



# REPORT ON PURCHASED LABORATORY EQUIPMENT AND SOFTWARE

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University of Nis



**Strengthening of master curricula in water resources management  
for the Western Balkans HEIs and stakeholders**

## PROJECT INFO

|                          |   |
|--------------------------|---|
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## List of abbreviations

|          |   |
|----------|---|
| AUTh     | Aristotle University of Thessaloniki  |
| BOKU     | University of Natural Resources and Life Sciences, Vienna   |
| CBHE     | Capacity Building in Higher Education   |
| EACEA    | Education, Audiovisual and Culture Executive Agency   |
| EHEA     | European Higher Education Area  |
| EQF      | European Qualification Framework  |
| HE       | Higher Education  |
| HEI      | Higher Education Institution  |
| NEO      | National Erasmus Office   |
| NMBU     | Norwegian University of Life Sciences, Norway   |
| PWMC VV  | Public Water Management Company "Vode Vojvodine"  |
| SWARM    | Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders |
| UACEG    | University of Architecture, Civil Engineering and Geodesy, Bulgaria   |
| UNI      | University of Nis, Serbia   |
| UL       | University of Lisbon, Portugal  |
| UoM      | University of Montenegro  |
| UNIRIFCE | University of Rijeka, Croatia   |
| UNMO     | Dzemal Bijedic University of Mostar   |
| UNS      | University of Novi Sad  |
| UNSA     | University of Sarajevo  |
| UPKM     | University of Pristina in Kosovska Mitrovica  |
| TCASU    | Technical College of Applied Sciences Urosevac with temporary seat in Leposavic                               |
| WB       | Western Balkan  |
| WRM      | Water Resources Management  |

## 1. Introduction

This document is a part of activity WP2.6 Purchasing of literature, software and laboratory equipment, installation and activation under the project SWARM “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders” (Project number 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP).

A major financial part of the SWARM project was the purchase of the necessary laboratory and teaching equipment and software. Table 1.1 presents the realized budget per WB partner HEI.

The reason behind the purchase of equipment was to use it intensively for project related activities such as:

- Implementation of developed master curricula (WP4.1),
- Implementation of trainings for professionals in water sector (WP4.2).

The equipment and software will be used after the project as part of activities in teaching and learning process at the benefiting WB HEIs.

In order to evaluate the purchase and installation of the equipment, the following activities were conducted:

- receipt of property register with the respective equipment items and software from each WB HEI,
- pictures of equipment items were taken,
- protocol was signed with a confirmation signature on the receipt/installment of the full equipment that had been purchased and the integration of it into the property register,
- Erasmus+ stickers were put on the IT equipment, which is obligatory according to the EACEA Guidelines.

According to the Guidelines for the Use of the Grant, the beneficiary i.e. WB HEIs shall retain with project accounts:

- All invoices for all equipment declared costs,
- Proofs of payment (bank statement),
- Proofs of tendering procedure for purchases above EUR 25,000,
- Proof that VAT is not deductible (if VAT exemption is not obtained and VAT costs are charged to the project budget),
- Registration in the inventory registry.

According to the previous prepared specifications on the basis of knowledge and recommendations of the EU Consortium partners, the tender documentation for public procurement the project laboratory equipment and software was prepared. Four independent public procurement procedure executions (one per each of WB partner countries) were launched (<http://www.swarm.ni.ac.rs/activities?id=23>).

Professional instruments needed for laboratory and field exercises such as equipment for wastewater treatment experiments, equipment for wastewater sample analysing and preparation, engineering and technical teaching equipment, equipment for fluid mechanics, testing principles in hydrodynamics and flow in pipes were purchased, installed and activated at all WB partner HEIs. Software for water modelling was purchased for effective simulation of water resources problems.

The objective of the modernisation of the laboratories is to acquire students' practical knowledge in the field of WRM.

The open call procedures were performed according to the EU, national legislation and Erasmus+ guidelines. The open calls were officially announced in the public media and on project website and websites of WB HEIs. The whole WP2.6 was led by the Project Coordinator institution - University of Nis (UNI).

All relevant documents to procurement procedure were copied and archived in project central archive.

Seven equipped laboratories will be used for preparing new laboratory exercises for education students and also professionals in the water sector.

