ISSUE SHEET 2

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BIODIVERSITY ASSESSMENT AS A BASE FOR DECISION-MAKING

Planning and managing the conservation of biodiversity requires a sound knowledge of all the existing animal, plant and fungal species within a given area – their status, their habitats, and the possible threats that they face. Accordingly, the Nature Conservation Programme (NCP) placed emphasis on the rigorous scientific collection of data in the field, and the analysis of this data to create a sound documentation base. This Issue Sheet describes the biodiversity assessment process and should be read in conjunction with other Issue Sheets, especially numbers 1 and 3. The key partner in all this work was the Macedonian Ecological Society (MES), a national NGO with a highly experienced team of specialist scientific staff.

> *"The NCP succeeded in designing interactive and efficient management of biological databases, establishing a common methodology in biodiversity research and setting new standards which were followed in most of the subsequent conservation projects throughout the country. The usefulness of the ESM was proven when it was taken as base for elaborating a national level version for the National Spatial Plan (2021-2040)."* Prof. Dr. Slavco Hristovski

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KEY LESSONS LEARNED

- Before commencing a biodiversity assessment process, it is important to identify and work with key stakeholders in the area - setting the base for a participatory process. This is especially necessary if some stakeholders may be potentially hostile.
- An Ecological Gap Analysis (EGA) together with investigations to fill the biodiversity data gaps proved to be a very successful tool for identifying the richness of biodiversity in the region and the presence of the rare and most endangered species and habitats.
- An Ecological Sensitivity Map (ESM) is an excellent tool for prioritising nature conservation. However, the analysis of all the necessary data is a time-consuming process, especially when the tool is being introduced for the first time. Adequate time should be allowed for such data processing.
- Well presented data can be a key tool for changing people's perceptions. The ESM was a particularly important tool in this regard, providing a clear visualization that could be readily understood by diverse stakeholders and used to develop scenarios for biodiversity conservation and argue for the proposed Protected Areas (PAs).
- Working with large teams of national and international experts specialising in different taxonomic groups and unifying the collection process was an effective approach for gathering a large volume of data in a short time. Typically, this results in a significant enrichment of scientific knowledge about an area; in this case, it included the recognition of various species new to science.
- Engaging students in data collection was a "win-win" approach: it was cost effective and succeeded in building the knowledge and field skills of young researchers through the sharing of national and international expertise (knowledge transfer).
- Companion Modelling (ComMod), as an innovative tool, greatly facilitated discussions between diverse stakeholders about the findings of the biodiversity assessment, their implications for nature conservation, and decision-making over future interventions.

ENSURING STAKEHOLDER ENGAGEMENT FROM THE BEGINNING

At the time of designing the NCP in 2011, little was known about the biodiversity of the Eastern region of North Macedonia beyond some early work in the Osogovo Mountains conducted by the MES. This had been part of a previous unsuccessful attempt to gain protection of the area within the Balkan Green Belt. In fact, Macedonians generally considered the Bregalnica region to be an area of economic activity focused on mining, conifer plantations and associated timber industries, and agriculture. It was simply not widely understood that region had significant value for nature.

"The Nature Conservation Programme deliberately worked at national, regional and local level in order to address conservation problems and challenges at all three levels. An important message for me when we began was that nature conservation does not protect and seal natural resources from use; rather, it is an approach that brings use and conservation or protection together. This was borne out in all activities. Both the explicit focus on three geographical levels and the approach of merging the use of resources with conserving them and their environmental functions were at the time quite innovative, considering the prevailing frame conditions and patterns of use." Thomas Stadtmuller, Senior Adviser Helvetas, responsible for the NCP phase I (pers. comm. January 2024).

Rather than start immediately with data collection, the project first sought to gain stakeholder understanding and acceptance through a series of workshops at national, regional and local level. As explained in Issue Sheet 1, this engagement with the stakeholders focused on the synergies between biodiversity conservation and socio-economic development. The workshops represented the first step in establishing partnerships between all relevant institutions at all levels and bringing ownership of the program to national and local institutions/organisations. The stakeholders were encouraged to share their intentions for future economic development in the Bregalnica region – for example, areas identified for mining expansion, new roads, hydropower or other infrastructure – so that this could also be considered.

ESTABLISHING THE DATABASE

DATA COLLECTION

It was important to be aware of all existing data, so a desktop analysis of available literature including those of previous projects (especially data on the Osogovo Mountains) was conducted. All existing biodiversity, landscape and geodiversity data were analysed and digitalised into GIS datasets. Also, a socio-economic analysis based on a public questionnaire and available official statistics, including detailed intentions and aspirations for regional development, were considered. The compilation of all this information resulted an EGA covering the various taxonomic groups and habitats present in the Bregalnica watershead, identifying the gaps in available data.

