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Wasec Newsletter
Promoting Innovation in Water Education for the Mediterranean

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ENHANCING WATER SECURITY AND SOCIO-ECONOMIC DEVELOPMENT IN THE EASTERN MEDITERRANEAN UNDER CLIMATE CHANGE (WASEC)

AMAZING ACCOMPLISHMENTS OF THE PROJECT

By Saed Khayat, Nawaf Abu-Khalaf and George Zaimes

The WaSec partnership through collaborative and innovative work has accomplish so many things during its duration that we are all very proud of (Fig. 1a,1b). Below we briefly highlight some these amazing accomplishments.

Fig. 1a. All the partners from the Kick-off Meeting in the Dead Sea, Jordan, in February 2019

Selected as Best Project by CBHE!

The Capacity Building in Higher Education (CBHE) selected approximately 100 projects that were funded during 2015-2020. WaSec was one of the six projects for the subject specific session "Environment." Saed Khayat and George Zaimes presented the WaSec results at the CBHE Virtual Fair online event to raise awareness on how to improve the Higher Education sector in the Partner countries in regard to sustainable water management issues under climate change conditions (Fig. 2, 3).

Fig. 1b. The final meeting of the WASEC project in the Dead Sea Jordan, July 2022

Launching WaSec joint Master program!

The Master program in "Water Sciences Innovations" was launched and accredited by the Palestinian Accreditation and Quality Assurance Commission (AQAC). It is the first collaborative Water Master program in the Eastern Mediterranean region. The Master program was prepared jointly by the WaSec partners. It is the first and unique water Master program that takes into account both the local needs and international European standards for innovative educational tools.

Fig. 2 WaSec was selected as a Best project by Capacity Building in Higher Education. Here Saed Khayat, the project coordinator is presenting online.

Innovative, State of the Art Courses!

Based on questionnaire that took into perspective the opinions the stakeholders, and professional of the water sector in the EU, Palestine and Jordan to develop the courses of the WaSec program on sustainable water management. The courses were developed base on new pedagogical and learning techniques for in person, blended and online teaching. In the table below are courses number titles and organization that developed it.

Virtual Learning Platform (https://vlp.wasec.net/)!

The Virtual Learning Portal contains all of the information regarding the new courses and is the main repository of the learning materials. It is able to be used simultaneously by at least 100 users and is capable of allocating roles to different type of users (lecturers, students, visitors). It also includes e-mailing abilities, discussion groups, and offers the possibility of being tailored to each courses needs and particularities. The Virtual Learning Portal will be in Arabic and English.

Cooperation with local enterprises!

Several online network meetings were implemented to increase the awareness but also get feedback on the result of the project. This feedback was essential to develop more applied courses. Specifically, events were held online via ZOOM on December 4th 2020 (50 participants), December, 17th 2020 (30 participants), April 2nd 2021 (35 participants) and June, 29th 2021 (30 participants). Overall, the participation in these events was high and their great interest in the project results. Finally, we need to mention that of the thesis topics of Palestinian and the Jordanian universities were in direct coordination with local enterprises to solve the local society's problems, especially the field of wastewater treatment and minimization.

Engaging Stakeholders!

Dissemination seminars, in person, were also organized to engage stakeholders on the project results. Specifically, the first seminars were help in Amman, Jordan on January 13th 2022 organized by the University of Jordan and under the patronage of H.E. Prof. Dr. Adnan Badran (Former Jordanian Prime Minister and Head of Kadoorie Graduates Committee). The second was held in Ramallah, Palestine on March 15th 2022, organized by the Palestinian Water Authority to honor the World Water Day. The third dissemination seminar was organized by Palestine Technical University – Kadoorie on May 26th 2022 in Tulkarm, Palestine. Finally, a conference was organized by the Jordan University of Science and Technology on July 27th 2022 in the Dead Sea, Jordan. Need to also highlight that the Wasec project was presented in numerous workshops and conferences to further increase the visibility of the project (Fig. 4).

Feedback from Students!

Emphasis was given on the course being applied based on new learning and pedagogical tools. To examine their utility training webinars tester workshops were conducted for students. The trainings were online and in person workshops. In both webinars and workshops partners from both the EU and Jordan and Palestine contributed. In the online trainings students from different countries participated.