Table 1.1 Realized budget for purchasing of laboratory equipment and software

| No           | HEI  | Type                              | Equipment Costs (EUR) | Total (EUR)       |
|--------------|--|-----------------------------------|-----------------------|-------------------|
| 1            | University of Nis (UNI)                                | Teaching equipment                | 8,926.76              | 48,544.80         |
|              |  | Laboratory equipment              | 39,618.04             |                   |
| 2            | University of Novi Sad (UNS)                           | Teaching equipment                | 5,125.72              | 34,568.01         |
|              |  | Laboratory equipment              | 29,442.29             |                   |
| 3            | University of Sarajevo (UNSA)                          | Laboratory equipment and software | 33,995.80             | 33,995.80         |
| 4            | Dzemal Bijedic University of Mostar (UNMO)             | Laboratory equipment and software | 33,995.80             | 33,995.80         |
| 5            | University of Pristina in Kosovska Mitrovica (UPKM)    | Laboratory equipment              | 12,910.98             | 33,852.59         |
|              |  | Teaching equipment                | 20,941.61             |                   |
| 6            | Technical College of Applied Sciences Urosevac (TCASU) | Laboratory equipment and software | 33,766.45             | 33,766.45         |
| 7            | Univeristy of Montenegro (UoM)                         | Laboratory equipment and software | 33,990.00             | 33,990.00         |
| <b>Total</b> |  |                                   |                       | <b>252,713.45</b> |

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## 2. Purchased equipment and software

### 2.1 University of Nis

Following the equipment purchase procedure for the implementation of the International project, “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders/SWARM” (Project number 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP; European program Erasmus +), Faculty of Civil Engineering and Architecture, University of Nis, acquired following equipment: 2 desktop computers CPU I7, RAM 16GB, DDR5, SSD 512GB, 1TB HDD, GPU Nvidia 1080Ti; Camera NIKON D5300 (black) + 18-55mm VR DSLR; RangeVision Smart 3D Scanner + rotation table; FLIR Duo R Thermal Camera, UPS BPU Memo RT 3000VA -2700W; Tablet All-new Kindle Paperwhite Essentials Bundle; Equipment for Advanced hydrological investigations; Equipment for Losses in a pipe system; Base module for experiments in fluid mechanics; Equipment/methods of flow measurements.

The above-cited equipment will be used for:

- Two desktop computers will be used for simulation of the different types of streamflow regimes, for hydraulic structures modelling (especially for the intake structures with all infrastructure), for the pipe system modeling and for the modeling the plants for water treatment.
- 3D scanner will be used for scanning the materials which will be used as filter material in biological treatment of waste water, materials for trickling filter, and the scanning procedure must to be done before and after the using of trickling filter in order to see the amount of bacteria on material.
- FLIR Duo R Thermal Camera will be used for detecting the potential damages on the wastewater and sludge line in treatment plan. Their small dimensions and the opportunity to be installed for the drone will be essential in detecting the damages on the sludge digesters (sludge line).
- UPS BPU Memo is important for ensuring the continuous work, provides the uninterrupted power supply, of all installed computers together with measurement elements and for the continuous work of SCADA system.
- Equipment for advanced hydrological investigations will provide information’s of storage capacity of different type of soils, seepage flows, oscillation of groundwater levels and sediment transport. Two wells in experiment tank, together with pipe, will represent the good opportunity for students to get practical knowledge in testing the wells (quantity of water). Tube manometers, flow meter and measuring weir in the measuring tank represent the opportunity of students to practically see and calculate the water losses in different occasions. Also, the software for data acquisition will allow the continuous measurements.
- Equipment for the losses in a pipe system will be used to demonstrate the students the investigations of pressure losses in piping elements and shut-off devices (angle seat valve, gate valve). The device can be used for the analyses of water pressure losses through Venture

pipe. Six pipe sections capable of being individually shut off, with different piping elements will be used for analysis of sudden contraction and sudden enlargement of water in pipes.