Using the EGA, a data collection plan was drawn up to fill the gaps in the data and establish a truly comprehensive database. Data collection took nearly two years of intensive fieldwork, and in fact, has continued afterwards as further new findings have been made. About 100 experts (both national and international) were involved, supported by more than 100 students and volunteers from different faculties and organisations. A common methodology was agreed, and the studies synchronized between the different expert teams. Together the team members logged well over 10,000 biodiversity data points on mobile databases customized for different taxonomic groups.

STUDENT ENGAGEMENT IN DATA COLLECTION

In the period 2014-2015 two 15-day summer research camps was organized in cooperation with the Biology Students' Research Society. The summer research camps took place on different locations in the Bregalnica region. About 40 students participated in each of the camps, collecting and processing data under expert supervision, and thus contributing to the overall biodiversity assessment process.

"The NCP provided a great platform to involve students in the investigation of biodiversity, to work in the field together with experts, collect data, learn about the methods of work, improve their knowledge, understand the threats to biodiversity and how to establish management and protection measures. In this way, NCP invested in strengthening the capacity of young conservationists. The students have contributed to promoting biodiversity protection through youth society." Despina Kitanova, MES


Photo by: MES archive


Photo by: MES archive

Engaging students was very effective, in both costs and introducing them into the scientific research work, building their knowledge and field experience for whatever role they occupy later in life. It also generated much youthful enthusiasm for biodiversity conservation.

"My career in conservation biology has its roots to the 2014 summer camp on Plachkovica mountain, as part of the Biology students research society. It was there I first got acquainted with the many fieldwork methods applied in ecology. The sheer beauty of the biodiversity I saw there convinced me that I want to devote myself to studying ecology, which inevitably led me to work as a conservation biologist in MES. Since then, I've always participated in the summer camps where I had the opportunity to deepen my knowledge" Andrej Gonev, Biology Students' Research Society

DATABASE MANAGEMENT

Field data was collected and synchronised using different digital tools and software for GPS navigation (Orux maps), database (MEMENTO) and GIS. In total 13 databases were established, covering different taxonomic groups and wider landscape characteristics. As time progressed and data accumulated, the GPS data from the field was converted into GIS format. The data collected in the MEMENTO database was accumulated into species distribution maps.


Photo by: MES archive

DATA ANALYSIS AND VALIDATION

Almost two years of research revealed that the Bregalnica watershed is home to over 1,400 species of plants, 260 diatom algae, 600 fungi, 220 birds, 66 mammals, 11 amphibians, 27 reptiles, 26 fish and around 1,500 invertebrates. More than 80 fungi were reported for the first time in the country. Various species new to science were described: one snail, two spiders and nine diatom species. Also, within the region two habitat types were discovered (both recognised as priority on the Annex I of EU Habitat list) that were new for the draft National Reference List.

Vitrea melovski, new snail for the science

"The Bregalnica river basin is a vast area of 4,300 km2 amounting to a sixth of the national territory. It has a great diversity of habitats, which are in some ways representative of the whole European continent. Mediterranean, Sub-Mediterranean and Steppe elements are present in the lower area, while further up the mixed forested landscapes of oak, beech and conifers with vast grasslands are similar to those found in the mountainous regions of Europe. The higher coniferous forests are analogue to the Taiga biome while higher still; the alpine pastures resemble the northernmost European ecosystems of the Tundra. As a result of such diversity, it was no surprise when 12 species new to science were found and described" Prof. Dr. Slavco Hristovski

Additionally, with its long farming traditions, the Bregalnica watershed hosts considerable agro-biodiversity, with old varieties of crops such as wheat, rice, peppers, beans, apples and pears. The research team found that in every village, crop landraces are still maintained. Agricultural practices are often performed manually in a traditional way. Locally adapted breeds of sheep such as the Ovchepolka were recorded; this is of significance as it is the only true native breed of Macedonian Pramenka sheep (known for their high quality milk for cheese making). The Busha cattle were also found in their indigenous form, albeit in smaller herds and often in the form of mixed breeding with other cattle.

MAPPING THE RESULTS

The Ecological Sensitivity Map (ESM) was developed using GIS, overlapping multiple criteria. These included the quantification of all available biodiversity information, physical (abiotic) risk factors, the structural aspects of habitats, and landscape connectivity (notably wildlife corridors). Some of these variables were specifically generated as part of the ESM development. The team adapted a methodology already implemented in several regions of Italy to identify biodiversity hot-spots (Pecci et al 2010[1]). The aim (in both Italy and North Macedonia) was not only to prioritise areas for protection, but also to determine where and what conservation interventions are necessary outside of such areas of protection.