♦ **Online training webinars:** The first was held by Palestine Technical University – Kadoorie and was titled "Water Quality Data Management." It was held online on May 24th- 25th 2021 and Through the course students were taught hydrochemistry data management tools to manage large datasets. Almost 60 students participated. The second was organized by the University of Jordan titled "Climate Change and Water Sustainability" and held online June 16th 2021. In this training professors from Palestine Technical University – Kadoorie, Al-Quds University and the International Hellenic University participated. The third webinar was also organized by the University of Jordan but titled "Water Food Energy Nexus Training Webinar" and was held online July 28th 2021. It to discussed the importance of the WEF for the sustainable management of natural resources and Palestine Technical University – Kadoorie, and the International Hellenic University also presented.

Fig. 3 WaSec was selected as Best Project for the CBHE session Environment. George Zaimes was one of the presenters from the WaSec project at the Virtual Fair.

♦ **In person tester workshops:** The first tester workshop was held on January 12th 2022 at the University of Jordan (UJ), Amman, Jordan in cooperation with Open University of Cyprus. The second was held in Tulkarm, Palestine on March 13th-14th 2022 by the Palestine Technical University – Kadoorie, with contribution from the International Hellenic University (Fig. 5). The third workshop was also in Palestine on March 16th-17th 2022 but was organized by Al Quds University in Abu Dis, Palestine. The fourth workshop was also organized by Al Quds University in Abu Dis, Palestine but in May 26th 2022. The last tester workshop was held on July 26th 2022 in Amman, Jordan by Princess Sumaya University for Technology (PSUT). The student feedback helped improve the courses!

Transnational MSc Committees!

Several joint master theses were supervised by University of Jordan and Palestine Technical University – Kadoorie (at least three thesis) and among Jordan University for Science and Technology (JUST) Palestine Technical University - Kadoorie (PTUK) and the International Hellenic University (IHU) (at least three thesis).

Long-lasting Collaboration!

Finally, while many of the partners were working for the first time the success of this project has spurred new collaborative efforts among the partners for the continuation of this project or for new projects. The goal is to continue the efforts to achieve sustainable water management in the Mediterranean!

Fig. 4 Saed Khayat presenting the WaSec project results at a conference.

Fig. 5 Saed Khayat presented at students during 2nd Tester Workshop in Tulkarm, Palestine, March 13th-14th, 2022.

SHOWCASED WASEC COURSE

INTEGRATED WATER RESOURCES MANAGEMENT

By Valasia Iakovoglou (IHU)

Climate change, desertification, rapid population growth and industrialization, are the leading causes for water becoming increasingly scarce in the Middle East. It is considered an expensive natural resource in the region because its scarcity can significantly impact food supply, public health and economic growth. Based on the above conditions in the region the objective of this course is to understand the importance of sustainable water management for the water security and socio-economic development of the region and learn new approaches and innovative methodologies to achieve it.

Fig. 6. A view of the Jordan Valley in Palestine.

To be able to sustainably manage the current water resources integrated water resources management (IWRM) needs to be implemented by the water and land managers of the region. The UN Environment Programme states that "IWRM is a cross-sectoral policy approach designed to replace the traditional, fragmented sectoral approach to water resources and management that has led to poor services and unsustainable resource use. IWRM is based on the understanding that water resources are an integral component of the ecosystem, a natural resource, and a social and economic good."

Fig. 7 Wadis are characteristic of the region.

In addition to learning the basic principles of IWRM another key feature to effectively implement is to understand firstly the unique hydrologic conditions and semi-aquatic ecosystems of the region. Specifically, emphasis is given on the Jordan Basin (Figure 6) the main water source of the region along with intermittent and ephemeral streams (wadis) (Figure 7) and the hydrologic cycle in semi-arid and arid environments. The hydrologic cycle in this region can be considered as more rapid and episodic. In many cases most precipitation gets evaporated due to high evapotranspiration rates. But when precipitation is substantial flooding, especially flash flooding can be caused along with significant erosion. This can lead to the loss of water resources and serious pollution problems. Defining and understating the importance of semi-aquatic ecosystems such riparian areas, wetlands and deltas is another focal point of the course. These ecosystems are essential for sustainable water management.