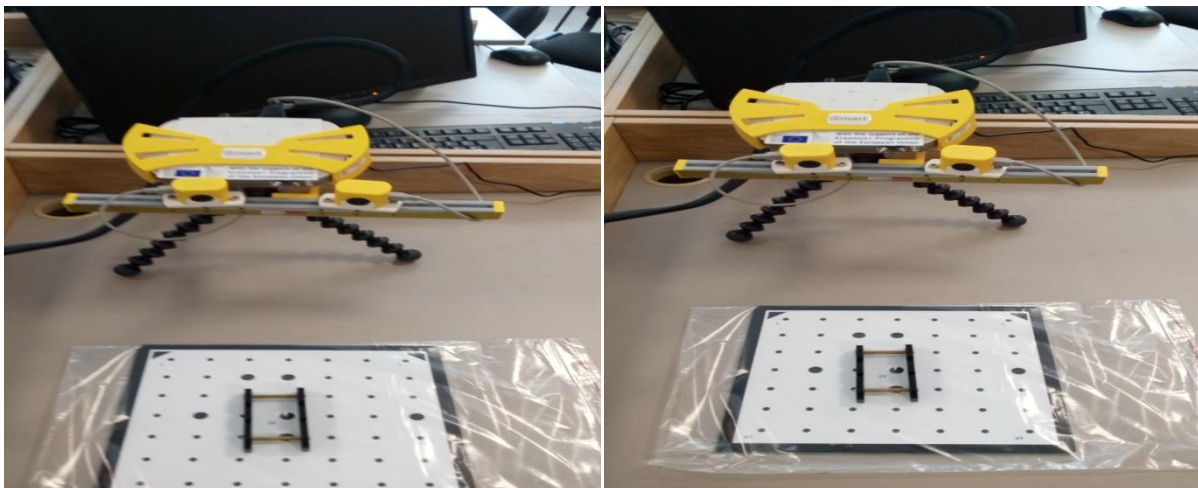
- Base module for experiments in fluid mechanics will demonstrate the closed water circuit, together with measuring tank and submersible pump. What is more, equipment can be used for volumetric flow rate measurements.
- Equipment/methods of flow measurements will be used to practically demonstrate (using the orifice plate flow meter/measuring nozzle, Venturi nozzle, rotometer and Pitot tube) the students different methods of flow rate measurement.

Table 2.1 Teaching equipment

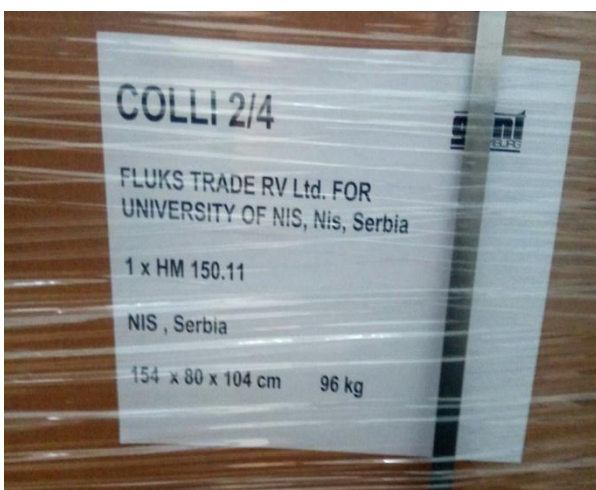
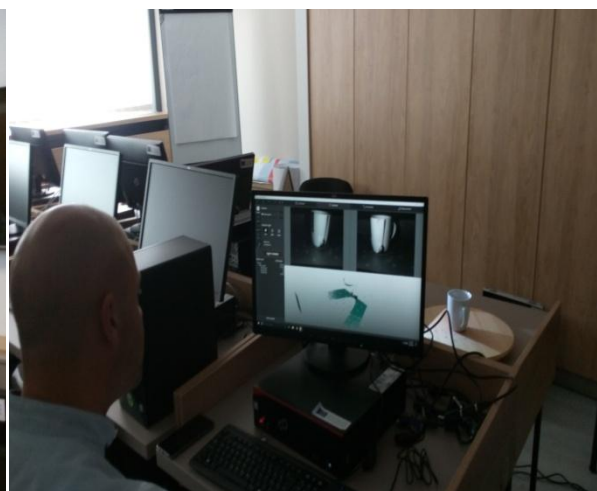
| No | Type                                 | Quantity |
|----|--------------------------------------|----------|
| 1  | HP Pavilion 690-0008ny               | 2        |
| 2  | NIKON Dig D5300 Black Set (18-55 mm) | 1        |
| 3  | RangeVision Smart - 3D scanner       | 1        |
| 4  | Flir duo thermal camera              | 1        |
| 5  | UPS BPU Memo RT 3000VA/2700W Online  | 1        |
| 6  | Pocket Book Basic 3 black            | 1        |

Table 2.2 Laboratory equipment

| No | Type   | Quantity |
|----|--|----------|
| 1  | Base module for experiments in fluid mechanics | 1        |
| 2  | Bernoulli's principle                          | 1        |
| 3  | Methods of flow measurement                    | 1        |
| 4  | Groundwater flow                               | 1        |





