

„COMPETITION FOR FINANCIAL SUPPORT FOR BASIC RESEARCH PROJECTS – 2025”

Administrative description of the project

Competition:
Competition for financial support of basic research projects – 2025
Main research area, of the project:
Agricultural sciences
Additional research area – for interdisciplinary projects:
Biological Sciences
Key words (up to 5):
Erosion, erosion control activities, mountain watersheds, biological quality elements
Project type: (write 1 – if you apply only with applying organization; write 2- if you have partner organizations)
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Project title:
Study the influence of erosion and erosion control activities on river ecosystems
Type of the planned research (financial support can be provided only for fundamental research):
<p>Fundamental, complex studies are planned, including field, laboratory work and the application of remote sensing methods to establish the impact of erosion and erosion control activities on river ecosystems in selected representative catchments on which there is no other significant pressure established (i.e. there is no impact of other factors that would affect the results of the studies) on the territory of the Basin River Directorate "East Aegean " (BRD EA). The assessment of the ecological status of river ecosystems will be based on the biological element of quality (BEQ) aquatic macrophytes. The impact of erosion processes on them will be studied by determining the amount of sediments that are transported and deposited in water courses as a result of water erosion and the macro and microelements that they contain. The amount of sediment will be determined by applying methods for assessing the risk of erosion and the amount of eroded soil using GIS (geographic information systems) and ground and airborne LiDAR (light detector and range) three-dimensional monitoring using laser sensors. The content of various elements in the soil will be determined by taking samples from certain parts of the watershed and examining them in a laboratory environment. The elements that have reached the watercourse will also be studied. The impact of erosion control activities, through which the environment and the regime of watercourses are changed, will also be studied. For hydrotechnical facilities, measurements of their main elements that affect the abiotic conditions and, respectively, the selected BEQ will be carried out, and for crops, taxonomic measurements will be made to determine the possibility of retaining sediment and nutrients and their impact on hydrochemical indicators will be determined. Dendrochronological studies are also planned to identify negative events that have affected crop growth. Maps will be made to more clearly visualize some of the results. This interdisciplinary approach to assessing the impact of erosion and erosion control activities on river ecosystems is new and there is no data for the territory of Bulgaria. The use of LiDAR technology for measuring erosion has also not been applied to date in the territory of our country. The results of the research will contribute to the development of fundamental research related to new knowledge, assessments and methods, which will be at a world scientific level. The high scientific and practical value of the results and the combination of several disciplines will provide an opportunity to present the results at various scientific forums</p>

and to a very wide audience. The results will be able to be presented in publications in various prestigious international scientific journals.
<i>Applying organization:</i>
Forest Research Institute – BAS
<i>Partner organizations:</i>
<i>Coordinator of the research team (academic position and degree, name):</i>
Assoc. Prof. Dr. Eli Pavlova-Traykova
<i>Coordinator's address (postal, electronic, phone):</i>
Postal: 132, "St. Kliment Ohridski" Blvd.1756 Sofia Electronic: pavlova.eli77@gmail.com Phone: 0887828213
<i>Basic budget (without the additional budget for equipment or immaterial assets) (in BGN):</i>
180 000 BGN
<i>Additional budget for equipment or immaterial assets (in BGN):</i>
75 000 BGN

Abstract of the project:

In Bulgaria, natural conditions predispose to the development of intensive soil erosion. Our country is characterized by a rugged hilly-mountainous relief and easily eroded soils, a climate characterized by heavy rainfall with high intensity and significant surface runoff with a high erosive impact. Due to the heavily eroded forest areas in the past, a large part of the mountain and semi-mountainous rivers have been strengthened, and in their watersheds significant anti-erosion crops have been created. This has led to the taming of water flows and a reduction in a large part of the sediments carried by water erosion. In recent years, however, an increase in sediments of various sizes has again been established as a result of the reduced retention capacity of forest stands and noticeable changes in the main elements of the climate. The increased input of fine sediments has both a direct and indirect impact on macrophyte communities, changing factors such as illumination and the structure and quality of the riverbed. The nature of these impacts depends largely on the rate of deposition and the type of deposited material. It has been established that changes in the composition of macrophyte communities can occur where the deposited material is richer in nutrients than the natural river bed. The aim of the study is to apply a new complex method to determine the impact of erosion and erosion control activities on river ecosystems. In order to establish the relationship between these processes, the application of remote sensing methods for assessing the risk of erosion and the amount of eroded soil, taxonomic measurements and dendrochronological analyses to establish the growth and productivity of crops, which is directly related to their ability to retain significant amounts of water and solid runoff. Soil and botanical studies will be carried out, as well as studies of water flows, which will determine the content of macro and microelements in different parts of the watershed. By applying methods for assessing erosion and estimating the amount of eroded soil, the amount of sediment can be predicted and, if necessary, unwanted processes can be directed in an appropriate direction by using various practices.

Expected results from the project

As a result of the research, it will be/will be:

- accumulation of fundamental scientific results and their systematization in a database.
- received up-to-date data on the main characteristics of the watersheds - physical-geographical conditions, plant cover, hydrographic system, soil erosion condition.
- established the impact of anti-erosion crops on water ecosystems.
- established the influence of hydrotechnical facilities on water ecosystems.
- established the amount of eroded soil and the potential and actual risk of erosion.
- established and mapped the spatial distribution of the catchment area according to the degree of erosion risk.
- an innovative approach to assessing erosion in our country was applied, using the capabilities of LiDAR.
- outlined the main impacts with a view to future such anti-erosion measures being carried out in a maximally sparing manner regarding water resources.
- results will also contribute to restoration measures of freshwater ecosystems, as they depend on the reliable detection of the impact of stressors on aquatic biota.

<i>Distribution of the requested budget for accomplishment of the project (in BGN) between the applying and partner organizations</i>	
<i>Organization:</i> Forest Research Institute – BAS	
Amount of basic budget: 180 000	Amount of additional budget: 75 000
<i>Organization:</i>	
Amount of basic budget:	Amount of additional budget:
<i>Organization:</i>	
Amount of basic budget:	Amount of additional budget:
<i>Requested total budget for accomplishment of the project (in BGN):</i>	
Total amount of basic budget:	Total amount of additional budget:

Members of the research team

<i>Organizations/team members¹</i>	<i>Note²</i>
<i>Applying organization:</i>	
Forest Research Institute – BAS	
<i>Coordinator of the research team</i>	
Assoc. Prof. Dr. Eli Pavlova-Traykova	researcher
<i>Team members:</i>	
Assoc. Prof. Dr. Gana Gecheva	Researcher
Assoc. Prof. Dr. Dimitar Dimitrov	Researcher
Assoc. Prof. Dr. Kiril Vassilev	Researcher
Chief assistant Dr. Milena Mitova	Researcher
Chief assistant Dr. Rositsa Yaneva	Researcher
Chief assistant Dr. Kameliya Petrova	post-doc
Chief assistant Dr. Elena Todorova	post-doc
Chief assistant Dr. Blagoy Koychev	post-doc
Chief assistant Dr. Sevdalin Belilov	post-doc
Veselin Marinkov	PhD student
Beloslava Genova	PhD student
Martin Georgiev	student

¹ Please, include the academic position and degree of each team member. Signatures are not required.

² Please, include the following notes: researcher, junior researcher, post-doc, PhD student, student, retired scientist, or researcher from abroad.