

PROTECT-STREAMS-4-SEA

The newsletter of the Protect-Streams-4-Sea (BSB963)

Issue # 5, January 2023

Common borders. Common solutions

The International Workshop on Protecting streams for a Clean Black Sea, Nehoiu, Romania, 4th-5th July, 2022

By Maria Marinescu, Oana Ristea

THE FIRST DAY - PRESENTATIONS (Monday, 04 July, 2022)



The International Workshop on Protecting streams for a Clean Black Sea was organized (Fig. 1) at “George Baiculescu” Cultural House, Nehoiu, Buzau County, ROMANIA, July 04-05, 2022.

The workshop was attended by representatives of stakeholders from Alunis Art Center NGO (Fig. 2), students and teachers from “Nicolae Iorga” Theoretical High School from Nehoiu, Municipalities of Nehoiu and Siriu, other project partners, members of the Romanian project team and guests (Gheorghe Constantin, director, Ministry of Environment, Water and Forests and Sorin Randasu, director, National Administration “Apele Romane” and the Technical Director of the Buzau-Ialomita River Basin Water Administration).

Figure 1. Dr. George N. Zaimes, Project Coordinator

SCIENTIFIC and FINANCIAL COMMITTEE MEETING

Valasia Iakovoglou (IHU-SARF) presented the LP activities completed and problems that they have faced. Maria Marinescu, BIWA presented the PP2 activities completed and problems encountered. Luiza Gevorgyan, YFU NGO presented the PP3 activities completed and problems re-solved. Ilya Trombitsky and Roman Corobov, Eco-TIRAS presented the PP4 activities completed and problems faced. Finally, Mustafa Tufekcioglu and Mehmet Yavuz, ACU, presented the PP5 activities completed and problems encountered.



SECOND DAY - Buzau River and Siriu Reservoir study visit (Tuesday, 05 July, 2022)

A study visit was organized in the pilot area of the project. During the trip, the first stop was at the waste collection equipment (skimmer vessel) purchased within the project that will be used for waste collection (wood, plastic, etc.) and Siriu Reservoir (Fig. 3) where Laura Zaharia, member of the BIWA project team, presented to the partners the skimmer vessel (Fig. 4) and some general information on the Siriu reservoir and dam regarding the uses of the reservoir, construction data, etc.



Figure 3. visit of the partners to the Siriu Reservoir



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The second stop was at Alunis Art Center and the barrier installed (Fig. 5) in Chirlesti locality area by the Alunis Art Center where the representative of ONG explained the working principle of the waste collector (barrier) on the Buzau River and expressed the hope that such barriers would reduce the amount of waste in the Buzau River

Figure 4. Skimmer vessel purchased within the BSB963 project



Figure 5. The barrier installed in Chirlesti locality area



The International Workshop on Preventing Water Pollution and Erosion in the Black Sea, Chisinau, Moldova, 13th -14th October, 2022

By Ilya Trombitsky

THE FIRST DAY - PRESENTATIONS (Thursday, October 13, 2022).



Figure 1. The Workshop participants.

The International Workshop on Preventing Water Pollution and Erosion in the Black Sea, was organized at the “Jazz” Hotel premises, Chisinau, Moldova. With 38 participants, the workshop attendees were included 38 participants (Fig.1) from governmental ministries and agencies (ministries of agriculture and environment, water and environmental agencies), universities, academic community, environmental NGOs and journalists (Fig. 2), students, and members of the BSB963 Project Team.

The first day was dedicated to the familiarization of the participants about the Black Sea Program and the "Protect-Streams-4-Sea" Project objectives and delivered outcomes. The representatives of the Moldovan ministries welcomed the seminar participants and presented their visions on the current situation in Moldova on the issues of soil erosion and water pollution. All project partners reported about results achieved, including the innovative methodologies. The participants asked the reporters numerous questions, receiving clarifications. In the end of the day the Project Scientific and Financial Committee Meetings took place.



Figure 2. Conference hall overview



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THE SECOND DAY - STUDY TRIP (Friday, October 14, 2022).



