



## Project Report

# “Ecological Data Gap Analysis and Ecological Sensitivity Map Development for the Bregalnica River Watershed”

Dekons-Ema and Macedonian Ecological Society

### Book 1

## Integral Report for the Project implementation

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**The Integral Report for the implementation of the Project " Ecological Data Gap Analysis and Ecological Sensitivity Map Development for the Bregalnica River Watershed ", Contract No., 0205-145/10 of 16.06.2014, signed between the Center for the development of Eastern Planning Region, represented by Dragica Zdravev, coordinator of the Center and Environmental Management Associates Dekons-Ema represented by Menka Spirovska, Director.**

## CONTENTS

1	General information.....	5
1.1	Main goal .....	5
1.2	Geographic Range .....	5
2	Management of the project.....	7
2.1	Coordination of project activities .....	7
2.2	2.2 Expert team.....	8
3	Implemented activities .....	10
3.1	Project management.....	11
3.2	Organised meetings and workshops.....	11
3.3	Field research.....	14
3.4	Database work .....	18
3.5	New principles, innovative approaches and application of good international practices ...	21
4	Cooperation with other organizations.....	22
4.1	Cooperation with the other project activities from “The Nature Conservation Programme” and other project activities in the region .....	22
4.2	Cooperation with other non-governmental organizations and stakeholders .....	24
4.3	Cooperation with Agency for Spatial Planning .....	25
4.4	Cooperation with the Ministry of Environment and Physical Planning.....	25
4.5	Involvement and cooperation with students.....	26
4.6	Transversal schemes in implementation of the actions .....	30
5	Main Outputs .....	33
5.1	Final reports .....	33
5.2	Periodical Reports .....	33

6	Annexes.....	35
6.1	Annex 1. List of all participants in the project activity with contacts.....	35
6.2	Annex 2. Participants of the 2-week-long field work orgnaized by biology Students' Research Society on Plachkovica, 2014 .....	38
6.3	Annex 3. Participants of the 2-week-long field work orgnaized by biology Students' Research Society on Maleshevo (Klepalo), 2015 .....	39

## 1 General information

### 1.1 Main goal

The main goal of the project activity was to analyze the ecological data gaps and to develop a map of ecological sensitivity for the Bregalnica river watershed. The main objective were to analyze the current literature data, conduct field research in order to increase the amount of data regarding biodiversity as well as to propose a coherent network of protected areas and to develop a map of ecological sensitivity. All of these objective will provide basis for protection and sustainable use of biodiversity in Bregalnica watershed. The elaboration of all of these documents and maps was coordinated with other project and project activities in the Bregalnica river watershed. Furthermore, these documents will be used during the elaboration of the Spatial plan of the Eastern Planning Region.

### 1.2 Geographic Range

The biodiversity analysis was conducted along the Bregalnica River watershed. The largest part of this watershed belongs to the East Planning Region, but parts of this planning region are also outside of the watershed. Which is why there is a defined **area of interest** which represents the union of the Bregalnica River watershed and the territory of the East Planning Region (Picture 1 and 2).

The source of the Bregalnica River is under Chengino Kale at 1690 meters above sea level, which also the Easternmost part of its watershed. The southern border of the watershed runs along the Plachokica Mountain, the source and the valley of the Kriva Lakavica River near the mine Buchim and Radovish. The western border runs along the lowest foothills of Konechka Mountain, until its mouth in Vardar and the western side of Ovche Pole i.e. the course and mouth of Svetinikolska River. The norther border of the watershed runs along the highest peaks of Osogovo Mountain, until the state border with the Republic of Bulgaria close to the peak Ruen. The border with Bulgaria is also the natural eastern border of the watershed.

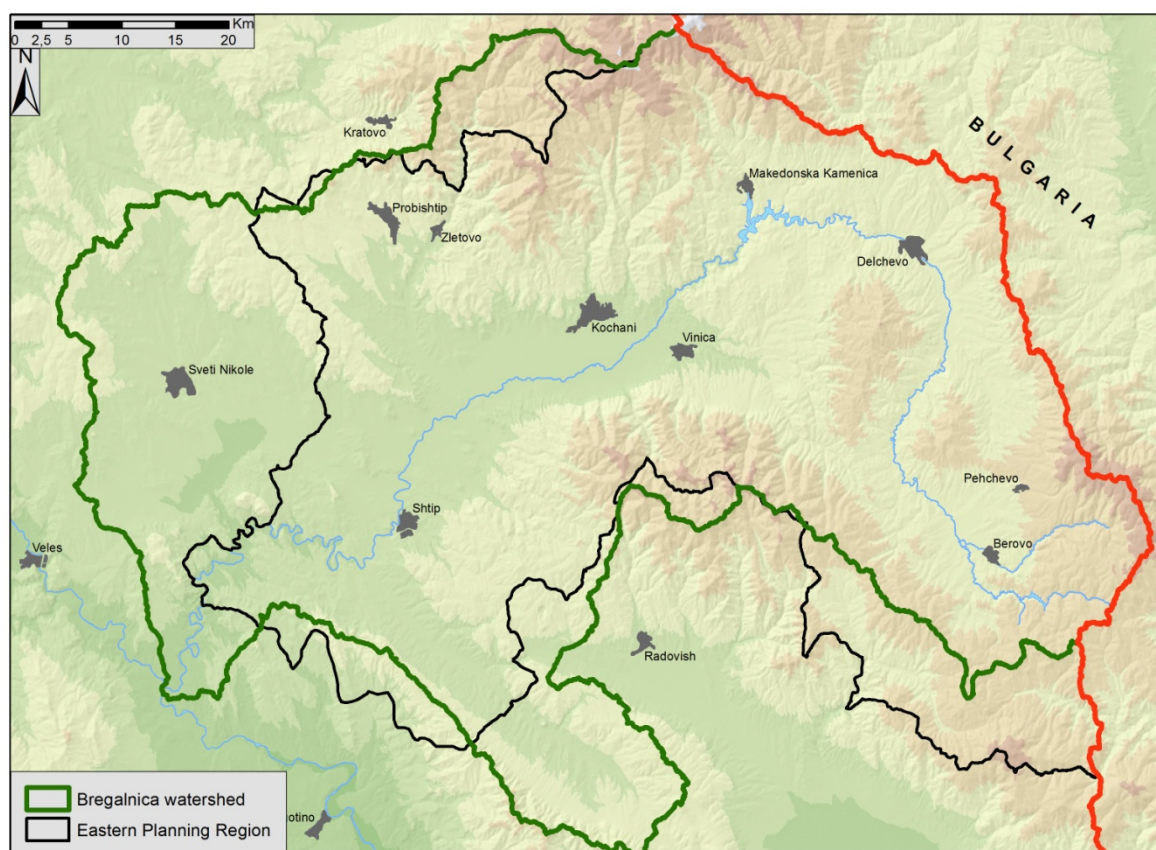
The altitude range of the watershed moves between 143 m.a.s.l. at the mouth of Bregalnica River in Vardar River and 2202 m.a.s.l. at the peak Mal Ruen on Osogovo Mountain.

The Bregalnica watershed includes parts of the Osogovo Mountains, Maleshevo Mountains, Plachkovica Mountain, Konechka Mountain, Vlaina Mountain, Golak Mountain, Obozna Mountain, Bajaz Tepe Mountain, Gradishtanska Mountain, Mangovica Mountain, Ovchepole Valley, Kochani Fields, Probishtip Valley and the valley of Lakavica River and Slan Dol. The border of this area covers the highest peaks of the abovementioned mountains:

Dzami Tepe (1801 m.a.s.l.) of the Maleshevo Mountain, Lisec (1754 m.a.s.l.) of Plachkovica Mountain, Kadiica (1932 m.a.s.l.) of Vlaina Mountain and the ridge of Osogovo Mountain with the peaks Carev Vrv (2084 m.a.s.l.) and Mal Ruen (2202 m.a.s.l.).

The Bregalnica River is the largest tributary of the Vardar River (225km long) and is the largest river in Eastern Macedonia. Some of the most important tributaries to Bregalnica River are: (from the right) Pehchevska River, Zhelevica River, Gabrovska River, Ochipalska River, Lukovichka River, Kamenica River, Orizarska River, Kochanska River, Zlatovska River and Svetinikolska River; (from the left) Ratevska River, Kamenica River, Budinarska River, Biglanska River, Zarovec River, Osojnica River, Gradeshka River, Zrnovska River, Plachkovica River, Kozjak River, Suva River, Otinje River and Kriva Lakavica River.