Figure 1 shows the ESM that was produced. The most sensitive areas on the map are those that have highest values for biodiversity and are at highest risk of destruction. These are very often core areas for the most important animal and plant species. The least sensitive areas are those with the lowest values for biodiversity and the lowest pressures. Between these extremes are areas in which biodiversity values are high, but unthreatened, and areas with relatively lower biodiversity values that are nevertheless at significant risk.

1 https://www.researchgate.net/publication/226842440_Biodiversity_protection_funding_preference_A_case_study_of_hotspot_geoinformatics_and_digital_governance_for_the_Map_of_Italian_Nature_in_the_presence_of_multiple_indicators_of_ecological_value_ecolog

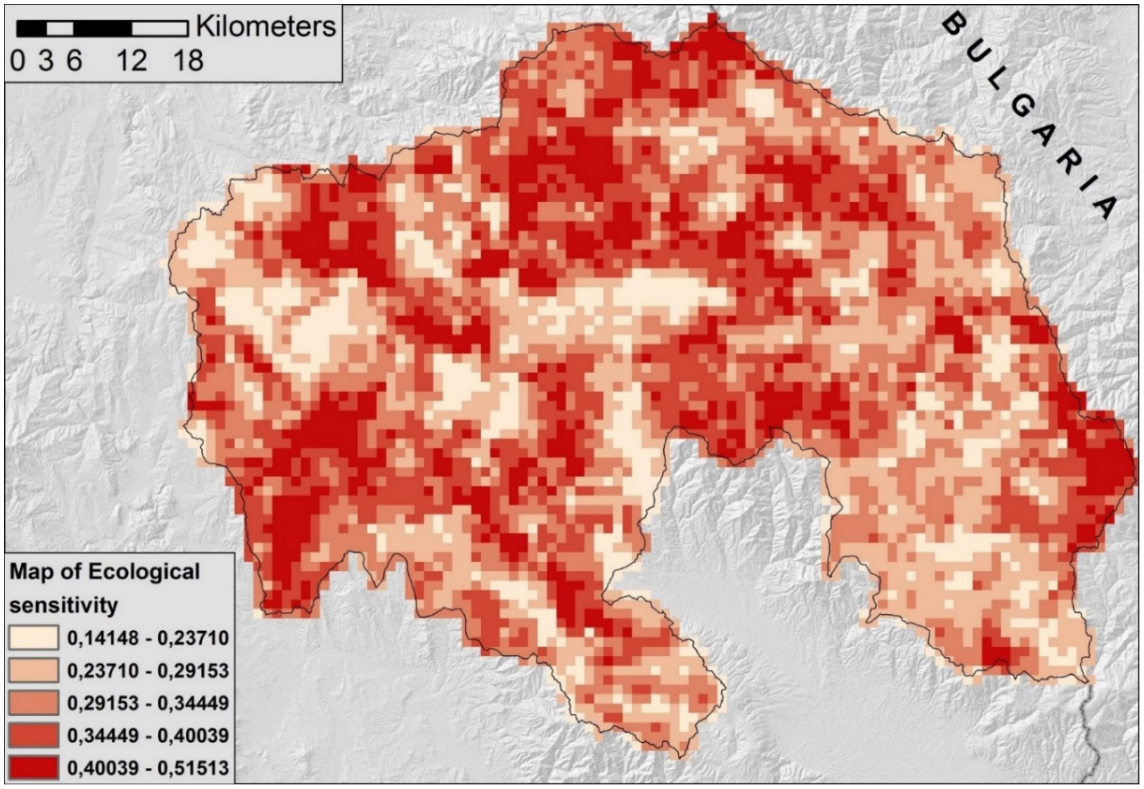

Figure 1 Ecological Sensitivity Map of the Bregalnica watershed region (dark red square present the most sensitive areas for protection).

The Ecological Sensitivity Map (ESM) provided a valuable means to:

- identify and eventually secure protection of the most endangered species habitats,
- facilitate spatial planning and smart economic development,
- mitigate human-related threats (developments such as roads, small hydro-power plants, photovoltaics, urbanization, adaptation of agriculture and forestry etc.)
- mitigate natural risk factors (floods, landslips, erosion etc.).

The ESM was finalised in 2015. It has the clear advantage of providing an overview of the entire landscape and priority areas for different levels of intervention. In this sense it is a very effective and contemporary tool for nature and biodiversity conservation, as priority areas are indicated not only according to their natural "values" but also the risks and pressures they are facing. The findings of ESM were used for designing scenarios for establishing Protected Areas in the Bregalnica watershed and as one of the main pillars for the Spatial Plan for Eastern Planning Region which was developed almost at the same time.

THE USE OF SCENARIOS FOR ESTABLISHING PROTECTED AREAS

Three different scenarios for establishing Protected Areas were developed for the Bregalnica watershed. The scenarios were developed from a matrix of criteria related to socio-economic development and biodiversity conservation. Each scenario then took a different approach, each of which provided a realistic way for local stakeholders to imagine and evaluate different options.