Figure 3. The target area of Baltata River valley

The scope of this trip was to familiarize project partners with the Moldovan project area (Baltata River basin) (Fig. 3), the local partner activities and results, as well as other informative objects. In this respect the group (13 people, representing by project partners) visited the Balabanesti village where soil and bank erosion evaluation was demonstrated by Dr. Ecaterina Kuharuk, local project manager, the land slides phenomenon, which is the real challenge in Moldova. After that the group has moved Old Orhei National Park, where on the River Raut the project litter trap of original design is established (Fig. 4,5). After that the project partners have moved to the left bank of the Dniester River to the city of Tiraspol, where they visited and very impressed by the modern "AquaTir" Sturgeon Enterprise, which produces more than 5 tons of black caviar in a year. (Fig. 6)



Figure 4. Observing litter trap functioning



Figure 5. Demonstration of erosion study with pins



Figure 6. Excursion to sturgeon farm in Tiraspol

The International Workshop on Sustainable Management of Mountainous Waters to Protect the Floodplains, Drama, Greece, 08th to 09th December, 2022

By Valasia Iakovoglou, IHU

THE FIRST DAY - PRESENTATIONS (Thursday, Dec 08, 2022)



Figure 1. High participation (>100 people) during the workshop with Dr. George N. Zaimis, Project Coordinator, presenting

The International Workshop on Sustainable Management of Mountainous Waters to Protect the Floodplains, was organized during two days (Dec 08-09, 2022) and took place at the Amphitheater of the department of School of Geotechnical Sciences of the International Hellenic University (IHU), Drama, Greece. The conference was considered a Great success since the participants were more than 100 (Fig. 1).



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During the conference partners and attendees shared their experiences and exchanged knowledge on best management practices based on innovative solutions such as nature-based approaches to reduce marine litter and pollutants that reach the sea, specifically the Black Sea). The opening remarks were done by the Deputy Regional Governor of Drama Mr Gregory Papaemmanouil that welcomed the partners of the project (Fig. 2).



Figure 2. Greetings from Keynote speakers Dr. P. Samaras and Governmental parties Mr Gregory Papaemmanouil

Continuously, Dr. Petros Samaras (Fig.3), the Dean of the School of Geotechnical Sciences of the International University of Greece, presented the topic “Valorization of non-conventional resources for energy production in municipal wastewater treatment plants”. Continuously, Mr. Fotis Kiourtsis (Fig. 3B), the representative of Macedonia and Thrace Forestry Policy Implementation Inspection Directorate of the Ministry of Environment and Energy, shared his experiences by presenting “Integration of forest genetic monitoring in forest management plans”.

Figure 3. Dr. Petros Samaras and Mr. Fotis Kiourtsis presented at the workshop related topics.



At the second session of the conference started with the Associate Professor and project coordinator of the project Dr. Giorgos Zaimis that presented the topic “Green Deal - Benefits of Nature-Based Solutions”. Continuously, Dr. Valasia Iakovoglou (Fig. 4A), project communication officer and Director of ecotourism sector at the UNESCO chair Con-E-Ect, contributed her experience with the topic “Ecotourism as a tool to achieve Sustainability for Ecosystems and Society”, while Dr. Paschalis Koutalakis (geologist) presented various applications of new technologies in water resources (Fig. 4B).



Figure 4. Dr. Valasia Iakovoglou and Dr P. Koutalakis, presented and shared their data topic related to the Project-Stream-4-Sea project



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Figure 5. Dr. Maria Marinescu, Mrs Luiza Gevorgyan & Dr Ekaterina Kuharuk presented at the workshop related topic

Following, (third section) Dr. Maria Marinescu (Project local manager/BIWA, Romania) presented the topic “Overview of the BSB963 project implementation - activities and results of BIWA” (Fig. 5A), while the representative from Armenia Mrs Luiza Gevorgyan (Project researcher/“Young Foresters Union” - UYF, Armenia) analyzed the theme “The use of the fingerprinting method in Debed River Basin for quantification of erosion and identification of non-point sources of the pollution” (Fig. 5B). Dr Ekaterina Kuharuk, the Moldavian partner presented “Particularities of the soil cover of the Baltata river basin: water erosion and pollution” (Fig. 5C).