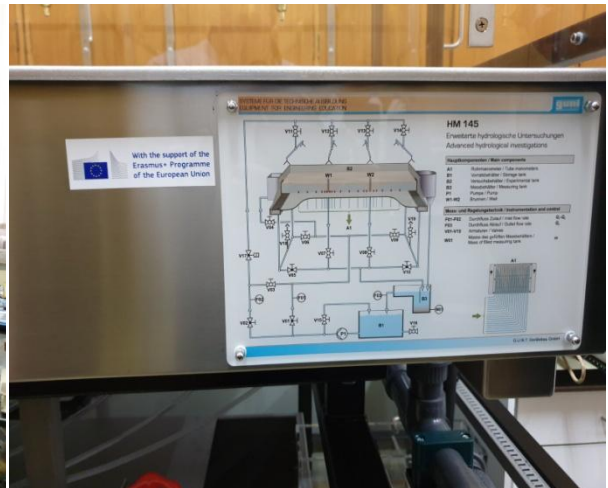
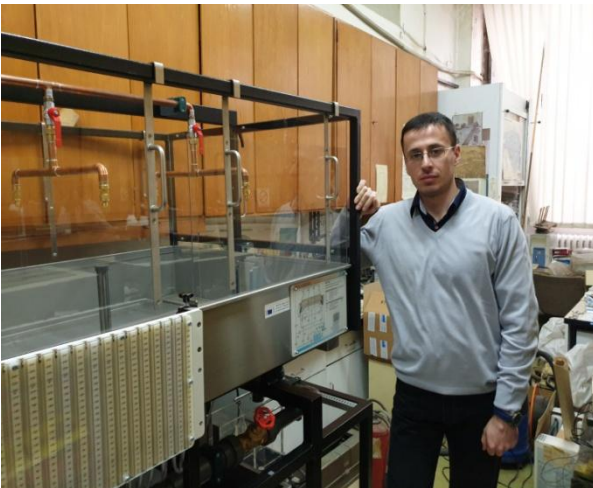














## 2.2 University of Novi Sad

Within the framework of the European Union-funded Erasmus + project, the Faculty of Technical Sciences, University of Novi Sad, has acquired computer and laboratory equipment. Erasmus + project title is “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders - SWARM, project number 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP. The equipment was procured through public procurement, in accordance with legal procedures.

The following computer equipment was purchased: 6 x headphones SENNHEISER GSP 300, 1 x cisco switch WS-C2960X-48TD-L with connection cable, 1 x freestanding rack for equipment storage Shrack DS428010-1 and 1 x laptop computer HP Envy 13-aq0019nm.

The following laboratory equipment was purchased: 1 x Bioreactor of 3L from plexiglass or glass with at least 8 side arms and bioreactor accessories, 1 x Refrigerated / heating circulator for temperature control of the reactor, 1x Two headed feeding reactor pumps for reactor operation, 1 x Pump of lower flow for carbon feeding, 1x Pump for SRT control of the reactor, 1x Air pump for aerobic conditions in the reactor, 1 x Mini peristaltic pump for pH reactor control, 2 x Air, Argon and supernatant removal on/off valves, 10 x Timers for automatic control of the reactor, 1 x Mixer (non-rotational agitation), 1 x Online carbon measurement, 1 x Online turbidity/suspended solids measurement, 1 x Online dissolved oxygen measurement, 1 x pH probe with controller and cables, 1 x Probes for dissolved oxygen and temperature, with monitor and cables, 2 x Glass flasks for reactors solutions, 1 x Jar Testing Equipment and 1 x Portable flowmeter for open channels and partially full pipes with ultrasonic compact Doppler sensor.

The aforementioned equipment will be used for:

- teaching process (laboratory exercises) on the innovated study program Water treatment and safety engineering within the SWARM project;
- upgrading of human and technical resources for the realization of teaching process at this study program;
- training of students for effective application of knowledge in the field of activities related to water resource planning and management;
- training of teaching staff and stakeholders;
- training of local community on issues related to water resource planning and management;
- students’ research and projects;
- conducting scientific research in the field of water resource planning and management and publishing results in the scientific journals.

Table 2.3 Teaching equipment

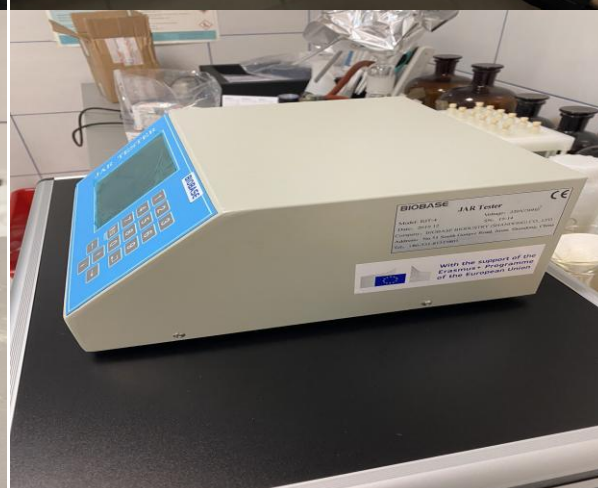
| No | Type   | Quantity |
|----|--|----------|
| 1  | Laptop HP Envy                                   | 1        |
| 2  | Headphone  | 6        |
| 3  | Switch 10/100/1000 48-port Cisco Catalyst 2960-X | 1        |
| 4  | Rack Cabinet                                     | 1        |

