PART 4
KEY MESSAGES: DECREASING VULNERABILITY TO NATURAL DISASTERS OF AGRICULTURAL PRODUCTION NETWORKS AND FOOD VALUE CHAINS

László Miklós uses a landscape-based approach to improve natural resource management. Landscape includes geological substratum, soils, georelief, land cover, and man-made objects that function as water vessels similar to watershed for surface water and aquifer for underground water. Disasters affect not only single resource sectors but the whole landscape system. A territorial approach is needed to secure agricultural production as a basis of all food supply chains.

Theresia Oedl-Wieser highlights the particular role of women in agricultural production networks in the mountains. While the global average of food-insecure people in developing countries is one in eight, almost half of those living in rural mountain regions are vulnerable to hunger and face poverty and malnutrition. Mountain regions are a gendered space, which means that the living conditions, resources, power relations, and perspectives for a good livelihood are unequally distributed between men and women. Women have roles as plant gatherers, home gardeners, herbalists, informal plant breeders, and seed custodians, and help to maintain the productive value of mountain environments.

Pia Kieninger and her colleagues target improving the environmental quality and combating ecological risks in Austrian landscapes. She reports on research on the way Austrian vintners evaluate national agro-environmental programmes, underlining how such programmes are needed to alter the resilience to natural disasters by stimulating a better resource management and amending the agricultural value chain. Without such programmes, positive environmental effects would not prevail.

Meinhard Breiling investigates effects of upscaling in food supply chains and changed vulnerabilities to disasters and food security. The small-scaled, remote production units are particularly vulnerable as they often live through subsistence agriculture and are usually not or not sufficiently integrated in large agricultural production networks and food markets. The better the integration into regional or global food chains is, the higher food security and disaster resilience will be at the expense of resource consumption/depletion and enhanced climate change. Climate change and increase in resource prices in turn hit smaller food producers and local food chains more than regional and global food chains.

Chapter 11

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CHAPTER 11

INTEGRATED LANDSCAPE MANAGEMENT IN SLOVAKIA

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Introduction

Slovakia produces less than 1% of total greenhouse gas (GHG) emissions out of the total European Union (EU) amount, but the impact of climatic change affects Slovakia to the same extent as the territories of the big emitters. It is obvious then that mitigation and adaptation policies to the expected climatic changes should be more emphasised than the struggle against emissions. The base problem in relation to climate change in Slovakia's climatic belt is generally the changed unbalanced water regime, the most visible expression of which are the more often occurring sudden intensive rains and local storms. These are the procuring cause of quick surface run-offs, which cause soil erosion, silting of channels and reservoirs, flash floods on small rivers and creeks, and disturbance of the stability of slopes, which cause landslides. Beside these are other unfavourable changes in ecosystems such as overwhelming waterlogging or its opposite, draught.

Another decisive cause of these phenomena is human activity, particularly the present land cover created by land use. Since runoff takes its course through forest, agricultural, rural, and urban lands, which are under the management of different sectors, it should be axiomatic that the mitigation of consequences needs harmonisation and coordination of policies in the forestry, agriculture, water management, nature conservation, landscape protection, urbanisation, and other sectors.

However, sectoral approaches to the management of landscape and its resources strongly prevail, separately managing approaches for each component such as soil protection,

water management, mineral resources utilisation, waste management, building codes, nature conservation, etc. (Breuste et al., 2009; Belaňová et al., 2014).

Theoretical-methodical background

The theoretical-methodical base for integrated approach to landscape management already exists as well as the legally supported institutional tools.

As far as management is concerned, those tools serve not only to mitigate climate change but to solve problems depending on optimal organisation and utilisation of landscape.

A crucial precondition in the implementation of the integrative approach to landscape management is the complex analysis and mutual comparison of the scientifically defined requirements of what landscape ecological/physical/biological regulative are essential to be implemented to the management tools on one side, with the legal surroundings, preconditions and provisions formulated in existing, legally supported management tools on other side.