The area of interest (Fig. 1 and 2) has surface area of 4663.3 km<sup>2</sup> and includes the Bregalnica River watershed and the East Planning Region of Macedonia. The Bregalnica River watershed has the area of 4315.5 km<sup>2</sup> i.e. 16.78% of the territory of the Republic of Macedonia. The East Planning Region has a territory of 3548.7 km<sup>2</sup> or 13.8% of the territory of the Republic of Macedonia.



**Figure 1** Geographic range (scope) of the Area of interest (Bregalnica watershed and Eastern Planning Region)

## 2 Management of the project

### 2.1 Coordination of project activities

The project activities were coordinated by Prof. Dr. Slavcho Hristovski, whose main task was to define and lead the program team, establishment of the research team, with the research dynamics for the whole area. In order to ensure accomplishment of the project activities on time and financial efficiency, the leading team was established in the first phase of the project (Fig.2). Some of the important obligations of the leading team was to present the project results in front of the stakeholders, cooperation with the local stakeholders and decision makers and with other project programs and their offices.

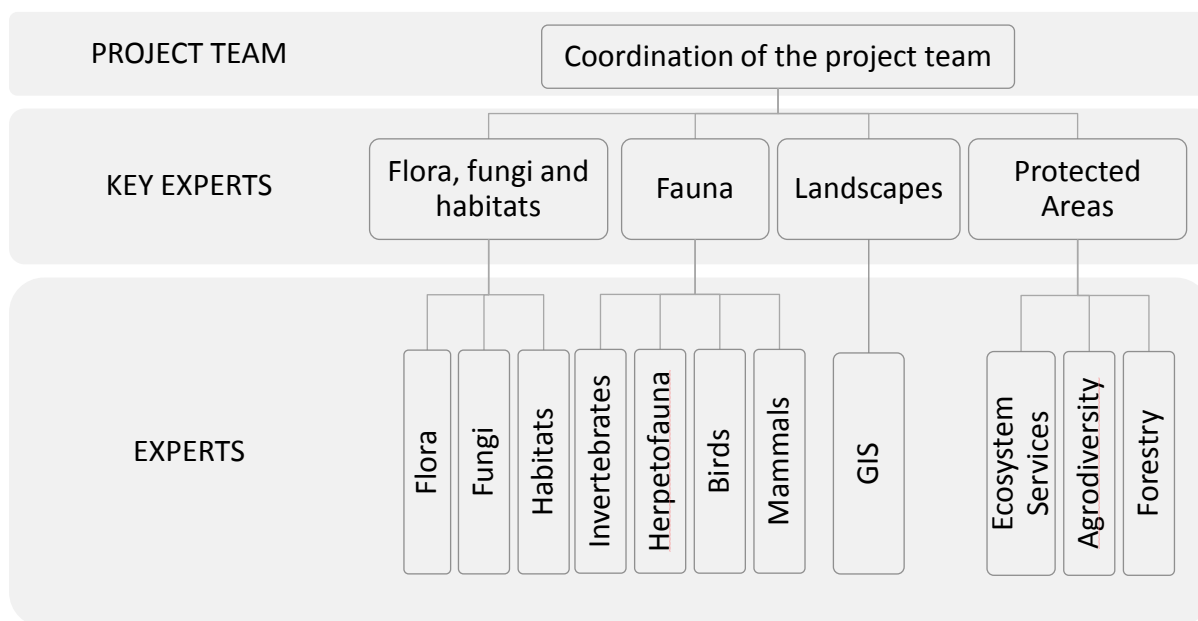


Figure 2. Scheme of the Management Team of the Project



## 2.2 Expert team

After the establishment of the leading team, the coordinator together with the four key experts have defined the research team who was involved in the research of the fields of interest of the program activity (Fig.3).



**Figure 3.** Scheme of the Investigating Team

Beside this, a research teams for each group were formed, that contributed by collecting and analysis of the literature and field data. The research teams were first divided in seven groups but later were re-group like in the Ta. 1, in order to ease the communication and the organisation of the research.

The key experts were in charge for the coordination of their groups and the design of the field research dynamics. In agreement with the key experts, the results from the field research were distributed to the project team and the coordinator has integrated them into the Final report for biodiversity in the watershed of river Bregalnica. In addition to the report, separate expert reports were given.

Table 1. List of the researchers and their role in the team

<b>Name and surname</b>	<b>Speciality/role in the team of experts</b>
<b>Vlado Matevski</b>	<b>Key expert for flora, fungi , habitats and expert for flora</b>
Mitko Kostadinovski	Habitats
Katerina Rusevska	Fungi
<b>Metodija Velevski</b>	<b>Key expert for fauna and expert for birds</b>
<b>Dimche Melovski</b>	Coordinator of the mammalian research group and expert for butterflies
Gjorgje Ivanov	Ungulates
Aleksandar Stojanov	Small mammals and bats
Danka Uzunova	Birds – assistant
Ana Arsovska	Birds – assistant
Ksenija Putilin	Birds – assistant
<b>Liljana Tomovikj</b>	Coordinator of the reptiles and amphibian research group
Bogoljub Sterijovski	reptiles and amphibians
Slavcho Hristovski	Ground beetles (Carabidae)
Despina Kitanova	Dragonflies and damselflies (Odonata)
Valentina Slavevska Stamenkovikj	Macro-invertebrates
Zlatko Levkov	Algae
<b>Robertina Brajanovska</b>	<b>Key expert for protected areas and coordinator of the experts for ecosystem services, agro biodiversity and forest diversity</b>
<b>Sonja Ivanovska</b>	Coordinator of the agro biodiversity group
Vladimir Dzabirski	agro biodiversity – livestock
Evgenija Jodanova	agro biodiversity – plants – assistant
Aleksandra Todorovska	agro biodiversity – livestock – assistant
<b>Nikolcho Velkovski</b>	Coordinator of the forest diversity group
Svetlana Pejovikj	forest diversity – assistant
<b>Natalija Melovska</b>	Ecosystem services
Ivana Lozanovska	Ecosystem services and natural resources – assistant
<b>Ljupcho Melovski</b>	<b>Key expert for landscape</b>
Daniela Jovanovska	Landscape – assistant
<b>Vasko Avukatov</b>	<b>Coordinator for the group for digital data processing, mapping and database management</b>
Aleksandar Sarov	digital data processing, mapping and database management – assistant

### 3 Implemented activities

The activities were conducted in the period from December 2014 – October 2015. They were mainly focused on field research for collection of qualitative biodiversity data. Of special focus for the research were the selection of priority species and habitats of interest, in order to describe the conservation priorities in the location as well as to define their distribution. The field activities included analysis of the landscape diversity, collection of data for the species of economic importance, and the agrobiodiversity in the river Bregalnica watershed. The research was narrowed down to collection of material in the river Bregalnica watershed and its priority was the identification of important species in order to define the state of the protected areas and the proposed areas for protection in that region.

Key part of the project was the digital processing of the data and the development of criteria for the creation of ecological sensitivity map for the research area. Very important step was the synchronisation of the database and the criteria for selection of important species. The data mapping was done according to the field research dynamics and the need of digital data analysis for certain research topics (landscapes, ecosystem services, protected areas, agrobiodiversity, biodiversity, etc.).

The management of the project activity and its research team was in accordance with the plan and the cooperation agreement. Along with the mutual planning of the field research in the different research teams lead by key expert and in consultation with the management team, consultations between the experts were organised. Occasional meetings among the research teams and the manager of the project were organised in order to synchronise the field work and the data processing. The key experts were intensely working with their teams from March to October 2015, in which period intense field work were conducted to fill in the missing data identified in the first reports. Several expert meetings were organised to discuss different themes. The aim of the first and third expert meeting was to synchronise the working groups and present the collected data so that next steps in the project could be defined. In these meetings, the criteria for modelling of the data needed for creation of ecological sensitivity map were discussed.

Maintenance of the cooperation with the organisations and institutions included in the “Programme for nature conservation in Macedonia” was realised through joint meetings for reaching agreements and joint promotion of the results from different project activities, which were organised in the Eastern planning region. It is important to note that the consultations were organised in due time and the information sharing between the Agency for spatial planning, the Macedonian Ecological Society and Dekons-Ema. In addition, the cooperation with Farmahem and through them with representatives from SECO project was of great importance. Moreover, it is important to be noted that a collaboration with the Ministry of Environment and Physical Planning (MOEPP) was established. A visit in the region was organised in order to strengthen the capacity of MOEPP for the protection of the natural resources in the river Bregalnica watershed.