SCENARIO 1: ECOLOGICAL NETWORKS

This scenario used the existing Macedonian National Ecological Network (MAK-NEN), which has been scientifically proposed as a country-wide network of core areas, corridors, buffer zones and nature development areas. The network was especially conceived as a means to ensure the movement of key fauna (focusing on Brown bear and large carnivores). In general Scenario 1 envisaged establishing one large Protected Area within the Bregalnica watershed, covering each of the key ecosystems present as far as possible.

SCENARIO 2: SPATIAL PLANNING USING THE EASTERN REGION DEVELOPMENT PLAN AND THE ESM

Using the Eastern Region development plan and the Ecological Sensitivity Map (ESM), this scenario envisaged the establishment of Protected Areas, which have the greatest national value for biodiversity (in terms of their uniqueness) and the highest sensitivity according to the ESM. The resulting scenario envisaged the establishment of two or three medium sized Protected Areas.

SCENARIO 3: ADMINISTRATIVE FOCUS

This scenario took the administrative divisions across the watershed as a base and proposed a number of small Protected Areas scattered across the watershed. In this way, each of the municipalities in the region would have its own Protected Area, chosen on the basis of important species and ecosystems, the values attributed to the natural landscape, the overlap with the municipal borders and the cross-border context (in some places, the national border adjoins a Protected Area in the neighbouring country – thus increasing its value as a relatively undisturbed habitat).

COMPANION MODELLING

Companion modelling (ComMod) is a tool used to engage stakeholders in decision-making over land use allocation in a participatory, non-conflictive manner. It is devised as a game in which stakeholders discuss the advantages and disadvantages of different scenarios, and finally choose the option that best fits their expectations.

Photo by: MES archive

Using the three scenarios outlined above, several ComMod games were held. Care was taken to invite representatives of diverse stakeholder groups for the ComMod exercise. They included agricultural workers (farmers, livestock breeders, bee-keepers); collectors of non-timber forest products; forest owners; hunters; fishers; mining representatives; small hydropower owners; government administrative officers at municipal and regional level; representatives of relevant line departments, Public Enterprise Forests, political parties, and national ministerial staff. Staff of the NCP and its partner MES were of course also present.


Photo by: MES archive

The diverse stakeholders debated the three proposed scenarios vigorously. Through this process, Scenario 2 became the clear favoured option, especially amongst mayors. Their opinions were crucial as it was they who were often required to explain choices and reasons to the citizens who elected them. A ranking of prioritisation emerged as follows:

1. Proclamation of Osogovo Mountains as a Protected Area, including parts of Zletovska Reka-Ratkova Skala.
2. Proclamation of a Protected Area 'Chengino Kale', later expanded as the Protected Area Maleshevo.
3. Recognition of the high ecological sensitivity of the Lower Bregalnica area. No protection interventions were foreseen due to various infrastructure construction activities. However, the area is identified as a future Natura 2000 site.
4. Recognition of the biodiversity importance of Lower Zletovica and Plachkovica (Zrnovska Reka-Lisec area) for consideration as future Natura 2000 sites.

Scenario 2 was used as a base for proposing areas for nature conservation in Bregalnica watershed. Putting this scenario into practice, with focus on desgnating Osogovo Mountains and Maleshevo for PAs, was a significant step, as outlined further in Issue Sheet 3.

PRACTICAL RECOMMENDATIONS

- When conducting a biodiversity assessment of multiple habitats, allow at least two to three years. Additionally, aim to engage multiple experts with different specialisations – in this case, around 40 senior individuals were involved.
- Invest in modern tools, equipment and technologies (Memento data base, Orux maps, ARC GIS software), as this facilitates reliable high quality data collection and the realistic, simple visualisation of the results.
- Establish a collaboration with one or more educational institutions to engage a large group of students in the collection and analysis of data.
- Dedicate adequate human resources for coordinating large teams so that they can function effectively. Furthermore, build in flexibility in the data collection plan to adjust to weather conditions (allowing for periods when fieldwork is difficult or impossible).
- Plan adequate time and resources for data analysis. In North Macedonia and countries with a similar legislative framework, a minimum five years is needed to create the type of database needed for initiating the proclamation of a Protected Area, and for planning other conservation actions.

This Issue Sheet was produced by Robertina Brajanoska Executive Director of MES, Despina Kitanova Program Coordinator of MES, Marjana Shushlevska, NCP's Team Leader, and Katerina Atanasovska, NCP's Program Officer both from Farmahem. Jane Carter, Senior Adviser at Helvetas provided editorial support. It entailed consultation with many NCP stakeholders, including but not limited to those quoted. For further information, please contact farmahem@farmahem.mk

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