In the European Union a significant set of policies that were approved in 2020 is The European Green Deal. The overarching aim is making the European Union (EU) climate neutral in 2050. Some of the key approaches for this especially in regard to water resources are ecohydrology, ecosystem-based approaches and nature-based solutions. Ecohydrology is an interdisciplinary field that focuses on the effects of hydrological processes on ecosystems and the effects of biotic processes on the hydrological cycle (Zalewski et al., 1997).

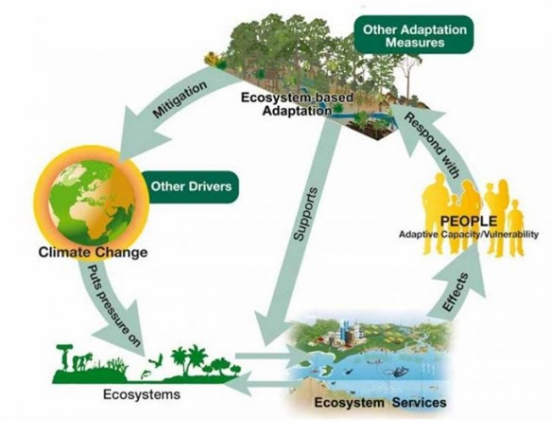

Fig. 8 Ecosystem-based approaches (Source: IUCN)

Ecosystem-based approaches is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change (Convention on Biological Diversity, 2009) Figure 8.

These involves a wide range of ecosystem management activities to increase the resilience and reduce the vulnerability of people and the environment to climate change. Nature-based solutions are also presented in the course. The IUCN defines them as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Figure 9).

Finally, the student will be introduced to new and innovative tools that will help better monitor and understand water resources. This will include Geographic Information Systems (GIS), Hydrologic Models, and the utilization laser scanners and unmanned aerial vehicles. Utilizing such tool can enhance the accuracy and the scale of the measurements. This should lead to more effective and sustainable water management plans in the region to be mitigate water scarcity.

Fig. 9. Nature-based Solutions (Source: IUCN)

MAIN EXPLOITABLE FINDINGS; WASEC'S DIAMONDS

Ben Sonneveld and Cornelia van Wesenbeeck

Erasmus+ projects, under the Horizon 2020 Program (EFTA, acc. 2019) aims to increase their impact by addressing socially relevant questions with evidence-based policies during and in the post-project period. Projects are, therefore, obliged to increase the importance of the exploitation plan which now is an admissibility condition included in the impact criterion evaluation of the EU funded projects.

WASEC's exploitation plan organizes activities that guide the course material generated in the project through its post-development stage towards a self-sustaining learning program for identified stakeholders. The consortial exploitation plan is based on a visioning of the desired future development on the use and positioning of the course material, indicating key elements for the exploitation strategy. In addition to the consortial plan, project partners present individual plans by indicating a set of general exploitation strategies. Individual exploitation strategies are synthesized for coherence and fine-tuning to avoid bias in activities.

The exploitation plan is clearly embedded and related to other work packages in the project. Notably, WP 4.1 develops an effective communication strategy to reach a wide audience interested in courses and course materials and is a natural partner of WP 4.2 that prepares an exploitation plan.

The exploitation phase includes a series of tester workshops attended by university staff, public and private partners to assess feasibility and interest of courses for beneficiaries. Additionally, the exploitation strategy is embedded in a business plan that proposes new organizational entities and makes a first evaluation of the revenue-cost structure for a successful and economically feasible launching of the regular and online courses.

The exploitation plan jointly with the dissemination activities has to convey a clear message about the usefulness of the project and its exploitable results and incorporates, therefore, in its analysis the logical framework and key components of the project. The plan identifies the project rationale, its targeted objectives, the relevant clients benefitting from the course material and indicates actions, consortium wide and by each WASEC partner individually to promote the exploitation of these assets.