### **3.1 Project management**

The needs of the research teams, such as the organisational and technical needs, as well as field equipment, were coordinated by the project management team, which demonstrates the good distribution of tasks and responsibilities.

The division of the workforce into research teams for the field research has proven to be a good tool for both organisational and research purposes. Through the synchronisation of the research methodology and dynamics, joint cooperation was promoted during the field research. Again, for the purposes of information exchange between all members of the management and research teams and synchronisation of the field research methodology, several work meetings (in smaller and larger groups) were organised in the final phase of the project.

### **3.2 Organised meetings and workshops**

The first expert meeting for coordination of the activities was organised in hotel “Shagal” – Vinica (3<sup>rd</sup>-6<sup>th</sup> - September 2014). In the meeting, concrete responsibilities for the experts, timetable and geographical scope of the project, work dynamics and the means for notification of the experts were defined. In addition, the technical and practical aspects of the field and research tasks were explained to the experts. The methodology for creation of the ecological sensitivity map and the gaps in the data which are crucial for its creation were discussed. In this meeting, the experts provided constructive criticism for improvement of the methodology for the creation of the ecological sensitivity map and later on the remarks were used to adapt the map. Also, in this meeting an inspection of the research area was conducted, in which ecosystems and habitats were identified that will be researched in the future. In conclusion, the meeting was of great importance as key directions and dynamics for the future research were determined and agreed.

The second expert meeting was organised on the 28<sup>th</sup> November 2015 in the offices of the Museum of Natural History of Macedonia (Fig. 4), in which the relevant parties participated. The expert and project management team, representatives from the MOEPP, the Swiss Agency for Development and Cooperation, Farmahem, SECO, Centre for Eastern Planning Region, the NGO OHO and others participated in this meeting.



**Figure 4.** Second experts meeting (Museum of Natural History of Macedonia), held on 28.11.2014

Next, meetings were organised between the research teams composed of junior experts and the volunteers, who were included in the analysis and field activities which were predefined in the project. Because of the extensive research area and the voluminous data sets, the aim of the management team was to include a larger group of researchers in order to be able to have a good coverage over the research area, generate good data and process the data in due time to complete the objectives of the project.

After the first two expert meetings, a need has arisen for a third meeting to be organised, in which only team experts have joined (Fig. 5). The meeting was held on the 30<sup>th</sup> January 2015 in the restaurant Orhideja, Skopje, and the its aim was to introduce the experts to the methodology for creation of a sensitivity map, as well as to jointly define the criteria for selection of the important species to be modelled for the creation of the sensitivity map and for the presentation of key and/or specific habitats. In addition, in order to harmonise the field methodology for data collection, the experts have been trained for several mapping and database projects on tablet computers.



**Figure 5.** Third experts meeting (restaurant Orhideja, Skopje, 30.01.2015)

Next, the aim of the fourth expert meeting was to present the progress in realisation of the field research activities and the collected data (Fig. 6). It was held in villa Klepalo, Berovo from the 23<sup>rd</sup>-25<sup>th</sup> June. In addition, one day visit to Vlaina Planina and Kukuljeto has been organised. Along with the management team and a part of the research team, representatives from Farmahem, Swiss Foundation Helvetas and Centre for Development of the Eastern Planning Region have participated at the meeting. The experts have stressed the need of continuing the field research activities following the presentation of the hitherto collected data from the field research, in order to form a clearer picture for the state of the biodiversity in the region. This need has been a result of the requirement for synchronisation of the results for the process of creation of Sector Studies for the Spatial plan of the Eastern Planning Region, conducted by the Agency for Spatial Planning (it is planned to be finalised by October 2015).



**Figure 6.** Fourth experts meeting (villa Klepalo, Berovo, 23-25.06.2015)

In October 2015, the fifth and last expert meeting was held as a part of the project (Fig. 7). The aims of the final meeting were to inspect the collected data from the research of biological and agrobiological diversity in the river Bregalnica watershed, to analyse how this data overlaps or changes the status of the existent and proposed protected areas, and to present the proposed system of protected areas in the above-mentioned watershed. The management team, key experts and representatives from Farmahem, Agency for Spatial Planning, MOEPP, and the Centre for Development of the Eastern Planning Region inspected the specifics of the area and jointly debated on their status.



**Figure 7.** Fifth experts meeting (hotel Queens, Skopje, 16.10.2015)

### 3.3 Field research

The biodiversity research in the river Bregalnica watershed begun in July 2014 in collaboration with the Biology Students' Research Society. Through this students' research activity a lot of data for Plachkovica Mountain has been collected. The last field research were conducted in October 2015. In the whole 16 month research period, 515 days of field research have been conducted, from which 195 days in 2014 and 305 days in 2015.

The scope of the research consists of steep like landscapes in Ovche Pole, rice fields in Kochansko Pole, dense mixed forests in Plachkovica and Maleshevski Plannina, and all water habitats – from river Bregalnica's tributaries, through accumulations and dams, to the lower meanders of river Bregalnica.



**Figure 8.** Part of the investigating team (photos from Zrnovci and Shtip region, forest in the gorge of Pehchevska River)

In 2014, in the fall period, intensive research was conducted by the teams studying small and big mammals, birds (owls), and fungi (Fig. 8). The experts for habitats and landscapes also conducted field research which had lasted for several days. A part of the field research activities are presented below:

- From 7<sup>th</sup> – 22<sup>nd</sup> July 2014, in collaboration with the Biology Students’ Research Society, a 15-day field research activity was conducted at the Plachkovica Mountain. During the field activities, several localities were researched which belong to the river Bregalnica’s watershed: Lisec, river Lumija valley, Turtel and other. Over 40 participants were included in the research, from which 35 students and 7 experts from the project team. During the research a lot of biodiversity data has been collected from Plachkovica Mountain.
- In the months of July, August and September 2014, collection of entomological material has been collected with “barber” traps in Shtipsko Pole. The main focus was given to the halophilic associations (on salty soil) and hilly pastures,
- At the same time as the first expert meeting, field research was conducted in several localities in the river Bregalnica’s watershed (Shtipsko Pole, valley of river Kriva Lakavica,



Zrnovska Reka in Plachkovica, Golak, Maleshevski Planini, Obozna and Bejaz Tepe, Pijanec and Vlaina). Here, 17 experts from the project team have participated In these activities (Fig. 9);

- In addition, the research teams of mammals, birds and fungi have conducted field research from the 18<sup>th</sup> – 19<sup>th</sup> September 2014 in the vicinity of Berovsko Ezero and an addition field research activity from 25<sup>th</sup> – 26<sup>th</sup> September 2014 in the localities: Bogoslovec, river Lakavica and Mantovo accumulation (Fig. 9);
- On October 2014, the small and big mammals team, including bats, in several occasions has visited the locality in order to identify species;
- Join field research activity was conducted by the fungi and birds team, from the 21<sup>st</sup> – 29<sup>th</sup> October 2014,
- From the 22<sup>nd</sup> – 26<sup>th</sup> October 2014 a field research activity lasting several days was conducted by the flora, habitats, landscapes and invertebrate experts.