Prof. Mustafa Tufekcioglu from Turkey indicated “The importance of the integrated watershed management concept when protecting the floodplains” (Fig. 6A). Finally, Mr. Georgios Gkiatas (Fig. 6B) (forester) presented the so far results of the project, with the theme “Results of Aggitis watershed on soil erosion/deposition hot spots”. Among the many attendees there were also distinct professionals such as, Mr. Manolis Hatzopoulos (the General Director of Development Drama S.A.), Mr. Vasilios Karydas (Firefighter-Investigative Officer of the Fire Service of Serres), Iordanis Kasapidis (managing director of A.M.K.E. Roots), representatives from the Kavala Forest Service, and students and citizens from the areas of Drama, Serres and Kavala. On the second day, an educational excursion took place in the Greek pilot area, the Aggitis river basin, which is located within the Regional Units of Drama, Kavala and Serres (Fig. 7). In particular, the partners visited the springs of Agia Varvara in Drama, the Kalliphitos torrent, the streams in the area of Mavrolefki, the Symboli Dam at Aggitis Confluence with other streams, the Alistrati cave, the Aggitis Gorge,



Figure 6. Prof. Mustafa Tufekcioglu from Turkey and Mr. Giorgos Gkiatas presented the BSB963 project.



Figure 7. Educational excursion ant the Greek pilot areas.

Mount Pangaio, the Holy Monastery of Panagia Eikosifonissa and finally the traditional village of Protli. The workshop was published on the Food and Agriculture Organization of the United Nations (FAO) official website, as it was dedicated both to the World Soil Day (December 5) and the International Mountain Day (December 11). The organization was done by A.M.K.E. Roots. Finally, we would like to thank all those who contributed to the organization of the two-day event, the hospitality, transportation and entertainment of the participants as well as all those who honored us with their presence. GERi Lab, Roots Make.



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Current research activities and project advancement - ACU-TURKEY

By Mustafa Tufekcioglu, Mehmet Yavuz, Cengizhan Yıldırım, Oğuzhan Bilgili

Water Quality and Erosion Estimation using SWAT

Soil Water Assessment Tool (SWAT) is widely used in the estimation, prevention and control of soil erosion, pollution control of non-point sources, and assessment of watershed management. The SWAT erosion simulation program is preferred in this project because it is practical to use and integrated with ArcGIS software. Besides, it can be easily calibrated with the SWAT-CUP program (Fig. 1). When the field measurements are calibrated on the simulation program, the closest results can easily be obtained. To run the SWAT erosion simulation program, soil and land use data, which are the most important bases, are collected. In this context, soil texture, bulk density and organic matter amounts were determined at 150 different points in the Arhavi Kapisre Stream Basin. The climatic data including precipitation, temperature, wind speed, solar radiation and humidity values, were taken from the meteorology station. Moreover, new land use maps continue to be produced using current satellite images. Thereafter, water quality and erosion amounts will be calculated for Arhavi Basin using the most current base data.