Main exploitable findings: the diamonds

Several elements make the WASEC water security program and related courses unique in its educational achievements as well as in its applicability to address socially relevant issues on water scarcity under climate change conditions. These elements constitute, therefore, the exploitable findings of the project. Below we list our diamonds:

I. Demand driven courses capitalizing on university-private\public partnerships

II. The project aims at a new culture of university- HEIs and public/private relationships in the Middle East that target educational programs to:

- address socially relevant water management related problems
- Increase graduates' employability
- stimulate entrepreneurship
- create a Water Network to promote HEIs and enterprise collaboration

III. The project develops, therefore, high quality educational courses that:

- are tailored to the above-mentioned target groups
- are unique for the Middle East and other arid/semi-arid areas
- consists of updated courses on water management with input from enterprises
- have clear learning objectives utilizing advanced and updated technologies
- avail of new and innovative learning and pedagogical approaches
- promote sustainability by accounting for intergenerational responsibility
- incorporating coping and adaptation mechanisms to address climate change
- develop a virtual learning platform to facilitate learning and assessment
- makes the courses available in English and Arabic.

IV. Furthermore, courses are:

- accredited in partner countries
- tested in special session with students and water professionals
- disseminated at a wide range of universities, public and private institutes
- to exploit the results by organizing knowledge transfer to other practitioners

These key elements of the exploitation will form the core of the dissemination strategy that will appear as a central message in the various media, emphasizing the strongholds of the project.

1ST DISSEMINATION SEMINAR – UNIVERSITY OF JORDAN

AMMAN, JORDAN, JANUARY 13TH 2022

By Ahmed Al-Salaymeh, Sura Al-Sbaihi & Tahani Almalki

Fig. 10. A group photo of the Seminar participants

Under the patronage of the Chairman of the Board of Trustees of the University of Jordan, H.E. Prof. Adnan Badran, the University of Jordan conducted WaSec dissemination workshop on 13th of January, 2022 at the Conference Hall - Prince Al Hussein Bin Abdullah II School of International Studies, University of Jordan

The meeting was attended by representatives from 12 Academic Institutions from Jordan, Palestine and Greece. In addition, 10 Public and private organization and NGOS attended. Overall, in the seminar more than 60 people participated (Figure 10 & 11) while the event also was covered by media (newspapers, radio and tv).

Fig. 11. Participants of the Dissemination Seminar

The workshop started with the opening session which included welcoming speeches from high-ranking participants such as former ministers, Presidents of Jordanian and Palestinian universities and director of the national Erasmus plus – Jordan.

Next a Memorandum of Understanding had been signed between The University of Jordan and Palestine Technical University- Kadoorie under the patronage of the Chairman of the Board of Trustees of the University of Jordan (Figure 12).

The following two session were presentation of different research projects in regard to water management primarily form Jordan but also with examples from other countries.

Fig. 12 The signing of Memorandum of Understanding between The University of Jordan and Palestine Technical University- Kadoorie

Specifically in the first session there were 3 presentations by a) George Zaimes, International Hellenic University, Greece, b) Saed Al Khayat, Palestine Technical University-Kadoorie, Palestine and c) Dr. Marwan Alraggad, INWRDAM, Jordan. In the second session there were 4 presentations by a) Jawad Al-Bakri, University of Jordan, Jordan, b) Othman Al-mashaqbeh, Royal Scientific Society, Jordan, c) Radwan Al-Weshah, University of Jordan, Jordan, and d) Reyhan Ahmad, Mostafa Al-Qaisi and Ahmed Al-Salaymeh, University of Jordan, Jordan. In the end of session there was a discussion with all the participants and recommendation on how the future water management Jordan should were developed.

2nd Dissemination Seminar - Palestinian Water Authority Ramallah, Palestine, March, 15th 2022

By Subhi Samhan

Under the Auspices of His Excellency Eng. Mazen Ghunaim Head of Palestinian Water Authority (PWA), on the occasion of the World Water Day, the PWA in cooperation with Al-Quds – University - Abu Dis and Palestine Technical University Kadoorie organized the dissemination seminar (Figure 13) for the project "Innovations in Water Education: Enhancing Water Security and Socio-economic Development in the Eastern Mediterranean under Climate Change (WaSec)."

Fig. 13 The participants of the seminar

Fig. 14 A photo during the dissemination seminar held in Ramallah, Palestine

The aim of the seminar was to present the results of the project in Palestine, in regard to adopting advanced education model, and a new postgraduate program in the field of water. The seminar was conducted on March 15th , 2022 at the Palestinian Water Authority's Premises in Ramallah, Palestine (Figure 14 and 15).