The next sections introduce the principles of harmonisation of the landscape ecological scientific base with the legal surroundings of territory management. Since these bipartite preconditions are borne in different milieus of fully different scientific branches with different aims, methods, and practices, their harmonisation is highly difficult, long-term, and a demanding process requiring an indispensably harmonised teamwork of different specialists. The specialists working on the implementation of integrated landscape management in Slovakia (and in the former Czechoslovakia) have worked on this harmonisation since the 1970s. Accordingly, these scientific works were focused on both sides of this bipartite process as the development of a methodics appropriate for implementation of landscape ecological principles and data to the physical planning. This work issued basically the methodics of the landscape ecological planning LANDEP (in Slovak: *krajinno-ekologické plánovanie*, Ružička Miklós, 1982, 1990), which has been recommended also in Agenda 21, Chapter 10, and to the specific methodics for projecting ecological networks called territorial system of ecological stability ÚSES (in Slovak: *územný systém ekologickej stability*, Buček et al., 1986; Miklós, 1996). The appropriate content of the Act on physical planning (called *územné plánovanie* or territorial planning), which issued to the creation the Act No.50/1976 Zb. on Territorial Planning and Building Order, which later allowed to implement elements of both of the above mentioned landscape-ecological methodics, in particular to the amendment numerate as Act No. 262/1992 Z.z., than to the Act No 237/2000 Z.z.

With certain amendments, these Acts remain valid. Moreover, the projection of ÚSES became part of several other Acts. Also, the basic principles of the LANDEP and ÚSES methods are still valid as they continually develop applying current knowledge and new technics such as geographical information systems, remote sensing, etc. (Kozová et al., 2007; Miklós et al., 2011; Miklós and Špinerová, 2011; and Izakovičová and Moyzeová, 2011).

The Methodical Principles

The Material Basis of Landscape Management

The material basis of integrated landscape management with the concept of landscape as a geosystem is respected in Slovakia. This concept is defined on the basis of the general system theory (Bertalanffy, 1968) as the set of components of the geosphere and their mutual relationship (e.g. Krcho, 1968; Neef et al., 1973; Demek, 1974; Preobrazhensky, 1983). This basic theory has also been elaborated for its application to the LANDEP and ÚŚES methods (Miklós and Izakovičova, 1997; Diviaková, 2010; Miklós and Špinerová, 2011; Miklós et al., 2015; Špinerová, 2010, 2015). This theory, as well as our consequently applied methods, emphasises that the basic geosystem elements the geological substratum, the soils, the georelief, the land cover, the man-made objects – are never isolated but exist in integrated form. The water regime is considered the vessel for water, i.e. the watershed for surface water and the aquifer for underground water, and is never isolated from the atmosphere and its climatic performances. As elements of geosystem acting according to natural patterns, all these are interrelated, irrespective of which sector manages them. Even if parts of the same material object are subjects to particular sectoral managements, their integrated character should be considered in all management tools (Agenda 21, 1992). All sectoral policies should therefore respect the natural patterns and the geosystem as a whole should be encompassed in the integrated management, planning, assessment, and updated concept of the evaluating ecosystem services (Nassauer, 2012; Grunnewald and Bastian (eds.), 2015). These principles have been fundamental in the development of the LANDEP and ÚSES methods.

Integrated Approach in the Management of Land Resources

Beside its practical importance, the integrated approach is a mainstream, trendy term in science as well as a favourite theme for politicians (Breuste et al. (eds.), 2009; Mizgajski and Markuszewska, (eds), 2010; Hynek, 2010; Belaňová et al., 2014). The approach is actually not new. Chapter 10 of the Agenda 21 from Rio Summit 1992 mentions only one

space, one landscape that must be accepted by each sector and that all activities may find their own area in the same landscape. These activities can conflict with each other, and, therefore, an integrated approach is needed in practice. The fundamental tool of such management strategies is physical planning, which must act as a frame and basis for the plan of each sector. The integrated plan should function as a base frame outlining the optimal organisation and utilisation of a territory for all sectors (Agenda 21, 1992).