Table 2.4 Laboratory equipment

| No | Type   | Quantity |
|----|--|----------|
| 1  | MINIFOR laboratory fermentor/bioreactor advanced kit | 1        |
| 2  | MINIFORCYR   | 1        |
| 3  | MULTIFLOW  | 1        |



|    |                         |    |
|----|-------------------------|----|
| 4  | PRECIFLOW 1             | 1  |
| 5  | HIFLOW                  | 1  |
| 6  | MINI-4-pump             | 1  |
| 7  | DC-motor                | 1  |
| 8  | Minifor Clark DO        | 1  |
| 9  | LAMBDA redox            | 1  |
| 10 | LAMBDA pCO <sub>2</sub> | 1  |
| 11 | MINIFOR pH              | 1  |
| 12 | PRECIFLOW 2             | 1  |
| 13 | VENLAB                  | 2  |
| 14 | TIMELAMB                | 10 |
| 15 | MINIFOR pH              | 1  |
| 16 | MINIFOR vessel          | 2  |
| 17 | Protokometar PCF-KDA    | 1  |
| 18 | JAR Tester BJT-4        | 1  |













## 2.3 University of Sarajevo

In accordance with the procurement procedure for equipment for implementation Erasmus + SWARM project “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders” / SWARM – 597888-EPP-1-2018-1 RS-EPPKA2-CBHE-JP). The University of Sarajevo has acquired laboratory equipment for practical student exercises in the field of water flow in open and closed channels and in the field of groundwater flow. Two pieces of software in the field of water resource management were also purchased, Watershed Modeling System and Aquifer Win32, Unsaturated Zone Flow & Contaminant Transport-UnSat Suite, student versions.

The above equipment is intended primarily for teaching in the field of hydrotechnics, civil engineering, water resources management and environmental protection, for:

- lectures,
- conducting practical exercises on purchased laboratory equipment, where water flow in open and closed channels and groundwater flow can be analyzed,
- use of software for analysis and forecasting of different water and pollutant scenarios, both in the catchment area and in the non-saturated and saturated zones. This can significantly contribute to the improvement in the field of water management and protection, as well as the implementation of an integral and holistic approach in making the most favorable decisions.

Therefore, the use of equipment, both laboratory and software, will contribute to the development of the water resource management sector both at the local community and the wider community.

The equipment will be widely used for the preparation of graduate and master's theses, as well as for the preparation of doctoral theses.

Using the equipment will enable:

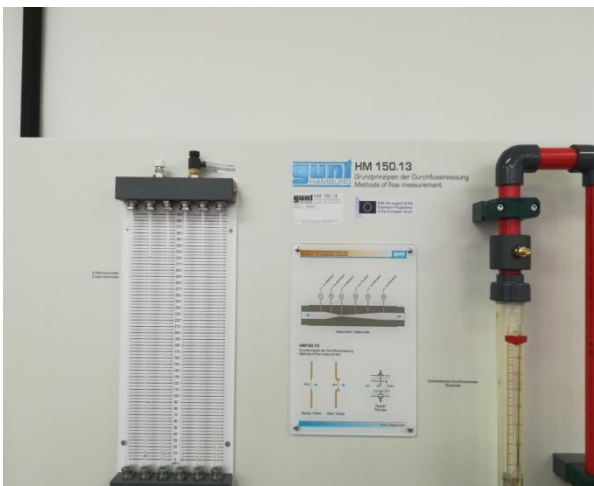
- improve both the human and technical resources necessary for the implementation of the teaching process at the study programs and at the University in general;
- contribute to the increase of knowledge and improvement in the decision-making process in the field of activities related to the protection of water and the environment and the management of water resources;
- Provide scientific and professional research in the field of water protection and publication of results in scientific and professional journals.