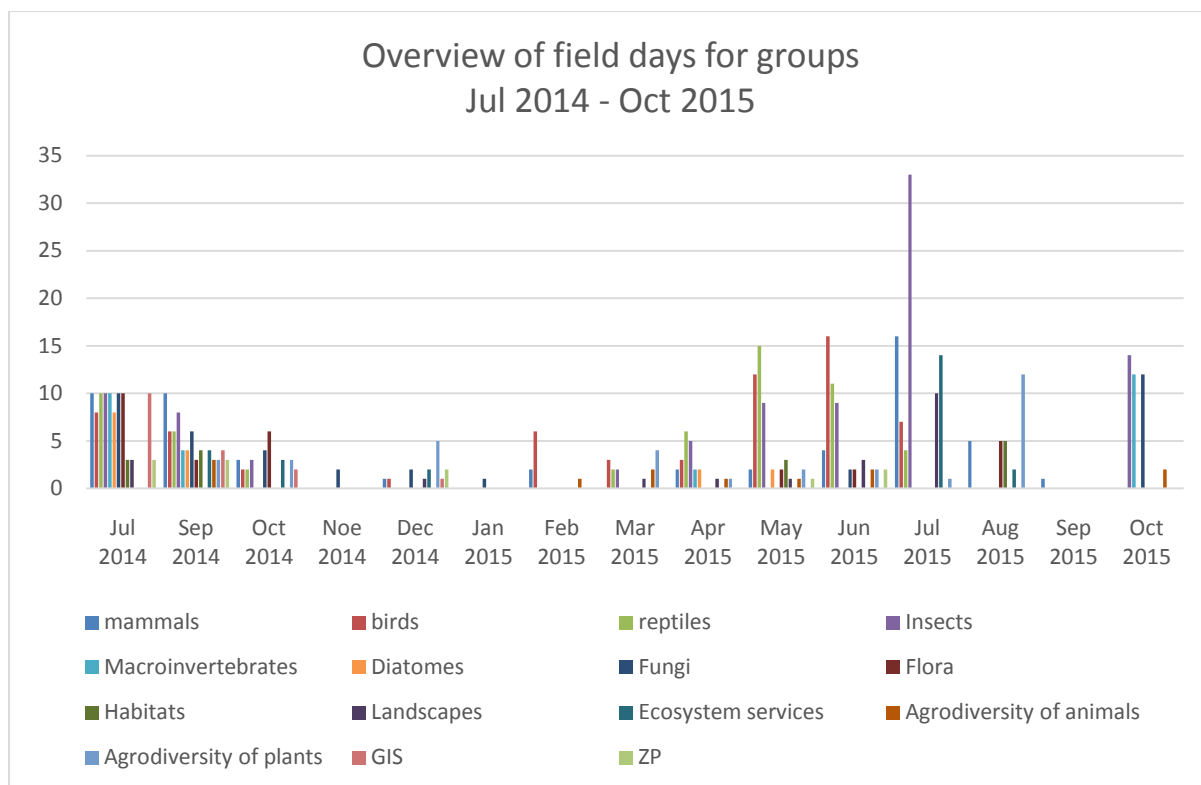
**Figure 9.** Part of the research equipment and findings of the teams

The biodiversity research continued with intensive field research in 2015. In this period (from January to October 2015) the research teams (biological and landscape diversity, agrobiodiversity, forest ecosystems, ecosystem services and use of biological resources) had defined work methodology, corresponding field equipment and established dynamics of the field research (Fig. 10).



**Figure 10.** Part of the findings of the field investigations (photos above – 01.04.2015 Slan Dol and v. Ularci); photos bellow – 29.03.2015 in v. Penush and 05.12.2015 v. Neokazi)

In accordance with the weather conditions in the second phase of the realisation of the project and the field research, the most intense research was realised in the months July 2014 (95 field activities) and July 2015 (85 field work activities). The most active research months were in march-august, which corresponds with the vegetation zone and the increased activity of the animals, in addition to the good weather conditions for conducting research. In this period, the most active field research were conducted in the groups of insects, reptiles and birds. The schedule of the field research in groups during the whole period of realisation of the project are shown in Chart 1.

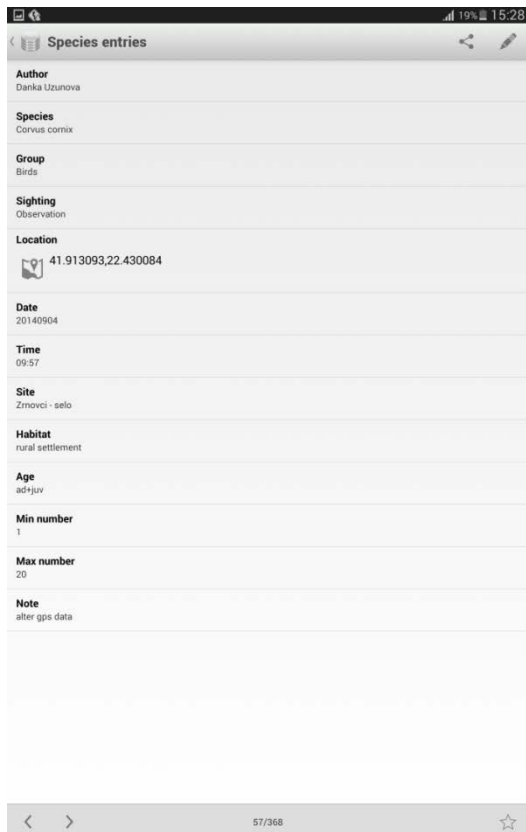


**Chart 1** Overview of the field investigations in the period July 2014 – October 2015

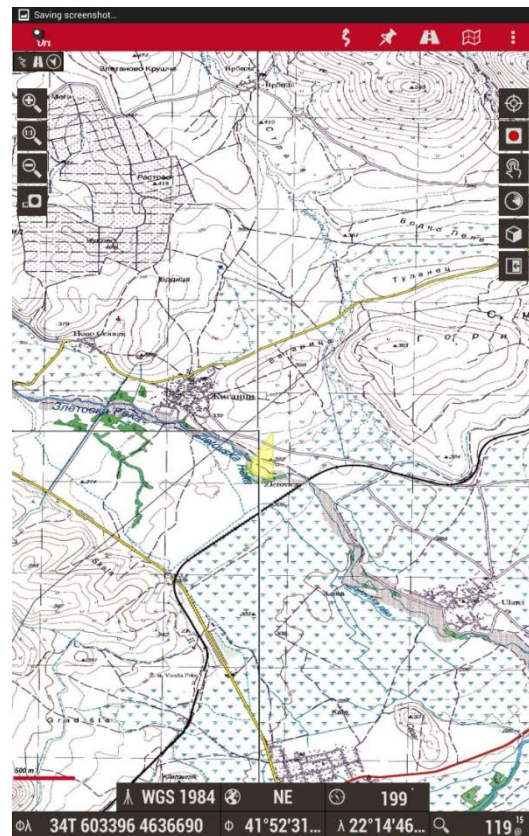
### 3.4 Databases management

Tablet computers were used to synchronise the methodological approach of data collection from the field research activities. An adequate software for GPS navigation (Orux maps), database (MEMENTO) and GIS were installed in the tablet computers, which were tested during the field activities in the first few months from the beginning of the project (Fig. 12). The research teams and the key experts had received training for efficient use of the tablet computers. As the time had progressed and as data had accumulated, the GPS data from the field work (tracks of movement and marked locations) had been converted in GIS format. The accumulated data from the MEMENTO database had accumulated into a map of species distribution (Fig. 13).

The preparation process, which included the creation and personalisation of the databases intended for biodiversity research, as well as the training for the use of the databases of all research teams, was completed during January 2015. In the same period, overview map of the researched area was created, along with topographic maps in scale of 1:100000 as a base, which contains the borders of the river Bregalnica's watershed and the Eastern Planning Region, as well as overview of the protected and the proposed for protection areas according to the Spatial Plan of the Republic of Macedonia or the newly identified and proposed areas for protection in agreement with the Representative network of protected areas. In addition, a lot of work has been done to change the structure of in total 13 databases in accordance with the needs of all research groups.