In accordance with these theses, we accept:

a) management as a ruling device, comprising the chain of activities as planning, organising, controlling;
b) integrated management is a ruling device for harmonisation of the demands of different sectors with respect to sustainable development, i.e. we do not consider as management some concrete physical actions executed, for example, in forestry, in agriculture, etc. Although they can finally lead to desired effects, they are, nevertheless, still physical sectoral actions, not management. Management is the ruling policy requiring the subjects to provide such actions (Izakovičová et al., 2007; Belaňová et al., 2014).
c) These provisions of Agenda 21 have been generally accepted and many times applied in both science and practice (Barsch et al, 1993; Langevelde, 1994; Oťaheľ, 1994; Nassauer, 2012). On other side is to state that these provisions are not fully exhausted! However, in Slovakia, these provisions have just served as the canon for the implementation of landscape-ecological principles and methods of LANDEP and ÚSES to the management tools (Ružička Miklós, 1982, Izakovičová et al., 2000).

Legal Basis of Sectoral and Integrated Planning

Different sectoral planning tools are used to manage agricultural land, forests, waters, urbanised landscape, nature conservation in standard and more or less separate ways. It can hardly be presumed that integrated management will ever become a single over-sectoral tool in real situation. It should rather be a rational process of coordinating chosen spatial planning procedures, where the final goal is the harmonisation and satisfaction of the demands of different – if possible, all – sectors towards the land resources, with respect to sustainable development. This principle was also accepted in the case of Slovakia.

This approach is not new and many good practices can be found in developed countries (e.g. Fabos, 1979; Ružička and Miklós, 1982; Haber, 1990; Barsch et al., 1993, Jongman, 1995; Breuste et al., 2009; Kolejka et al., 2011). The spatial planning tools which might be subject for integration are physical (territorial, spatial) planning, regional planning, watershed planning and management, flood management, agricultural land

arrangement (land consolidation) planning, land-use planning, forestry planning, and ecological network planning. Nevertheless, their unified, harmonised spatial projection and integration remain a not fully solved problem.

One basic precondition of the desired harmonisation is the definition of integration by law. A clause from Act No. 7/2010 Z.Z. on Flood Prevention in Slovak Republic might serve as an example. Paragraph 9 (on coordination of management plans) reads as follows: '.. plan of the flood risk management and the watershed management plan shall be coordinated with the land arrangement projects, the territorial plans, the forest management plans. They altogether will constitute the tool of integrated landscape management on the whole territory of the watershed'.

The practice, however, is still not satisfactory. The results of effort towards integrated management, particularly those focused on the implementation of landscape ecological principles as provided by the legal system in Slovak Republic, are described in the next chapter.

Institutional Tools for Landscape Management and their Integration in Slovakia

During the last 30 years, Slovakia's landscape-ecological principles and methods have been implemented step by step per the existing, amended, and newly created legal tools that are appropriate for integration in landscape management. This process has been quite difficult.

The precondition for the integration of different tools to an integrated system is the elaboration and implementation of legal clauses to respective Acts, which ensure that their key provisions will be mutually recognised for synergistic cooperation. Another precondition is their correct factual-time arrangement based on their character and successive role in the integrative process. Accordingly, we rank and characterise the current landscape management tools in Slovakia as follows:

1. **The integrated spatial informational base (obviously GIS based)**
   As these tools serve as the unified information base for all kind of activities in the landscape, we consider them as the information base for integrated management of landscape. The legal basis of these tools are:
   - Act No. 3/2010 on the national infrastructure for spatial information, an adoption of Directive 2007/2/EC/EP (INSPIRE) by the Slovak legal system; and,

- The landscape-ecological base for integrated management as defined in Act No. 7/2010 on flood prevention. In this Act, the basic data on geosystem necessary for integrated landscape management are itemised.