Through this event the Palestinian Water Authority and the WaSec consortium celebrate with the people of the whole world an important occasion that places water at the centre of the common human welfare, which should be free from political conflicts and economic wars, because it is fundamentally linked to human existence and humans' permanence on earth. Despite this fact, the Israeli occupation exploits the Palestinian water and restrict our people form its utilization trying to break their steadfastness.

This year's slogan for the World Water is "Groundwater: Let's make the invisible visible." It is enough to show that the extent of the Israeli violations of our water rights visible to the world, by knowing that they control more than 85% of our groundwater, and is continuous utilizing our water for the benefit of its illegal settlement, and placing difficult obstacles in the way of establishing development projects for our water resources, especially in areas classified as "C", which extends over more than 62% of our land.

The WaSec project is an important tool to engage young people on water issues with an emphasis on special circumstances of water in Palestine on the one hand, and to raise awareness on the other that water challenges will be the most prominent issues on a global scale as a result of the steady increase in the population, as well as the environmental deterioration and climate change impacts. Through the WaSec project the aim is of giving the necessary scientific background, and finding tools capable of making our youth an active participant in facing these water challenges, and developing solution for the present and future of the water sector.

Fig. 15 Discussion among the participants.

Please also check out the short video developed and published by the Palestinian Water Authority at the link https://fb.watch/dM5mubHUoW/

3RD DISSEMINATION SEMINAR & BLENDED MANAGEMENT MEETING -

PALESTINE TECHNICAL UNIVERSITY - KADOORIE—TULKARM, PALESTINE, MAY 26TH 2022

By Saed Khayat and Nawaf Abu-Khalaf

The 3rd Dissemination Seminar of the WaSec project took place on May 26th 2022 in Tulkarm, Plastine that was organized by the Palestine Technical University – Kadoorie. The meeting was both in person but also online.

During the seminar the welcome speech was conducted by H.E. Prof. Nouraldin Abu-Alrob/ Palestine Technical University Kadoorie. It was followed by a presenataion of the current progrees of the WaSec project by George Zaimes International Hellenic University (Zoom), Greece and Prof. Saed Khayat, Palestine Technical University Tulkarm, Palestine. This was continued by the progress of the WaSec project at Jordanian Universities, in regard to the master lectures and joint master students' supervision, by Ahmad Al-Salaymeh, University of Jordan and Fahmi Abu-Al Rob, Jordan University of Science and Technology

It was decided to conducted in parallel the project blended management meeting. While initially the meeting would be in person with all partner this was not possible because of the Israeli restriction for Jordanian partner to enter the country along with restriction of COVID to entry in the country due to COVID. Therefore, this logistic problem was resolved with having a blended management meeting to discuss the project activities progress and planning for the next actions to be conducted. In person the meeting was attended by Creative Thinking from Greece, represented by Maya Dimitriadou who is responsible for the quality control of the project outcomes, along with representatives from Palestine partners local partners from PWA, AQU, and HEC. The other Jordanian and EU partners joined the meeting through ZOOM. Overall, the experience of blended meeting was suite successful.

WaSec – Deliverable for Work Package 2.2 – Innovative and Modern Courses

By Vassilis Litskas

Water is a valuable resource, especially for the arid and semi-arid areas of the world and sustainable management is key to avoiding water shortages and supporting food security. Water demand is increasing, driven by a rising global population, rapid urbanization, changing diets and economic growth. On the other hand, drought is more frequent and more severe, as observed for many EU and Mediterranean areas for 2022 (https://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1153). Agriculture is the largest consumer of the world's freshwater resources. Besides water, more than one-quarter of the energy used globally is expended on food production and supply.

The WaSec project aims to strengthen the relationship between higher education institutions (HEIs) and enterprises by implementing innovative educational approaches. Water resources sustainable management and climate change mitigation/adaptation is the focus areas of the educational material that has been produced and it is summarized in the Deliverable 2.2 of the project.

The Deliverable describes the Innovative Education Approaches, tools and methods that were used during the project. The learning design, the material repository and the tuning workshop that took place online to establish a

common methodology for the educational material and for building the WASEC VLP (Virtual Learning Platform). In addition, the strategic positioning of the new Master program is presented.