Table 2.5 Laboratory equipment

| No | Type   | Quantity |
|----|--|----------|
| 1  | Base module for experiments in fluid mechanics | 1        |
| 2  | Bernoulli's principle                          | 1        |
| 3  | Methods of flow measurement                    | 1        |
| 4  | Open channel and closed channel flow           | 1        |
| 5  | Groundwater flow                               | 1        |

Table 2.6 Software

| No | Type   | Quantity |
|----|--|----------|
| 1  | Watershed Modeling System                                      | 2        |
| 2  | Watershed Modeling System, licence for students                | 25       |
| 3  | Flow & Contaminant Transport-UmSat Suite, academic licence     | 1        |
| 4  | Flow & Contaminant Transport-UmSat Suite, licence for students | 25       |







## 2.4 Dzemal Bijedic University of Mostar

In accordance with the procurement procedure for equipment for implementation of Erasmus+ SWARM project “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders” / SWARM – 597888-EPP-1-2018-1 RS-EPPKA2-CBHE-JP), the University of Mostar has acquired laboratory equipment for practical student exercises in the field of water flow in open and closed channels and in the field of groundwater flow. Two pieces of software in the field of water resource management were also purchased, Watershed Modeling System and Aquifer Win32, Unsaturated Zone Flow & Contaminant Transport-UnSat Suite, student versions.

The above equipment is intended primarily for teaching in the field of hydrotechnics, civil engineering, water resources management and environmental protection, for:

- lectures,
- conducting practical exercises on purchased laboratory equipment, where water flow in open and closed channels and groundwater flow can be analyzed,
- using software for analysis and forecasting of different water and pollutant scenarios, both in the catchment area and in the non-saturated and saturated zones. This can significantly contribute to the improvement in the field of water management and protection, as well as the implementation of an integral and holistic approach in making the most favorable decisions.

Therefore, the use of equipment, both laboratory and software, will contribute to the development of the water resource management sector both at the local community and the wider community.

The equipment will be widely used for the preparation of graduate and master's theses, as well as for the preparation of doctoral theses.

Using the equipment will enable:

- improve both the human and technical resources necessary for the implementation of the teaching process at the study programs and at the University in general;
- contribute to the increase of knowledge and improvement in the decision-making process in the field of activities related to the protection of water and the environment and the management of water resources;
- Provide scientific and professional research in the field of water protection and publication of results in scientific and professional journals.

Table 2.7 Laboratory equipment

| No | Type   | Quantity |
|----|--|----------|
| 1  | Base module for experiments in fluid mechanics | 1        |
| 2  | Bernoulli's principle                          | 1        |
| 3  | Methods of flow measurement                    | 1        |
| 4  | Open channel and closed channel flow           | 1        |
| 5  | Groundwater flow                               | 1        |

Table 2.8 Software

| No | Type   | Quantity |
|----|--|----------|
| 1  | Watershed Modeling System                                      | 2        |
| 2  | Watershed Modeling System, licence for students                | 25       |
| 3  | Flow & Contaminant Transport-UmSat Suite, academic licence     | 1        |
| 4  | Flow & Contaminant Transport-UmSat Suite, licence for students | 25       |









## 2.5 University of Pristina in Kosovska Mitrovica

Within the framework of the European Union-funded Erasmus + project, the Faculty of Technical Sciences, University of Pristina in Kosovska Mitrovica, has acquired laboratory and computer equipment. Erasmus + project title is "Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders" - SWARM, project number 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP. The equipment was procured through public procurement, in accordance with legal procedures. The following laboratory equipment from the manufacturer Gunt Hamburg was purchased: HM 167 – Groundwater flow, HM 150 – Laboratory equipment for fluid mechanics: Base module for experiments in fluid mechanics, HM 150.07 – Laboratory equipment for testing principles in hydrodynamics: Bernoulli's principle, HM 150.13 – Laboratory equipment for testing flow in pipes: Methods of flow measurement. Also, the following computer equipment was purchased: **16 x Desktop computers** (processor INTEL Core i7-6700K 4.0GHz, Intel® 1151 with integrated graphic processor Intel® HD Graphics 530, Mother board ASUS MB - SOCKET 1151 - B150M-C D3, graphic card GIGABYTE nVidia GeForce GTX750Ti 4GB DDR5 128bit -GV-N75TWF2OC-4GI, Ram memory 2xKINGSTON 8GB DDR3 HyperX FURY Red 1866MHz CL10 -HX318C10FR/8, Hard disc WD 1TB 3.5" SATA III 64MB 7200rpm Black -WD1003FZEX, optical device ASUS 24 x DVD-RW DRW-24D5MT, DEEPCOOL Mini Tower Smarter, 201 x 365 x 420 mm, LC-Power 600W LC600H-12 V2.31 12CM FAN, S-BOX optical mouse - M-17B, keyboard MS INDUSTRIAL USB (Black) - KB-01, monitor LG LED 21.5" 22MP58VQ-P IPS Full HD, Wireless TP Link 150 Mbps N PCI Express Adapter), **2 x laptop računar** (Processor Intel Core i7, Quad Core, 6700HQ, memory 8 GB, HDD 1 TB, graphic card VGA NVIDIA GeForce GTX1060, 3GB, display 15.6", 1920 x 1080, Anti-Glare, USB 3.0 3, USB 3.1-Type C 1, HDMI 1, WiFi, LAN 10/100/1000 Mbps), **2 x printer Color Laserjet all in one** (LaserJet Pro, A4, print/scan/copy/fax, print 600x600, 28/28ppm black/color, scan 1200dpi, ADF/Duplex, USB/LAN), **2 x scanner Duplex ADF, 200 dpi** (Image Enhancement Technology: Visioneer Acuity, Duplex (two side scanning), Interface: USB 2.0 (3.0 compatible), Optical Resolution: 600 dpi, ADF Capacity: 50 sheets, Visioneer OneTouch Technology (PC), Duty Cycle: 3000 pages/day, ADF Maximum Paper Size: 8.5" x 38" in, ADF Minimum Paper Size: 2" x 2" in, Dimensions: 11.20" x 6.5" x 6.7" (WxDxH), Output Bit Depth: 24-bit color, 8-bit grayscale, Light Source: LED, Drivers: PC: TWAIN, WIA, ISIS Mac: TWAIN, ICA, Supported Operating Systems (OneTouch 4): Windows 10, 8, 7, Vista, XP (SP2), Imaging sensor: Contact Image Sensor (CIS), Paper Thickness/Weight: 7 to 110 lbs, Speed @ 300 dpi, b&w, grayscale, or color: 25 ppm / 46 ipm, Speed @ 200 dpi, b&w, grayscale, or color: 38 ppm / 66 ipm), **3 x external hard disc drive** (2.5", 4 TB Memory).