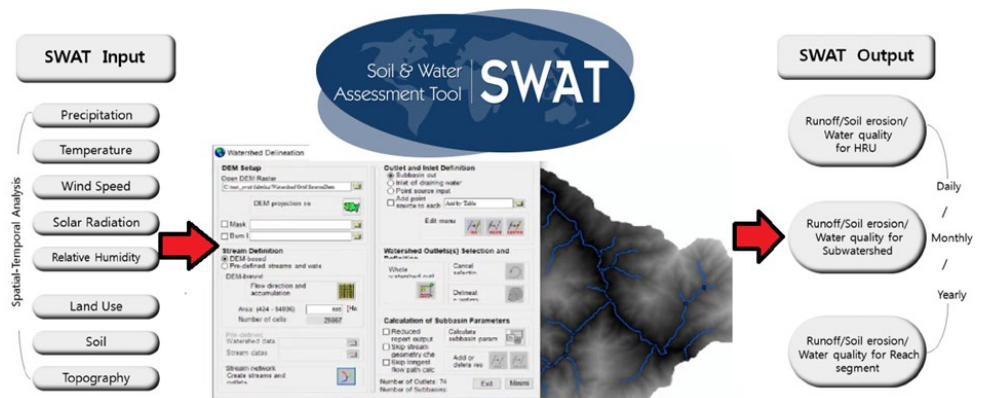


Figure 1. The outline of the SWAT workflow in the Kapisre Stream, Arhavi, Türkiye.

Hot Spot - Drone Mapping - Landslide Volume Estimation using Drones and Pix4D Software



Figure 2. A translational debris flow in the tea plant garden that overflowed the paved road near the Sirtoba village, Arhavi, Türkiye (Photo by M.Yavuz 2023)

After detecting the hotspots using the Normalized Difference Vegetation Index (NDVI), Normalized Difference Water Index (NDWI), and Normalized Difference Soil Index (NDWI), the DJI Matrice 300 RTK drone was utilized to further get close-up photos to delineate boundary extents and estimate 2D (area and length) and 3D (volume) measures of each landslide (Fig. 2). The Pix4D software was utilized for these procedures. The landslide types and forms based on Hungr et al. (2014) and Varnes and Eckel (1958) were also recorded during the image analysis. The pixel-based image analysis algorithm (PBIA) & the object-based image analysis algorithm (OBIA) were applied to detect and delineate the landslide boundaries, along with two other classifications (Fig. 3). The area and perimeter of each landslide were measured and compared using student's t-test analysis in IBM SPSS statistical software. We found that the OBIA algorithm performed well comparing to other classification techniques.

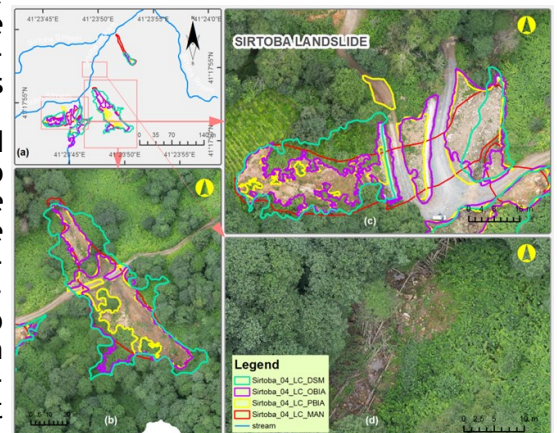


Figure 3. Outlining the extent of landslide boundaries using the four classifications

Current research activities achieved so far-IHU-SARF-Greece

By Paschalis Koutalakis

Research Project Advancements

One of the Protect-Streams-4-Sea deliverables is to monitor the geomorphological changes with innovative tools in order to locate hot-spots of erosion/deposition. The geomorphological conditions were studied for the Kallifitos Torrent near the city of Drama which belongs to the Aggitis Watershed (the Greek Pilot Area). The investigation utilized two different environments/point views: (a) traditional terrestrial methods and (b) innovative aerial methods. The traditional methods include the placement of erosion pins at streambanks and field cross-section measurements of the stream channel. For the innovative methods we used unmanned aerial vehicles to compare the geomorphologic changes over the last 3 years (2020-2022) with a total of six flights (Fig.1 & 2). The results from the UAVs showcased