A large part of this Deliverable is devoted to the key competences and new or updated courses. In more detail, for each of the 13-week courses: 1) the teaching staff, 2) the aims and objectives, 3) the subject areas, 4) expected learning outcomes, 5) educational material, 6) teaching schedule and teaching methods as well as 7)

Course #	Course title	Organization
WASEC513	Water Energy Food Nexus	Open University of Cyprus (OUC)
WASEC522	Climate change & water sustainability	University of Jordan (UJ)
WASEC612	Water Policy and Governance - transboundary basin	The Amsterdam Centre for World Food Studies (ACWFS)
WASEC523	Hydrology and Hydrogeology	Al Quds University (AQU)
WASEC521	Water and wastewater treatment and Reuse	Princess Sumaya University for Technology (PSUT)
WASEC621	Entrepreneurship and Innovation in Water	Universidad Politécnica de Madrid (UPM)
WASEC512	Water Quality	Jordanian University of Science and Technology (JUST)
WASEC611	Integrated Water Resources Management	IHU (International Hellenic University)
WASEC701A, B	Master Thesis I, II	Palestine Technical University – Kadoorie (PTUK)

Table 1. The WaSec courses – a screenshot from the Deliverable 2.2.

a detailed description per week are presented. These, come in combination to the material that has been produced for each of the courses and it is placed in the WASEC VLP and the repository of the project. This material is available to the project partners to build new courses and/or enrich existing curricula. Several weeks have been tested (tester workshops) during the last year of the project. The partners will continue the collaboration till the end and after the WaSec project and use the deliverables for contributing to sustainable water resources management, emphasizing arid areas, under climate change.

Transnational MSc Committees!

By Ahmed Al-Salaymeh, Fahmi Abu Al-Rub, Sura Al-Sbaihi and Ghena Barakat

One of the major goals of the WaSec project was to have true collaboration of the universities of the project. This was achieved by having on master students' committees', professors from universities of different participating countries. Following are the students and their thesis topics.

University of Jordan

Student: Reyhan Ahmed Al-Saodi. *Topic*: Assessing the Hydrologic Vulnerability to Climate Change Impacts at Amman-Zarqa Basin, Jordan. *Committee:* Prof. Mustafa Al-Qaisi, Supervisor, Prof. Ahmed Al-Salaymeh, Co-Supervisor, Prof. Mahmoud Irshedat, Examiner, Prof. Omar Rimawi, Examiner, Mohammad Al-Qinneh, External Examiner. *Presented:* January 6th, 2022

Student: Hasan Odeh, *Topic*: Assessment of Water Quality under the Impacts of Climate Change Using Sentinel-2

Satellite Imagery: A Case Study of the King Talal Dam. *Committee:* Prof. Ahmed Al-Salaymeh, Supervisor, Prof. Jawad Al-Bakri, Co-Supervisor, Prof. Saed Khayat, External Examiner, Prof. Mahmoud Irshedat, Examiner, Prof. Abbas Al-Omari, Examiner *Presented:* May 22th, 2022

Student: Wafaa Abu Hammour, *Topic*: Use of Remote Sensing Techniques for Assessing the Impact of Climate Change on Water –Energy -Food Nexus in Wadi Araba. *Committee:* Prof. Jawad Al-Bakri, Supervisor, Prof. Ahmed Al-Salaymeh, Co-Supervisor, Prof. Mohammad Hamdan, Examiner, Dr. Michael Rahbeh, Examiner, Prof. Saeb Khraisat, External Examiner. *Presented:* May 22th, 2022



Fig. 20. The MSc students presenting, a) Reyhan Ahmed Al-Saodi (left), b) Hasan Odeh (center) and c) Wafaa Abu Hammour (right)

Jordan University of Science and Technology

The following students were also funded for their thesis projects

Student: Noor Aldin Abu Saleh. *Topic*: Biological Treatment of the Wastewater from Pulp and Paper Industries Using Anaerobic Digesting. *Advisors:* Prof. Fahmi Abu Al-Rub (JUST), Prof. Saed AlKhayat (PTUK), George Zaimes (IHU). *Funding:* 6500 JD (2021-2022).

Student: Hadeel Al-Malkawi. *Topic*: Investigating the use of Modified Granular Activated Carbon by Copper Oxide Nano Particles as Antibacterial. *Advisors:* Prof. Fahmi Abu Al-Rub (JUST), Prof. Saed AlKhayat (PTUK). *Funding:* 6500 JD (In Progress).