The aforementioned equipment will be used for:

- Teaching process (lectures and exercises) on the innovated study program Civil Engineering within the SWARM project. The accreditation process for the mentioned study program is on preparatory phase.
- Upgrading of both human and technical resources for the realization of teaching process at this study program;
- Training of students for effective application of knowledge in the field of activities related to water resource planning and management;
- Training of teaching staff and stakeholders;
- Training of local community on issues related to water resource planning and management;
- Students' research and projects;

- Conducting scientific research in the field of water resource planning and management and publishing results in scientific journals.

Table 2.9 Laboratory equipment

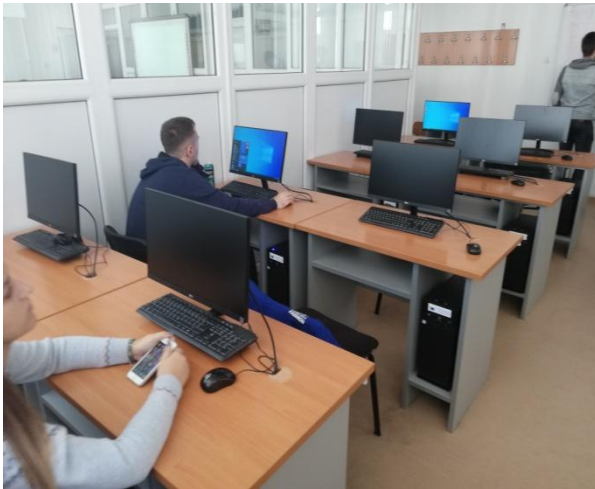
| No | Type   | Quantity |
|----|--|----------|
| 1  | Base module for experiments in fluid mechanics | 1        |
| 2  | Losses in a pipe system                        | 1        |
| 3  | Methods of flow measurement                    | 1        |
| 4  | Advanced hydrological investigations           | 1        |

Table 2.10 Teaching equipment

| No | Type                                   | Quantity |
|----|--|----------|
| 1  | Desktop computer - Intel Core i7-6700K | 16       |
| 2  | Laptop computer                        | 2        |
| 3  | Printer Color Laserjet all-in-one      | 2        |
| 4  | Scanner Duplex ADF 200dpi              | 2        |
| 5  | External Hard Disk Drive               | 3        |









## 2.6 University of Montenegro

The University of Montenegro, Faculty of Civil Engineering, for the for the implementation of the Erasmus project, “Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders (SWARM)” announced a tender for the purchase of the following equipment:

- **Laboratory equipment for fluid mechanics: Base module for experiments in fluid mechanics** (Volumetric flow measurement for large and small flow rates),
- **Laboratory equipment for testing principles in hydrodynamics: Bernoulli's principle** (Static pressure and total pressure distribution),
- **Laboratory equipment for testing flow in pipes: Methods of flow measurement** (Comparison of different measuring methods and determining the flow coefficients),
- **Laboratory equipment: Open channel and closed channel flow** (Flow processes on different structures in open and closed channel flows; losses at inlet and outlet),
- **Laboratory equipment: Groundwater flow** (Three-dimensional investigations; demonstration of lowering of groundwater; investigation of excavation pits),
- **Software - Urbano Canalis, Urbano Hydra**, Designing, calculating and analyzing gravity, pressure and vacuum piping systems for sewage and water supply distribution network.