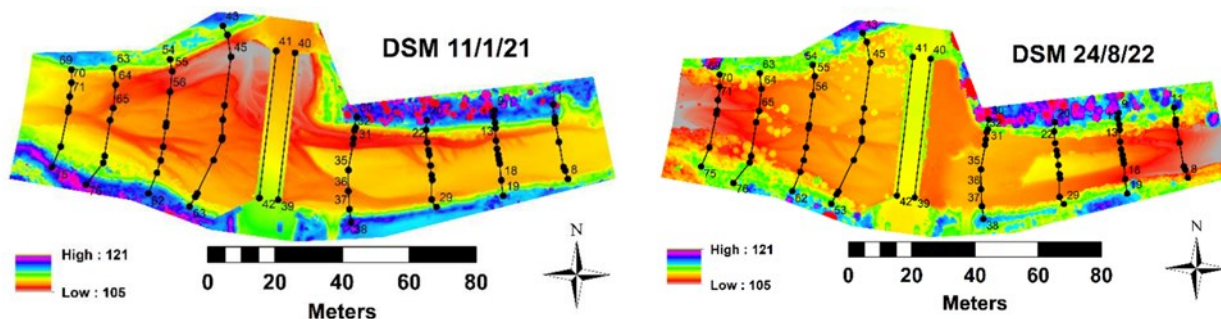


Figure 1. The Digital Surface Models (DSMs) of two different flights (January 2021 and August of 2022) showcased the geomorphic changes and the disequilibrium of the Kallifitos torrent. Cross sections via topographic survey were also performed (black lines).

the episodic nature of the torrent as both erosion and deposition were captured during the different monitoring periods. In addition, the impact of the anthropogenic structure (Irish bridge) is evident, since upstream, more substantial deposition was recorded compared to downstream. The similarity of the results between the innovative method and the traditional methods indicates the method's effectiveness and the usefulness in using UAV images for stream bank and bed monitoring. The results were published in Hydrology MDPI Scientific Journal.

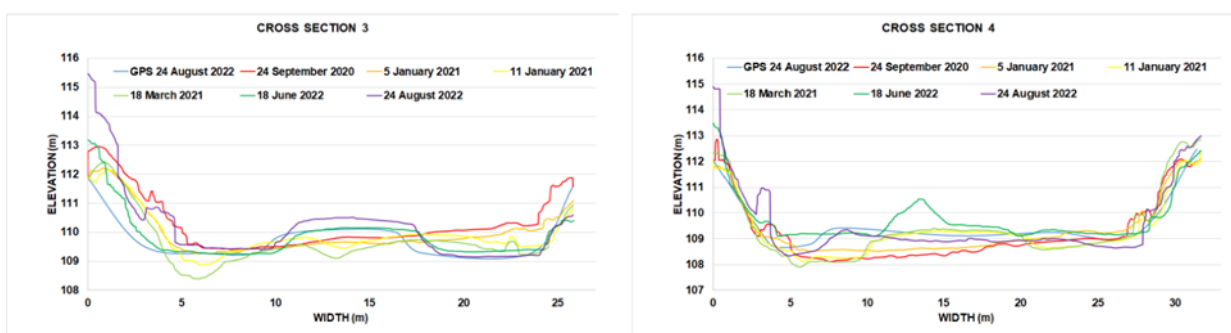


Figure 2. The cross sections depict the differences from the produced DSMs in each day. Cross sections are numbered from the East.

Apart of the geomorphologic change monitoring, UAVs have been employed to study the water flow. Water velocity and discharge are essential parameters for monitoring water resources sustainably. In addition is a key element that affects the streambed's locations where deposition or erosion occurs (hot-spots). A new method was produced that could be utilized to easily and safely (non-contact) estimate the streamflow based on data collected from UAVs. Both surface velocity and river geometry were

measured directly in field conditions (at a cross section of Aggitis River) via a UAV while streamflow was estimated with a new technique. Specifically, surface velocity was estimated by using image-based velocimetry software while river bathymetry was measured with a floating sonar, tethered like a pendulum to the UAV. Traditional field measurements were collected along the same cross-section in order to assess the accuracy of the remotely sensed velocities, depths, and discharges. In addition, the specific location is permanently monitored by the hydrologic and meteorologic station that were purchased and placed for the scopes of the project. Figure 3 presents the results of the method; specifically (a) the produced vectors (green arrows) of the surface velocity and the cross section (red line), (b) the surface velocity magnitude in colorized scale, (c) the velocity magnitude in the cross section and (d) the water depth at the cross section. Overall, the new technique is very promising for providing accurate UAV-based streamflow results compared to the field data. The results were published in Hydrology MDPI Scientific Journal.