2. **The tools as the physical base and spatial frame for all other sectoral plans**
   The very base tool for the whole integration process is territorial planning (physical planning). In fact, it plays the role of 'frame and base for all other sectoral plans' as defined in Agenda 21. This is also the tool for the transformation and transfer of the landscape-ecological data to the real executive planning tools, i.e. transporting the results produced by LANDEP and ÚSES, which are obligatory parts of the territorial planning, to other spatial planning tools. The legal basis of these tools is Act No. 50/1976 Zb. on territorial planning and building order, particularly its amended Act No. 237/2000 Z.z

   The most important provisions for integration of landscape-ecological principles to theplanning defined in the amended Act No. 237/2000 Z.z. are as follows:
   - The definition of landscape as geosystem fully in accordance with scientific definitions;
   - The definition of the properties of landscape elements as obligatory regulatives, i.e. bans, limits, allowances for the ecologically optimum organisation and utilisation of the territory;
   - The landscape-ecological planning as the obligatory result of surveys and analyses, as tool for ecologically optimum organisation and utilisation of the territory;
   - The ecologically optimum utilisation of the territory is defined as obligatory regulative;
   - The territorial system of ecological stability ÚSES , which includes the definition and localisation of biocentres, biocorridors, and interactive elements as obligatory regulative for territorial plan on regional and community level.

   Beside many other provisions, the Act also defines the obligations of other planning tools to respect the results of the territorial plans as frame and base.

3. **Executive sectoral planning and management tools**
   These traditional, generally well-functioning tools are to execute the concrete demandsof the sectors to the territory through planning and projection. The result of integrative efforts is the implementation of landscape-ecological principles and data in two ways: firstly, through the obligatory recognition of the territorial plans, which includes both LANDEP and ÚSES; secondly, through the recognition of the results of the ÚSES elaborated specially as obligatory base for these sectoral plans.

The legal bases of these tools are:

- **For nature conservation**: Act No. 543/2002 Z.z. on nature and landscape conservation, which defines the limitations of nature conservation for all sectors. Moreover, as a new proactive concept of nature conservation, the Act also defines the territorial system of ecological stability ÚSES as the system of biocentres, biocorridor, and interactive elements. ÚSES has become the obligatory part of several other sectoral planning.
- **For planning and projecting agricultural land**: Act No. 330/1991 Zb. on land arrangement and consolidation, implemented based on several new amendments, defines ÚSES as obligatory part of land arrangement and consolidation projects. ÚSES might play the role of a cause for new land arrangement project.
- **For forestry planning**: Act No. 326/2005 Z.z. on forests provides for the protection of nature and nature resources, e.g. it defines three basic groups of forests: timber productive forests, protective forests aimed mainly to protect waters and soils, and forests of distinctive determination, particularly forests in nature conservation areas.
- **For water planning and watershed management**: Act No. 364/2004 Z.z. on waters comprises a number of provisions respecting the Framework Water Directive of EP/EC 2000/60/EC. The key part of the Act concerning integrated management is watershed planning, where the cooperation of different planning tools is mandated. The landscape-ecological principles are implemented through the implementation of plans to consider ÚSES.
- **For flood protection management**: Act No. 7/2010 Z.z. on flood protection recognises flood protection as a real integrative activity requiring cooperation of all sectors. Amongst others, it defines the needed data for integrated landscape-ecological information base, the implementation of ÚSES, and integrated watershed management as the harmonisation of different planning tools. Although newer amendments have slightly changed the original wording of the Act, the basic integrative sense of the act remains.

In ideal case, these tools move the landscape-ecological and integrating principles to concrete physical territory. Moreover, the above-mentioned tools must respect the territorial plans (described above) as integrative frame and base for other plans. However, there are still problems with practical cooperation of these tools as well as with the concrete implementation of this transfer.

4. Tools for assessment and regulation of impact on the environment

In Slovakia, environmental impact assessment and integrated prevention and pollution control are not oriented towards direct management of landscapes but towards control and assessment of the impact of the sectoral spatial activities. We therefore consider them as important tools for regulation.

The legal bases of these tools are Act No. 245/2003 Z.z. on Integrated Prevention and Pollution Control, and Act No. 7/2010 Z.z. on Environmental Impact Assesment (E.I.A.) and Strategic Environmental Assessment (S.E.A.), both as amended.

