics and e-services by means of locally available professionals
3.9. Delivery and transport services	Differentiated public transport system based on a network of intermodal junctions network and a bicycle infrastructure, integration of public transport on rail and/or water, as far as possible An environment-saving logistic system based on differentiated, intermodal junction network Primacy of railway and water-based transport in long-distance delivery
3.10. Business, advisory services	Network of public and small enterprise business services integrated into the basic public service Undertake the popularisation of the environment-conscious enterprise
3.11. Tourist trade services	Meeting of environmental and social carrying capacity criteria of the region Local recycling the earnings of tourism in favour of maintaining, development and exploiting the tourist trade potentials of the region

PRODUCTION AND CIRCULATION OF MATERIAL GOODS	
FACTORS	**RESOURCES**
3.12. Agriculture and forestry	Priority of meet micro-regional needsIncreasing scale of environment-friendly production-methods, ecological farming, labour-intensive activities, nature and landscape protection aimed farming, production of renewable sources of energy Meeting energy-demands of agriculture from local renewable sources Institutionalised integrity of agriculture resp. forestry and processing industry, nature- and landscape protection, tourism, local recreation
3.13. Industry	Decentralized, micro-regional network of repair- and recycle-services Prevalence of environment-aware management systems Competitiveness of activities based on local resources (raw material, energy sources, human resources) Settling whole production-processes (from the idea, through the finished product, to the recycling or disposal) within the region The presence and maturity of environment-protection industry and technology
3.14. Mining	Exhaustable stock within the limits of the principle of mining exclusively materials, impossible to replace by renewable or recycled materials Environment-aware and humane mining technologies Guarantees for recultivation or for other way of reuse corresponding to sustainability principles
3.15. Water management	Steadily exploitable water resources of surface water features and aquifers Operating of legally and institutionally established integrated water management system Institutionalised and technologically established differentiated water use, grey water recycle and water-retaining
3.16. Energy management	The renewable and unexhaustible energy potential of the region Scale exploitation of renewable/unexhaustible energy sources potential Operation of integrated, local/micro-regional energy supply systems, based on regional sources
3.17. Apartment- and building management	Size of housing stock, the part of the stock meets the regional needs and technical state requirements Legal and financing conditions preferring rehabilitation, lifetime expansion and energy- and land-saving types and methods of building Legal background of eliminating dangerous, non-reusable and non-breaking-down ingredients Legal and financing conditions encouraging soft HVAC- and sanitary technologies and building of houses safekeeping opportunity for soft technologies' building-in posteriorly
3.18. Waste management	Regional waste management developed on subsidiarity principle Institutional system of prevention and recycling, recycle-network relations among regional companies
3.19. Trade	Moderated spatial distribution of commercial network and accessibility of units Evaluating systems encouraging to meet principles and standards of global sustainability Functioning of direct producer-consumer connections, CSA systems, local and micro-regional markets Funding systems for developing enterprises encouraging to implement the principle of subsidiarity

* Local/regional import network, participation in technical trainings, R+D activity, know-how transmitting, regional market bounds, exploiting of regional raw materials and energy and human resources, settling of foreign leader stratum within the region, using local/regional services, preferring plant sites accessible by public transportation, long lasting staying in the region

** Maintenance and development of human resources: social, health, educational, training services and others to maintenance of physical-mental-spiritual conditions, to help self-realization

Table 2c. Resources of sustainable development in urban micro-regions: economy

Table 3a. Resources of sustainable development in Esztergom-Dorog Region: society

1. SOCIAL RESOURCES (2 factors)	
ORGANIZATIONAL RESOURCES	
FACTORS	**RESOURCES**
1.8. Ability of self-organization	A rate of environmental civil organizations highly exceeding the national average Amount of non-profit organizations in the field of sport and leisure activities exceeds several times the national average Number of trade union type organisations exceeds highly the national averageImmission Agreement among large companies of 5 towns (in the mezo-region)

1.10. Ability of communication	Particular initiative between participants of regional development to create a conversation: "Livable" Region Program Operation of Tele-huts in the region – one in a small and one in a large village