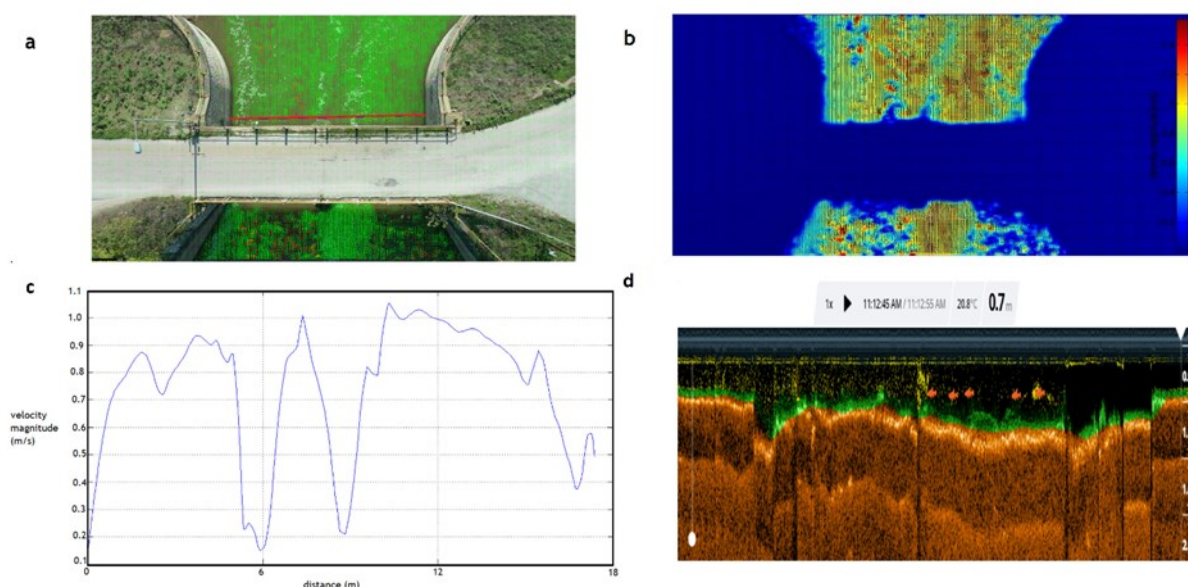


Figure 3. The results of the coupled sonar and UAV methodology: (a) the vectors (green arrows) of the surface velocity and the cross section (red line), (b) the surface velocity magnitude in colorized scale, (c) the velocity magnitude in the cross section and (d) the water depth at the cross section.

Awareness Events Protect-Streams-4-Sea by Eco-Tiras

By Ilya Trombitsky

The public awareness event - **The Youth Summer School “Dniester - 2022” (YSS)** was organized in Moldova dedicated to the rivers and Black Sea pollution from the non-point sources. 70 youngsters took part in it. During ten days - from July 8th to July 17th, 2022 on the Dniester River bank participants of the ages 15-20 studied the environmental issues and at the same time - built confidence between parts of the frozen conflict in Moldova, and also close to the area suffered with on-going war (Fig. 1).

10 days of the YSS were dedicated the spheres of environment protection, geography, history, archaeology, and anti-racism. Organizers tried to share the modern knowledge, methods, and democratic values. The special attention was given to the civic education via public participation in environmental decision making and in this respect we gave to the youth the possibility to enter to the real decision making process by commenting the real draft of the law which will be soon discuss in the parliament, and moreover, to draft the letter with the comments which was signed and sent to the Parliament. We used the options opened to the public by the Aarhus Convention.

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Figure 1. Evaluation of organic pollution and bank erosion of the Raut river during Eco-Tiras Youth Summer School

The YSS participants studied the issues of macro-, micro- and nanoplastic, water and bank erosion, as well as the impact of rivers on the eutrophication of the North-West Black Sea region.

Participants were familiarised with the use of drone technology in quantitative evaluation of bank and water erosion.