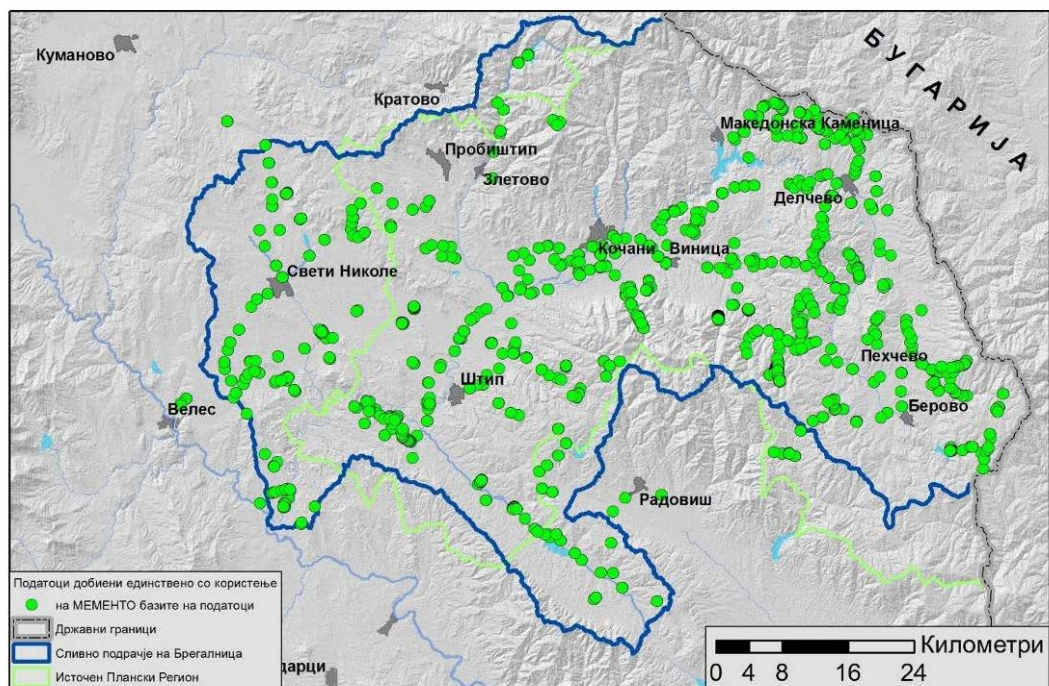


**Figure 11** Interface of the database (MEMENTO) – part for data input, installed on a field research tablet



**Figure 12** Interface of the software OruxMaps, installed on field research tablet

Until October 2015, 4000 entries have been done in the MEMENTO databases, which were used by the research groups (Fig. 11). Often times, the experts were recording information relevant for other research groups in their databases. The total number of entries for biodiversity, landscape diversity and agrobiodiversity is 20 000 records.



**Figure 13.** Using data from MEMENTO database in the investigation in Bregalnica River basin.

Significant differences were visible in the use intensity of MEMENTO databases, which is a result of the different needs and specificity with which the field work is conducted by different expert groups. Namely, one of the major advantages of using GBS during field research is the opportunity for obtaining a precise location of the data and decreasing the time required to record the data, and a part of the research groups had either very little data to record, or a small number of locations for the data of interest, and as a result the advantages for using the methodology are lost. On the other hand, a part of the research groups did not had the opportunity to record data of interest (identification of microscopic species and other) during field work, but the collected material from specific locations was identified in a laboratory. Besides the use of the databases from all research groups, it is evident that for some types of research more adequate methods exist. Consequently, differences among the research groups were evident, the groups that work with biodiversity which can be identified on site (mammals, invertebrates, flora, herpetofauna, birds, etc.) had databases with 120-880 records, while the remaining groups (habitats, landscape ecology, algology, macro invertebrates, agrobiodiversity, etc.) had significantly lower number of records (16-80).

The areas of the significant habitats were mapped in detail, while the remaining habitat types and associations were marked as single spotted locations, which if needed were used in the mapping process.

New thematic maps for biological, landscape, forest and agrobiological diversity have been created and used for the creation of the ecological sensitivity map and the Study for natural heritage of the Eastern Planning Region. The created maps include: soil map of the research area, geological

base maps, capacity maps, balance and demand-supply of ecosystem services, habitat CORINE map, protected and proposed for protection areas maps, maps of internationally important areas.

### **3.5 New principles, innovative approaches and application of good international practices**

The creation of the ecological sensitivity map of the river Bregalnica watershed was the main activity of the project. The experts’ capacities of this project used and developed for the first time adaptations of the state-of-the-art methodology for creation of an ecological sensitivity map. The adaptations were made because:

- The specificity of the region of the research area (which is a combination of watershed and administrative area and it is called area of interest) and
- For overcoming the problem of unequal distribution of data and knowledge for biodiversity in the area of interest.

The parameters used with this methodology are: structure (specific aspects of the position of the terrain of the area of interest), composition (contain data for biodiversity), and abiotic risks.

More details for the creation of the ecological sensitivity map, the used methodology and parameters are provided in the report Ecological Sensitivity Map with interpretations.

Additionally, the assessment of the importance of the landscapes and corridors for the habitat connectivity is one more methodology which is used for the first time for analysis of the landscape diversity data in Macedonia.

The use of MEMENTO as base for standardised way of data collection is another innovation which was included in the realisation of the activities of this project.

## 4 Cooperation with other organizations

During the implementation of this project activity, there was a continuous cooperation with all other project activities within “The Nature Conservation Project in Macedonia”. Certainly, when implementing the project activity, the managing team considered maintaining and strengthening the cooperation not only with this Project, but also with all key stakeholders active in the entire Bregalnica River basin. Exchange of information for better implementation of the different projects was of a particular importance when defining the condition with the natural values in the region. Thus, the coordinating team had continuous consultation with all stakeholders, especially with the Agency for Spatial Planning and the Development Center for the East Planning Region.

Very important aspect for this project activity, as well as for the project activity for management of Bregalnica River basin which is led by SECO - State Secretariat for Economic Affairs, was the closer cooperation and the exchange of information between the teams working in the region – especially for the data for Bregalnica River basin important for defining the map of the ecological sensitivity. Thus, the managing team in cooperation with Farmahem and Development Center for the East Planning Region was regularly delivering data from and to the national institutions, local authorities and organizations that worked in the region. The borders of the investigated area along the Bregalnica River basin were adjusted with the borders used during the investigations for the project activity financed by SECO, in order to have easier and coordinated data management for the EPR as final user.

In this direction, very good cooperation was established with the MoEPP in terms of providing data for Bregalnica River basin important for defining the system of future protected areas in the basin.

Moreover, aiming for coordination and cooperation between all project activities, an mutual Agreement was achieved that this project activity will deliver its all findings for the biological and landscape diversity and proposed areas which will be identified as important for protection, to the MoEPP and the Agency for Spatial Planning before the sectoral studies necessary for the creation of the Spatial Plan for the Eastern Planning Region are finalized.

### 4.1 Cooperation with the other project activities from “The Nature Conservation Programme” and other project activities in the region

The Managing Team had constant cooperation with and coordinated the actions of this project activity with all other project activities within “The Nature Conservation Project in Macedonia” which is supported by Swiss Agency for Development and Cooperation (SDC).

All actions and results were transparently presented in front of all organization and institutions involved in the project: Farmahem DOOEL Skopje, Development Center for the East Planning Region, Fundation OHO, SECO - State Secretariat for Economic Affairs with the project activity „PURS – Management of Bregalnica River basin” and IDEAO.K (elaborators of the “Study for the status of the potentials for tourism development in the East Planning Region”).

This project activity has contributed in defining the Study and the Strategy for tourism development in the East Planning Region, by giving directions and data for including of natural values and resources as potential for future tourism development in this region. **IDEAO.K** and Development Center for the Eastern Planning Region have organized 3 working meetings for development of **Strategy for tourism development in the East Planning Region and Action Plan** (held accordingly on 31.10.2014, 05.06.2015 and final event on 15.10.2015 in Shtip). Besides the Managing Team of this and other project activities, many local authorities, private business owners, regional governmental agencies and NGOs attended the meetings with main aim –to jointly develop this strategical document.

Additionally, the **Development Center for the East Planning Region** has presented the Development Project for the East Planning Region (2015 – 2019) on 21.11.2014, and part of the planned actions were considered when defining the future proposed protected areas in the area of the basin and/or the potential threats towards them.

**SECO - State Secretariat for Economic Affairs** with the project activity „PURS – Management of Bregalnica River basin” have organized several public presentations and workshops for implementation of their project activity (public presentation of the project activity in December 2014 and final presentation in November 2015). The direct connection and possibility for mutual cooperation between these two project activities was appointed during the workshop organized by the Group for National Politics Dialogue on the topic “Requirements for improvement of the capacities for water management” held in December 2015. This resulted with direct cooperation through exchange of GIS data between SECO and the Managing Team.

The Managing Team has established cooperation with Farmahem since planning the scope of this project activity. Farmahem has directly followed the progress of this project activity as they are a national coordinators for “The Nature Conservation Project in Macedonia” (Figure 14). Moreover, by the announcement of the Second Call for small grants in September 2015, the Macedonian Ecological Society continued its direct involvement through the awarded small grant “Trail of the Woodpecker”. The project is planned to be implemented until end of first half of 2016 and represents direct conservation action by establishment of educational trail, which is planned to be set near Ponikva, Osogovo Mts.