The above-cited equipment will be used for:

- teaching process, lectures, exercises and practical work at the Master studies of Water Engineering according to the final accreditation of the University of Montenegro and Faculty of Civil Engineering, which will be further enhanced under the SWARM project;
- helps students to enhance their learning and thinking skills. This help the students to be more competitive and help achieve their goals through higher level of education and thinking order;
- to motivate students and stimulate their interest in the subjects and ensuring the students to be better prepared for theoretical examinations;
- preparation of students master's thesis and other research based on practical problems of hydraulic engineering;
- facilitate teachers lectures and explanations of specific hydraulic phenomena;
- conducting scientific research regarding the water engineering investigation in the scientific journals;

Generally, science lab equipment and supplies make learning as well as teaching much easier. There are many scientific concepts and theories that are quite difficult to explain directly from text books. For example, different hydraulic models it easier to understand the otherwise complex theories of science. Students will be able to retain knowledge for much longer when are can see the experiments being performed in front of them.

Table 2.11 Laboratory equipment

| No | Type   | Quantity |
|----|--|----------|
| 1  | Base module for experiments in fluid mechanics | 1        |
| 2  | Bernoulli's principle                          | 1        |
| 3  | Methods of flow measurement                    | 1        |
| 4  | Open channel and closed channel flow           | 1        |
| 5  | Groundwater flow                               | 1        |

Table 2.12 Software

| No | Type           | Quantity |
|----|----------------|----------|
| 1  | Urbano Canalis | 1        |
| 2  | Urbano Hidra   | 1        |





## 2.7 Technical college of applied sciences Urosevac with temporary seat in Leposavic

Following the equipment purchase procedure for the implementation of the International project, “ Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders/SWARM” (Project number 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP; European program Erasmus +) , Technical College of Applied Sciences Urosevac, with temporary seat in Leposavic, acquired following equipmen: 17 Laptops, UVI/IS spectrophotometer LAMBDA XLS, the OTT C31 Universal Current Meter, digital photo camera Nikon D5300 + Lens 18-105mm VR, LIGRA Luxiboard 6Touch 88 in Interactive board + NEC UM301W Ultra Short Throw projector, UVI/IS spectrophotometer LAMBDA XLS, 2 The OTT C31 Universal Current Meter, 2 Digital photo camera Nikon D5300 + Lens 18-105mm VR, 2 Desktop Intel® Core™ i5 Processor, 8GB DDR4 2400 MHz, 1TB HDD, Integrisana HD 630 + monitor LED 21.5" + keyboard and mouse and Software ICDD DATABASE PDF-2 2019.

The above-cited equipment will be used for:

- teaching process, lectures, exercises and practical work at the specialist program *WATER PROTECTION*, established under the SWARM project, and whose accreditation process is in preparatory phase;
- upgrading of both human and technical resources for the realization of teaching process at this study program;
- training of students for effective decision-making in the domain of water protection related activities;
- simulation of different scenarios that are related to water protection and deployment of virtual environment and how to manage such issues;
- training of teaching staff and stakeholders;
- training of local community in the issues related to water protection;
- students’ research and projects;
- conducting scientific research regarding the water protection and publishing of the obtained results in the scientific journals.

The laboratory with presented equipment will be used also for the needs of public sector. In cooperation with the local authorities and competent public services, we plan to establish scientific-technical based laboratory which will contribute to better understanding of water protection related issues, finding the way to surpass the barriers and finding the most efficient solutions that will contribute to the upgrading of the water quality in the area.

Table 2.13 Laboratory and teaching equipment

| No | Type  | Quantity |
|----|---|----------|
| 1  | UVI/IS spectrofotometer LAMBDA XLS  | 1        |
| 2  | Channel Master H-ADCP   | 1        |
| 3  | Digital photo camera Nikon D5300 + Lens 18-105 mm VR                                    | 1        |
| 4  | LIGRA Luxiboard 6Touch 88 in interactive board + NEC UM280W Ultra Short Throw projector | 1        |

|   |                           |   |
|---|---------------------------|---|
| 5 | Laptop 10-12" computer    | 2 |
| 6 | PICO projector with Wi-Fi | 1 |
| 7 | Projector                 | 2 |
| 8 | MFP Laser A4 printer      | 2 |
| 9 | Desktop computer          | 2 |

Table 2.14 Software

| No | Type                     | Quantity |
|----|--------------------------|----------|
| 1  | ICDD database PDF-2 2019 | 1        |