During YSS the participants initiated the press-conference, during which young participants were

informed about river ecosystem ecology and put a lot of questions to experts. For the development of public participation skills in environmental decision making experts proposed the youth to evaluate the pluses and minuses of the draft law placed to the Moldovan Parliament website for discussion and adoption (nr. 174 from May 10, 2022 - <https://www.parlament.md/.../language/ro-RO/Default.aspx>). Such training of the use of the Article 6(8) of the Aarhus Convention had a win-win nature: to transfer youngsters the skills of participation and to formulate their views on the draft law to improve its quality. In this respect the public hearings were organized. The participants formed four groups (authorities, business, interesting in adoption of a law, public (NGOs), and mass-media. Finally the youth formulated the letter to the country President, Prime-Minister and the Parliament speaker with the draft analysis and critics. In the result the environmentally non-friendly draft law was rejected even on the level of the government.

Awareness Events Protect-Streams-4-Sea by Eco-Tiras

By Ilya Trombitsky

The National Seminar was organized by Eco-Tiras on October 20, 2022 in the premises of the Summit Centre in Chisinau with the objective to familiarize the local stakeholders with the project, used methodologies, and its outcomes. 34 stakeholders representing the youth, students, academics, universities, NGOs (Fig. 1).



Figure 1. Project experts at the National seminar



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Awareness Events Protect-Streams-4-Sea by IHU, Greece

By Georgios Gkiatas

George Zaimes, Paschalis Koutalakis, Georgios Gkiatas, Georgios Pagonis, Iordanis Kasapidis, Konstantinos Krikopoulos and Theodoros Klepousniotis showcased to university students the methodologies that were implemented in the BSB963 “Protect-Streams-4-Sea” project on October 6th, 2022 that was held in Drama, Greece (Fig. 1). Specifically, they presented the use of the streamflow meter, informed them about the soil sampling methods and how to evaluate the different types of the soil erosion and the importance of use new technologies like drones, submarine drones and sonar that enhance the ability to estimate erosion and pollution in streams. More than 40 students participated in the awareness event, that showed great interest in the project since they got ideas for future thesis proposals but also were interested in participating in the project as volunteers.