**Figure 14.** Representatives from Farmahem, DCEPR and Helvetas attending the fourth expert meeting

**Foundation OHO** has its own project activity within “The Nature Conservation Project in Macedonia”, which is related to educational actions in the area of Bregalnica River basin. On a request of the Foundation, a cooperation was established with the Macedonian Ecological Society in February 2015, by providing help in defining the most important tree and bird species found in the area of Bregalnica River basin. Macedonian Ecological Society has commented regarding the scientific aspects of the educational package prepared and delivered by foundation OHO, and got access to the final version of the package.

## 4.2 Cooperation with other non-governmental organizations and stakeholders

During the implementation of the project activity, Dekons-Ema continued its cooperation with other non-governmental organizations. Macedonian Ecological Society (MES) was a part of the Managing and investigating team, using its experts and technical capacities for implementation of the project activity. MES has great experience in planning and organizing complex field investigations in the region and gives technical and experts’ support for implementation of the project activity. It appeared that, MES with its experience gathered through the implementation of the long-term project for protection of Osogovo Mts. and the projects for studying Ovche pole and Dolna Bregalnica, as well as the data from some independent investigations in the area of Bregalnica river basin, provided valuable help and were used in defining the natural values in Bregalnica River basin and EPR.

During whole period of cooperation, MES engaged senior experts and assistants for realization of the field investigations – as a way to strengthen its own experts’ capacities. Additionally, MES provided access to cartography information and databases for biodiversity in the area of Bregalnica River basin. The experts’ and technical aspect of the implementation of this project activity together with MES, was conducted with many consultative meetings (7 meetings in 2014 – when defining the methodology and the specific activities and only 2 meetings in 2015).

Through direct cooperation with the local authorities from the East Planning Region (thereby also in the area of the basin), the Managing Team have presented the results and the findings from the field investigations during the meeting of the Council of mayor from the EPR held in July 2015. The conclusion of this meeting was that local authorities consider the economical development of the region as a priority, and that the primary concept for protected areas sounds contra productive. This consciousness is one of the next goals to work on in the area of the basin and EPR – to use the outputs of this project activity (Study for the Natural Heritage and Map of Ecological Sensitivity) when working with the stakeholders from the local authorities during the establishment of protected areas in Bregalnica River basin, for effective conservation of the biodiversity.

### **4.3 Cooperation with Agency for Spatial Planning**

In the period August-October 2015, the Managing Team had intense cooperation with the Agency for Spatial Planning, in order to consolidate the activities and the results that are of mutual interest. In that period, the Agency was in a final phase of the preparation of the separate studies for the Spatial Plan for East Planning Region. Results from the valorization of the biological, landscape, forest and agriculture diversity are overlapping with this Spatial plan. In order to adjust the findings, it was agreed to foster the production of the Map of ecological Sensitivity and the Study for Natural Heritage in EPR, and integrate them in the Spatial Plan of EPR. With this we achieved one of the most important goals of this project activity – direct incorporation of the results from the biodiversity study into a regional strategic document.

### **4.4 Cooperation with the Ministry of Environment and Physical Planning**

The Managing team and the Ministry of Environment and Physical Planning organized 2 meetings between Farmahem, Agency of Spatial Planning and Development Centre for East Planning Region (held accordingly on 12.03.2015 and 20.03.2015 in Skopje). During the first meeting, it was agreed that this project activity will contribute in the elaboration of the Study for Natural Heritage in EPR (document to be used during the elaboration of the Spatial Plan for EPR by the Agency of Spatial Planning). On the second

meeting, with the Department of nature in MoEPP, it was suggested to create a Steering Committee consisted of representatives from the municipalities from EPR, and to communicate with and inform the local authorities. Additionally, it was agreed to incorporate also information for the geological sites and characteristics from the final study of this project activity, and to share them with Macedonian Info Centre.

There was a direct cooperation with the MoEPP (precisely, with the Department of Nature) through sharing information from the field investigations along the Bregalnica River basin, as well as their active participation in the investigations. Experts, together with the MoEPP, conducted joint visits to the important sites at the beginning of June 2015. Following sites/localities were visited: Gladno Pole – important steppe locality with several new species found; Slan Dol near v. Penush, where there are well preserved willow-poplar riparian forests, steppe habitats, saline wetlands and springs; gorge of river Zletovska, Beaz Tepe and Kartal where there are natural pine associations in a beach forest.

After the last experts meeting within this project activity, another meeting with the Department of Nature was held in order to review all protected areas (existing, proposed and newly identified ones), as well as to set up priorities and directions for starting processes of designation of protected areas in future.

### **4.5 Involvement and cooperation with students**

One of the goals of the project activity and a working task for the Project Team were cooperation with student organizations and involvement of students in the field investigations.

In the period 07-22.07.2014, a 15-days summer research camp was organized on Plachkovica Mt. in cooperation with Biology Students Research Society (Figure 15). During the field activities, following localities belonging to Bregalnica River basin were visited: Lisec, valley of river Lomija, Turtel. More than 30 participants were involved in the investigations, of which majority were students and 7 experts from the Project Team (S. Hristovski, Lj. Melovski, Lj. Tomovich, B. Sterijovski, K. Rusevska, N. Melovska, D. Jovanovska and Z. Levkov - Annex 2). During the investigations, many data on the biodiversity of Plachkovica Mt. were collected. Afterwards, when investigations ended, the data were processed and analyzed by the students with the help of the experts. These results were used for biodiversity assessment in the Bregalnica River basin.



**Figure 15.** Working with students from Biology Students Research Society on Plachkovica Mt.

The cooperation with the Biology Students Research Society continued in 2015 by organizing several one-day field trips (Pehchevska River and Slan Dol) and one two-week research camp at Klepalo, Berovo region. During the research camp, following localities were visited: Klepalo, Ramni Rid, Chaushica, Aramiski Rid, Divna, Lake Berovo, Murite, Kjeramizhdjen, Ambarite, Chengino kale, Gola Chuka, Dabevski potok, Klepalska River, Breza and Karaulnik, which over wide scope of habitats and species (Figure 16 and 17).



**Figure 16.** Specific habitats in the area of Bregalnica river basin (fir forests at Murite, sand extractions near v. Kjoselari, erosive forms – Slan Dol, bog with Round-leaved Sundew – Chengino Kale)



**Figure 17.** Specific species in the area of Bregalnica river basin (*Suncus etruscus* at Blatishte, larvae form the butterfly *Cerura vinula*, a flock of cows on Chengino Kale and Round-leaved Sundew)

36 participants were included in the investigations, of which 17 were students, 6 were secondary school students and 10 national and international experts (Lj. Melovski, D. Melovski, N. Melovska, D. Jovanovska, I. Lozanovska, D. Kitanova, D. Uzunova, M. Veleviski, Lj. Tomovich, I. Dedov (Annex 3). The students and the secondary school students participated in all field investigations, processed and analyzed all collected material under the supervision of the experts (Figure 18). Many other students and postgraduates were also included in the investigation of various fields: entomology, ornithology, mammology, agrobiodiversity, identification of forests with high natural value etc.