Table 3b. Resources of sustainable development in Esztergom-Dorog Region: spatial structure and land use

2. SPATIAL STRUCTURE AND LAND USE (4 factors)	
SPATIAL STRUCTURE	
FACTORS	**RESOURCES**
2.1. Ecological Network	Proportion of protected or potentially protected pieces of land: a ratio of 0,15 hectares/head instead of 0,09, as proposed by national documents for minimum to safekeeping biosphere Potential areas of ecological corridors: creeks and its branches especially the Únyi Creek and an opportunity of building surface water reservoir of 113 hectares Open spaces crossing the urbanized zones appropriate to develop ecological corridors between the Danube and the hills
2.2. Land Use	Existing reserves of agricultural land: 0,49 hectares per head Moderate growth of urban built-up areas because of the population stability: – 1,7 % in 10 years
2.4. Settlement network	A tripolar settlement system: Esztergom, Dorog and Nyergesújfalu as three nodes Manageable size: poles with 15-40 thousands inhabitants Favourable conditions for developing another required pole: Bajna 5 basically different settlement clusters standing guarantee for diversity: an urban zone, a cluster of medium-size settlements with suburban-like characteristics, cluster of medium-size rural settlements, small rural settlements, recreational settlements
LAND USE: PIECES OF LAND FOR PRODUCTION	
2.6. Areas of agriculture and forestry	Opportunity for development of a regional supply zone of full value – minimal demands: 0,28 ha/head, supply: 0,38 ha/head Opportunity of (partial) timber industrial self-sufficiency: 50-107 %, depending on the scale of exploitation of the theoretical potential Graze land providing a 90 % self-sufficiency of dairy products and beef , a 100 % , in case of change in cultivation branch, in both cases corresponding the principles of sustainable landscape management and supposing an extensive cattle raising – demands: 6000 ha, supply: 5342 ha Agricultural land providing theoretically total self-sufficiency of pork and poultry meat, corresponding the principles of sustainable landscape management Remaining arable lands – total area of near 9500 ha, parts are suitable for production of renewable energy sources

Table 3c. Resources of sustainable development in Esztergom-Dorog Region: economy

3. ECONOMIC RESOURCES (7 factors)	
PUBLIC, COMMERCIAL AND BUSINESS SERVICES	
FACTORS	**RESOURCES**
3.8. Human services	Non-profit organizations play important role in the fields of human services: 200-240 organizations Secondary schools exceeding national average and also British norms: 14
3.9. Information services	Presence of Tele-hut in the region – in two villages An 'Intelligent Region Program' on macro-regional level exists in planning phase
3.11. Business, advisory services	Total cover in the field of basic financial services by locally developed savings bank network
PRODUCTION AND CIRCULATION OF MATERIAL GOODS	
3.13. Agriculture and forestry	A rate of ecological farming reaching the national average: 1,7 % of agricultural land A significant amount of agricultural land: 2044 ha, the 7,9 % of total agricultural land in protected or potentially protected areas (locations with particular chances for funds financing farming technology change)
3.14. Industry	A rate of environmental industry exceeding the national average: 1.6 % of the total environmental services emerges in the model region, meanwhile only 1.1 % of the inhabitants lives here. Both data have to be understood without Budapest Industrial use of integrated methods directed to reduce industrial waste and the use of fossil energy sources (Cement Works) Recycling activities (Paper Works, Recycle of plastic waste in two industrial villages)
3.15. Water management	Existing of a valid acro-regional Catchment Management Plan with the model-region included Significant surplus in drinking water, opportunity of long term self-sufficiency Most part of the concerned tertiary catchments are fully included within the region Operation of own Water -association Possibility of building barraged reservoirs: 113 ha
3.18. Waste management	Presence of conditions for developing full autonomy: opportunity of regional management serving the 98 to 130 thousand people as minimum Presence of medium sized and large companies can potentially be activated in recycling (paper works, glass works, cement works, dangerous waste management plant)