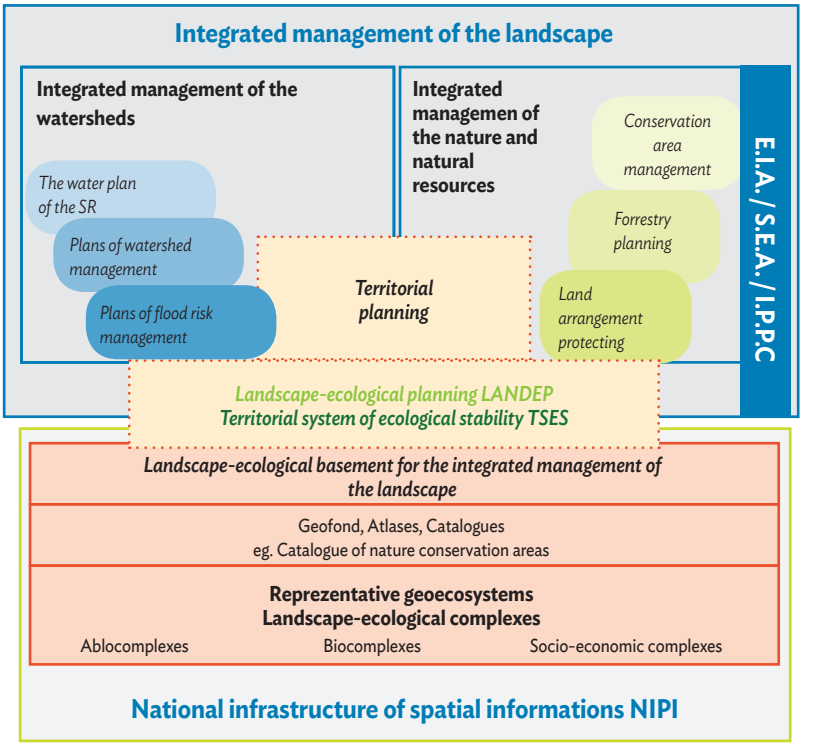
One of the key landscape-ecological elements of these tools is the obligatory consideration of ÚSES.

The logical sequence of those tools – from informational base, through physical frame and execution up to assessment and control – is crucial for their integration. An ideal scheme of such sequence is shown in Figure 1. The key elements in realising integrative approach to landscape management, i.e. the integration of the sectoral planning procedures, are:

- An integrated GIS-based spatial (not sectoral!) information system;
- Landscape-ecological planning for transfer of landscape ecological principles and data to other planning processes as tool for ecologically optimum organisation and utilisation of the territory;
- A spatial (territorial, physical (not sectoral!) planning as a legal, obligatory frame for each sectoral plan, as stated in the provisions of Agenda 21;
- Sectoral planning respecting the results of over-sectoral spatial (physical, territorial plans).

In Slovakia, the key integrative ecological element is the territorial system of ecological stability ÚSES defined by law. ÚSES is determined as obligatory in the above-described management tools.

Figure 1: Relations of the Tools for Integrated Landscape Management in Slovakia



Source: Authors.

Conclusion: Problems of Implementation

As described, the methodical and the legal bases of the integrated management of landscapes in Slovakia are at quite proper level. Nevertheless, the integrative principles in practice is not yet satisfactory because of problems of different character. In terms of methods, the concept of integration is variously understood by different sectors and rarely as real integrative decision-making on optimal subdivision of the whole landscape for each sector.

The danger of simplification, formalisation, and over-politicisation of the approach should be avoided as this can weaken and flatten the professional consideration of the geo-system concept as material base. Therefore, the need to enhance trade-offs among sciences, policies, and sectors is obvious. Likewise, this needs changes in education. Integrated management is not one single topic of study but a systematically organised set of topics that requires a balance between scientific (geographical and biological disciplines, landscape ecology, environmental disciplines), technical (industrial, agricultural, forestry, construction knowledge), as well as social science topics (law, economics, management).

The other problem is the lack of political will for integration. Publicly, nobody objects to integration. However, resistance of the sectors to be integrated under any trans-sectoral planning prevails. Also, the aversion to accept nature and landscape limitations as obligatory regulations still exists. Sectors, companies, communal authorities, and other interest groups consider integration only if it offers (short-term) profits.

Nevertheless, new real landscape situations, particularly climatic change, will increase pressure on natural resources, which will increase competition among sectors in the landscape. Therefore, the demand towards implementation of integrated approaches will increase and, consequently, the implementation of different integrative approaches will develop in the near future.

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