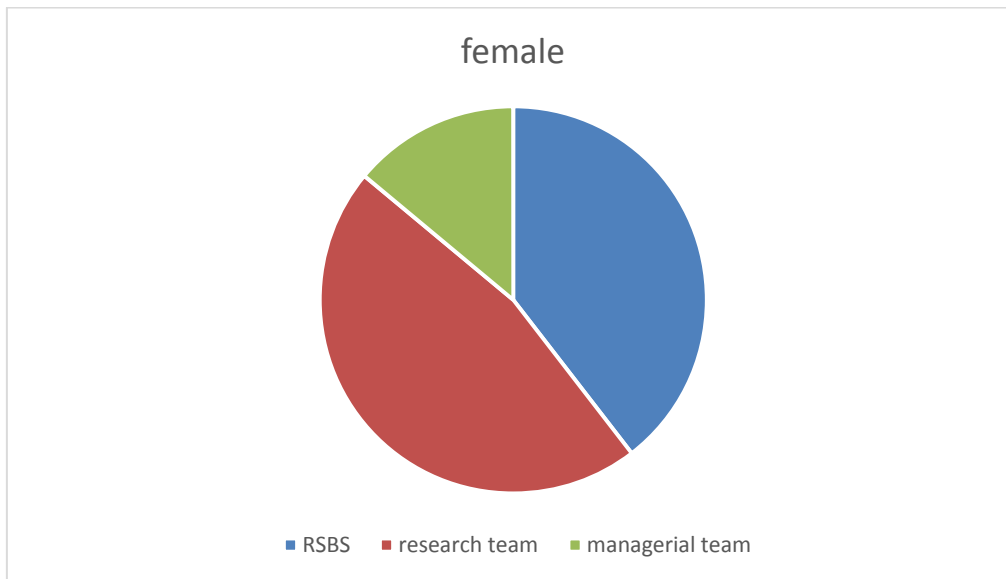


**Figure 18.** Working with students from Biology Students Research Society at Klepalo

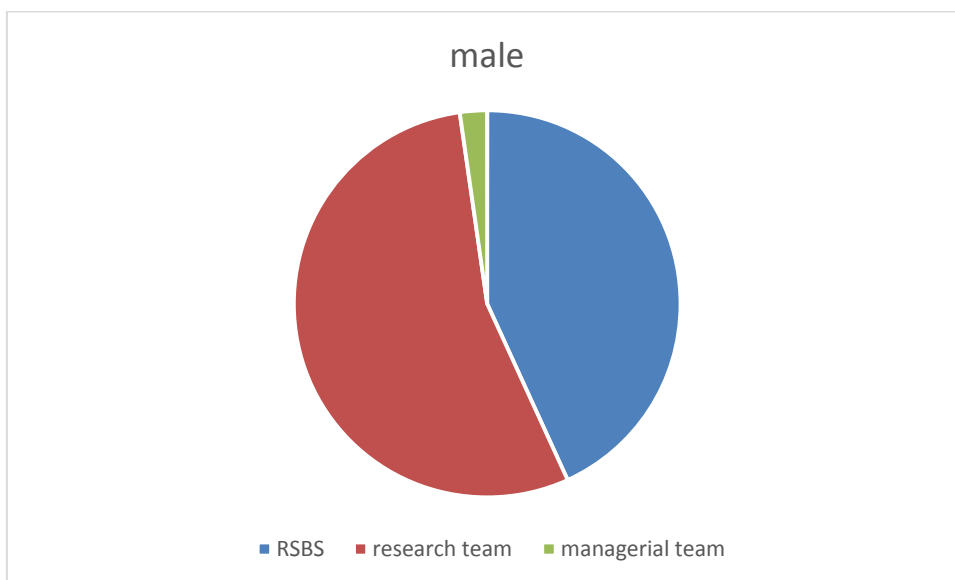
Also, these data were included in the valorization of the biological, landscape, agro-biological and forest diversity in the area of Bregalnica River basin.

#### 4.6 Transversal schemes in implementation of the actions

In the implementation of this project activity, various profiles of participants were directly involved: from experts to volunteers, who were involved in realization of specific tasks. A total of 85 participants were involved, which, according to the different gender and the role in the project activity, are divided on the following way presented in photos 19 and 20.



**Figure 19.** Overview of the female participants from different groups in implementation of the project activity

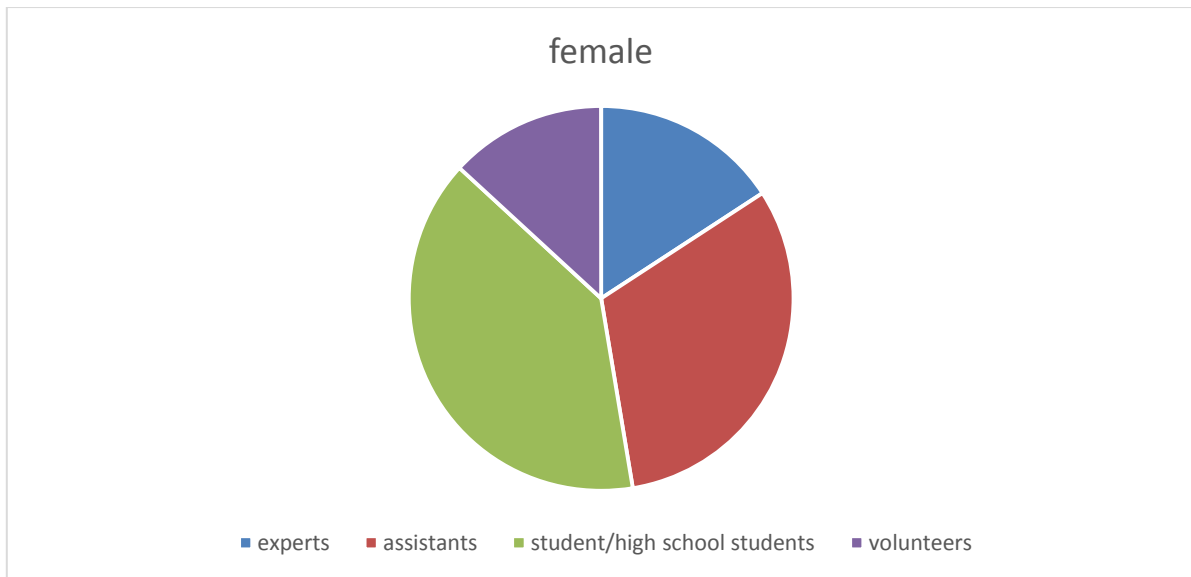


**Figure 20.** Overview of the male participants from different groups in implementation of the project activity

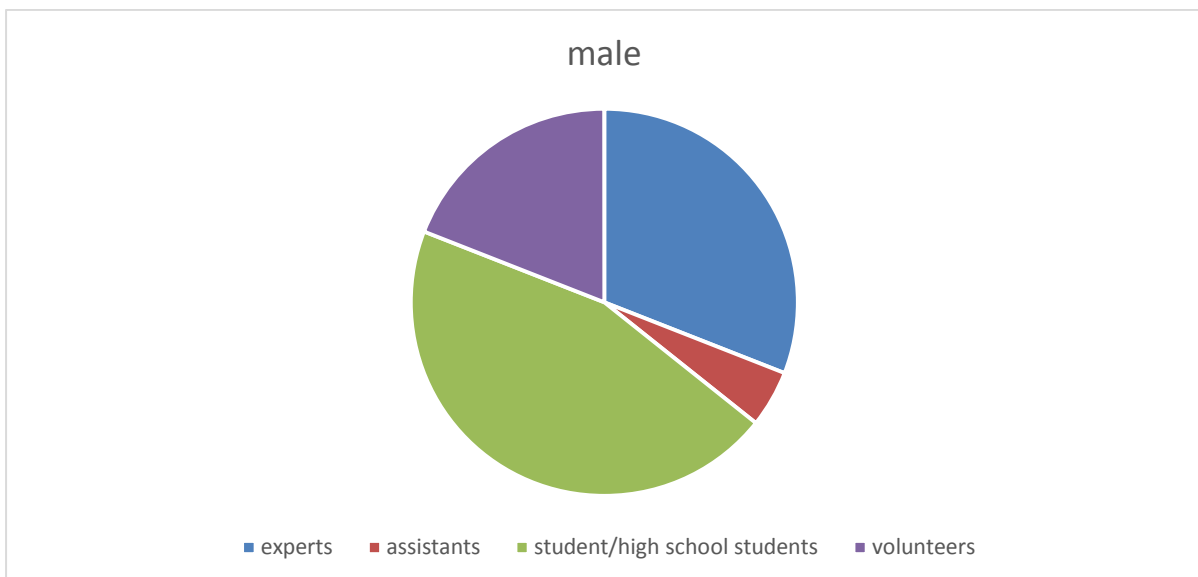
Data showed that, according to the different groups in implementation of the project activity (BSRS, investigating team and managing team), female gender is dominant in the managing team (14%) – and 2% males are managers. In the investigating team, males are dominant (53 %), while the females are 47%.

More detail overview of the male-female ratio according to the level of expertise in the implementation of the project activity, are presented below (Figure 21 and 22).





**Figure 21.** Overview of female participants in the implementation of the project activity according to the expertise



**Figure 22.** Overview of male participants in the implementation of the project activity according to the expertise

Regarding the expertise, most of the experts in the implementation of this project activities were males (31%), while only 16 % were females. The female participants were more often assistants of experts (up to 32%), compared with males with only 5 %. Males are also dominant among the students/secondary school students (45%), compared to females with 39 %.

Although there is partial domination of the male gender among the participants of this project activity, still this is not a big difference.

## 5 Main Outputs

Numerous documents were produced as a result of the analysis of the collected data for the biological, forest, landscape diversity and agrobiodiversity. A list of all these documents is presented in the text bellow.