Figure 1. The participants of the awareness event

International and local conferences

- ◆ Corobov R., Syrodoev G., Trombitsky I. WEPP model as a tool for assessing the soil loss and sediment deposition in a river basin // Transboundary Dniester River Basin Management and EU Integration - Step by Step / International conference (2022; Chişinău). Proc. of the Int. Conf. Chisinau, October 27-28 2022. - Chişinău: Eco-TIRAS, 2022. P. 129-134.
- ◆ Syrodoev G., Corobov R., Trombitsky I. WEPP modeling of soil loss and sediment deposition in the Baltata River basin // Transboundary Dniester River Basin Management and EU Integration - Step by Step / International conference (2022; Chişinău). Proc. of the Int. Conf. Chisinau, October 27-28 2022. - Chişinău: Eco-TIRAS, 2022. P. 206-211.
- ◆ Ecaterina Kuharuk, “The role of international projects in the greening of education in Moldova (on the example of the international project “Protect-Stream -4-Sea”), International scientific and methodological online seminar: “Analysis of educational programs in the context of the development of “Green” educational institutions” Astana, Kazakhstan, October 28, 2022.
- ◆ Yıldırım C., Tufekcioglu M. Change of Soil Surface Runoff Amounts Due to Different Land Uses. International Black Sea Modern Scientific Research Congress, Sept 29-Oct. 2, 2022, Rize, Türkiye.
- ◆ Yıldırım C., Tufekcioglu M. Measuring the Amount of Erosion in the Channel System Caused by Arhavı Kapistre River Flooding. International Black Sea Modern Scientific Research Congress, Sept 29-Oct. 2, 2022, Rize, Türkiye.
- ◆ Tufekcioglu, M. The Importance of the Integrated Watershed Management When Producing Controlled and Quality Water Production; Erosion, Torrent and Flood. (TR:Kaliteli ve Kontrollü Su Üretiminde Entegre Havza Yönetiminin Önemi; Erozyon, Sel ve Taşkınlar). Prof. Dr. Hasan Zuhuri Sarıkaya Su Yönetimi, Barajlar ve Enerji Sempozyumu, 23-24 December 2022, Artvin, Türkiye.
- ◆ Yavuz, M. Evaluating and Mapping Streamside Erosion and Corridors Using UAVs and Remote Sensing Techniques (TR: İHA’lar ve Uzaktan Algılama Teknikleri Kullanılarak Dere Kenarı Erozyonu ve Koridorlarının Değerlendirilerek Haritalanması). Prof. Dr. Hasan Zuhuri Sarıkaya Su Yönetimi, Barajlar ve Enerji Sempozyumu, 23-24 December 2022, Artvin, Türkiye.
- ◆ Zaimes, G.; Koutalakis, P.; Iakovoglou, V.; Gkiatas, G. (2022) Targeted approaches to implement nature-based solutions in Aggitis Watershed, Greece with the use of new technologies. In proceedings of the 8th International Conference on Water Resource and Environment (WRE 2022), 1-4 November 2022, Xian, China (online).
- ◆ Zaimes, G.; Iakovoglou, V.; Koutalakis, P.; Gkiatas, G.; Marinescu, M.; Ristea, O.; Diaconu, D.C.; Ghulijanyan, A.; Gevorgyan, L.; Trombitsky, I.; Kuharuk, E.; Tufekcioglu, M.; Yavuz, M.; Tufekcioglu A. (2022) Targeted approaches of nature-based solutions to mitigate nonpoint source pollutants. In proceedings of the International Conference on Energy, Power, Environment and Computer Science (EPECS2022), 6-27 September 2022, Beijing, China



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Publications

- ◆ Koutalakis, P., & Zaimis, G. N. (2022). River Flow Measurements Utilizing UAV-Based Surface Velocimetry and Bathymetry Coupled with Sonar. *Hydrology*, 9(8), 148.
- ◆ Gkiatas, G. T., Koutalakis, P. D., Kasapidis, I. K., Iakovoglou, V., & Zaimis, G. N. (2022). Monitoring and Quantifying the Fluvio-Geomorphological Changes in a Torrent Channel Using Images from Unmanned Aerial Vehicles. *Hydrology*, 9(10), 184.
- ◆ Sirodoev Igor G., Sirodoev Ghennadi N., Trombitsky Ilya. Using normalized difference indexes to determine erosion-prone areas: the case of the Bălțata River basin (Republic of Moldova) // *Journal of International Scientific Publications. Ecology & Safety*. Volume 16, 2022. P. 66-78. ISSN 1314-7234. <https://www.scientific-publications.net/get/1000052/1664112384553184.pdf>
- ◆ Romanescu V., Moshu A., Trombitsky I. Changes in the Fish Biodiversity of the Lower Dniester River (Moldova) // *Biodiversity Online Journal*, 2022, V.3, issue 3. P. 1-7. ISSN: 2637-7802. <https://crimsonpublishers.com/boj/pdf/BOJ.000561.pdf>

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[Protect Streams 4 Sea](https://www.youtube.com/channel/UC...)

New Videos

Please check out the new videos on our Youtube channel:

- a) Workshop in Romania - organizer BIWA - Siriu Reservoir - Buzau River (4th-5th July 2022)
- b) "Protection of the environment and the reduction of pollutants and waste in the Black Sea"
- c) Protection of the environment and the reduction of pollutants and waste in the Black Sea part B
- d) Awareness Event Eco-Tiras Dniester Youth Summer School, July 2022, MOLDOVA
- e) The litter trap boat to collect waste from the Siriu Reservoir's surface (Romanian Partner - BIWA)

Joint Operational Programme Black Sea Basin 2014-2020. Editor: Valasia Iakovoglou, (IHU-SARF)

Co Editor: Paschalis Koutalakis and Georgios Gkiatas, (IHU-SARF)

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