### 5.1 Final reports

- 1.1 Biodiversity of Bregalnica River basin
  - 1.1.1 Final experts report #1 – Habitats in Bregalnica River Basin
  - 1.1.2 Final experts report #2 – Plant diversity in Bregalnica River Basin
  - 1.1.3 Final experts report #3 – Fungi in Bregalnica River Basin
  - 1.1.4 Final experts report #4 – Diatom flora in Bregalnica River Basin
  - 1.1.5 Final experts report #5 – Macroinvertebrate fauna in Bregalnica River Basin
  - 1.1.6 Final experts report #6 – Dragonflies in Bregalnica River Basin
  - 1.1.7 Final experts report #7 – Ground beetle diversity (Coleoptera, Carabidae) in Bregalnica River Basin
  - 1.1.8 Final experts report #8 – Daily butterflies (Lepidoptera, Papilionoidea) in Bregalnica River Basin
  - 1.1.9 Final experts report #9 – Batrachofauna and herpetofauna in Bregalnica River Basin
  - 1.1.10 Final experts report #10 – Birds in Bregalnica River Basin
  - 1.1.11 Final experts report #11 – Mammals in Bregalnica River Basin
  - 1.1.12 Final experts report #12 – Plant agrobiodiversity in Bregalnica River Basin
  - 1.1.13 Final experts report #13 – Biological diversity in domestic animals in Bregalnica River Basin
  - 1.1.14 Final experts report #14 – Forests in Bregalnica River Basin
  - 1.1.15 Final experts report #15 – Ecosystem services in Bregalnica River Basin
- 1.2 Landscape diversity in Bregalnica River Basin
- 1.3 Report on the status of Protected Areas in Bregalnica watershed
- 1.4 Map of Ecological Sensitivity

### 5.2 Periodical Reports

- 1.1. First and second experts report #1 for GIS and data bases
- 1.2. First and second experts report #2 for habitats

- 1.3. First and second experts report #3 for vascular plants
- 1.4. First and second experts report #4 for fungi
- 1.5. First and second experts report #5 for mammals (Mammalia)
- 1.6. First and second experts report #6 for birds (Aves)
- 1.7. First and second experts report #7 for amphibians and reptiles (Amphibia and Reptilia)
- 1.8. First and second experts report #8 for dragonflies (Odonata)
- 1.9. First and second experts report #9 for ground beetles (Coleoptera, Carabidae)
- 1.10. First and second experts report #11 for daily butterflies (Rhopalocera, Lepidoptera)
- 1.11. First and second experts report #11 for biodiversity in water ecosystems
- 1.12. First and second experts report #12a for agrobiodiversity – plants
- 1.13. First and second experts report #12b for agrobiodiversity – animals
- 1.14. First and second experts report #13 for forests
- 1.15. First and second experts report #14 for landscape diversity
- 1.16. First and second experts report #15 for ecosystem services and use of natural resources
- 1.17. First and second experts report #16 for protected areas

## 6 Annexes

### 6.1 Annex 1. List of all participants in the project activity with contacts

List of contacts from all persons involved in the project activity: Approach and methodology for analysis of the gaps in the ecological data and preparation of a map of ecological sensitivity for the area of Bregalnica River basin

	Name and surname	Role in the project activity	E-mail	Contact phone
Managing team	<b>Menka Spirovska</b>	<b>Coordination of the Project activity</b>	m.spirovska@ema.com.mk	078 252 676
	Violeta Stojanovska	Technical and administrative support	v.trajanovska@ema.com.mk	078 252 680
	Ana Despotovska	Technical and administrative support	a.despotovska@ema.com.mk	071 530 575
	Sofija Trajkovska	Technical and administrative support	s.trajkovska@ema.com.mk	
	<b>Slavcho Hristovski</b>	<b>Manager of project team and activities</b> (coordinator of investigating team for invertebrates)	slavco_h@pmf.ukim.mk	078 450 049
	Despina Kitanova	Support in implementation of project activities (part of the investigating team for invertebrates)	kitanova@mes.org.mk	078 317 639
Investigating team	Danka uzuova	Technical aspects of project activities (part of the investigating team for birds)	uzunova@mes.org.mk	070 908 131
	<b>Vlado Matevski</b>	<b>Key expert for flora, fungi , habitats and expert for flora</b>	vladom@pmf.ukim.mk	070 398 085
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	Katerina Rusevska	Fungi	krusevska@pmf.ukim.mk	070 423 684
	<b>Metodija Velevski</b>	<b>Key expert for fauna and expert for birds</b>	velevski@mes.org.mk	070 782 826
	<b>Dimche Melovski</b>	Coordinator of the mammalian research group and expert for butterflies	melovskid@mes.org.mk	078 393 436

**Integral Report for the Project implementation**

	<b>Name and surname</b>	<b>Role in the project activity</b>	<b>E-mail</b>	<b>Contact phone</b>
	Gjorgje Ivanov	Ungulates	ivanov@mes.org.mk	078 349 111
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	Valentina Slavevska Stamenkovikj	Macro-zoo benthos	vstamen@yahoo.com	070 382 685
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	Ksenija Putilin	Birds – assistant	putilin@mes.org.mk	070 364 254
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	Evgenija Jodanova	agro biodiversity – plants – assistant	jordanovska@mes.org.mk	075 496 494
	Aleksandra Todorovska	agro biodiversity – livestock – assistant	todorovska@mes.org.mk	071 605 645
	<b>Nikolcho Velkovski</b>	<b>Coordinator of the forest diversity group</b>	nikolcovelkovski@gmail.com	072 228 819

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	Ivana Lozanovska	Ecosystem services and natural resources	lozanovska@mes.org.mk	078 420 281
	<b>Ljupcho Melovski</b>	<b>Key expert for landscape</b>	melovski@pmf.ukim.mk	071 714 985
	Daniela Jovanovska	Landscape – assistant	jovanovska@mes.org.mk	078 370 705
	Vasko Avukatov	Coordinator for the group for digital data processing, mapping and database management	avukatov@mes.org.mk	070 434 280
	Aleksandar Sarov	digital data processing, mapping and database management – assistant	sarov@mes.org.mk	077 857 411

## 6.2 Annex 2. Participants of the 2-week-long field work organized by biology Students' Research Society on Plachkovica, 2014

1. Zlatko Levkov
2. Ljilana Tomovic
3. Aleksandar Pavlov
4. Elena Jovanovska
5. Magdalena Petkova
6. Ljupco Melovski
7. Natalija Angelova
8. Daniela Jovanovska
9. Maja Mladenova
10. Elena Minova
11. Martin Trpevski
12. Katerina Misirkova
13. Lozenka Ivanova
14. Mitko Karadelev
15. Katerina Rusevska
16. Aneta Lambevaska
17. Nenad Petrovski
18. Todor Tokov
19. Marjan Komenov
20. Ana Marija Atanasovska
21. Slavco Hristovski
22. Dime Melovski
23. Emilija Bozinovska
24. Kiril Arsovski
25. Georgi Hristov, Bugarska akademija na naukite
26. Sandra Mateska
27. Bogoljub Sterijoski
28. Danka Uzunova
29. Bisera Vlahova
30. Oliver Paunovski
31. Vasko Avukatov
32. Aleksandar Stojanov
33. Andrej Gonev
34. Trajce Mitev

### 6.3 Annex 3. Participants of the 2-week-long field work organized by biology Students' Research Society on Maleshevo (Klepalo), 2015

1. Kiril Arsovski
2. Magdalena Petkova
3. Maja Mladenova
4. Elena Minova
5. Martina Markovska
6. Pane Kamcev
7. Vesna Trpcevska
8. Oliver Paunovski
9. Monika
10. Filip Kiselovski
11. Nenad Petrovski
12. Aleksej Anovski
13. Vanco Gjorgjiev
14. Bisera Vlahova
15. Andrej Gonev
16. Gala Matevska
17. Sandra Matevska
18. Angela Klimovska
19. Marija Pitoseska
20. Slave Nakev
21. Dejan Rajkovski
22. Stefani Ordevska
23. Ljupco Milenkovski
24. Ivajlo Dedov
25. Dragan Cobanov
26. Slavco Hristovski
27. Ljupco Melovski
28. Dime Melovski
29. Ivana Lozanovska
30. Vasko Avukatov
31. Natalija Melovska
32. Daniela Jovanovska
33. Danka Uzunova