Student: Shatha Badarneh. *Topic*: Using extracellular polymeric substance extract for heavy metal removal from wastewater. *Advisors:* Prof. Fahmi Abu Al-Rub (JUST), Dr. Qutaibah Ababneh (JUST), Prof. Saed AlKhayat (PTUK). *Funding:* 6500 JD (In Progress).

1st Tester Workshop – University of Jordan Amman, Jordan, January 13th

By Ahmed Al-Salaymeh, Sura Al-Sbaihi & Tahani Almalki

Fig. 21 Prof. Ahmed Al-Salaymeh, welcoming speech.

The University of Jordan in cooperation with WaSec partners conducted a Tester workshop on Water Food Energy Nexus – "Farm to fork: Carbon farming and minimizing the footprint of food products", on January, 12th, 2022 at the School of Agriculture - The University of Jordan that was delivered by Vassilis Litskas, from the Open University of Cyprus. The Tester workshop aimed to teach new technologies and methods to students that will incorporate them in water resources management plans and that eventually will be adopted in the water relevant organizations and businesses. The workshop focused on introducing MSc students and stakeholders in water sectorto tools for GHG emissions determination and planning for mitigation with theoretical and practical parts, during the workshop, the participants had the chance to test the Food Water Energy module (one

Fig. 22 Vassilis Litskas presented on Life Cycle Assessment; LCA tools, and afterwards on the Environmental Footprint calculator – Cool Farm Tool.

of WaSec updated modules) and provide feedback.

The workshop started with a welcoming speech from UJ project Co-ordinator Prof. Ahmed Al-Salaymeh, also Prof. Saed Khayat (Figure 21) the general project coordinator presented a brief presentation about WaSec project and the updated modules under WaSec project. After that, Dr. Vassilis Litskas from The Open University of Cyprus delivered two presentations (Figure 22); the first one was about Life Cycle Assessment; LCA tools, while the second presentation was about Environmental Footprint calculator – Cool Farm Tool. Then, a practical training for the students on using the material/tools was provided to calculate the environmental footprint of the following food products: 1) tomato, 2) olive under 1) high and 2) low inputs agriculture, the students were able to use the coolfarmtool app to calculate the environment food print for different kind of vegetables.

At the end of the workshop, the students had a chance to ask and discuss many points regarding the implementation on the coolfarmtool app. The workshop was attended by 20 participants (physical), in addition to 15 participants who attended virtual via Zoom app from different institutions and academic levels, the participants included MSc and PhD students with agricultural background, MSc students in the climate change programme from engineering school and stakeholders from the ministries at UJ.

2nd Tester Workshop - Palestine Technical University – Kadoorie (PTUK)

Tulkarm, Palestine, March 13th-14th, 2022

By Saed Khayat, Nawaf Abu-Khalaf

Fig. 23 Abdel Karim Daragmeh the manager of the National Erasmus Office in Palestine (NEO) attended the workshop

The Palestine Technical University – Kadoorie (PTUK) hosted the second tester workshop in March. The president of PTUK Prof. Nouraldin Abu-Alrob opened and welcomed the participants and opened the event. The workshop was also attended by the National Erasmus Office in Palestine (NEO) manager Dr. Abdel Karim Daragmeh (Figure 23). During the first of the workshop George Zaimes and Associate Professor from the International Hellenic University presented “Ecoservices in Water Resources Sustainability” and Subhi Samhan Director for Research and Development Palestinian Water Authority presented “Pharmaceutical residue in wastewater wadis West Bank / Palestine.” In the second day Amer Sawalha Professor of Al Quds University presented the training lecture on “Isotopes as Environmental Tracers for Hydrological Cycle” and Saed Khayat Professor of PTUK presented “Using Isotopes as tracers in Water quality studies.” In addition, several students presented some innovative project ideas. Overall, approximately 20 participants (Figure 24) attended this event and more attended through the Zoom link.

Fig. 24 The participants of the workshop

3rd Tester workshop at Al- Quds University

Jerusalem – Abu Dis, Palestine 17th-18th March 2022

By Amer Sawalha and Sameer Hijazi

Fig. 25 The Acting Vice Rector of AQU Dr. Hasan Dweik discussing with partners future colloborations

Al-Quds University hosted the third tester workshop in the Jerusalem - Abu Dis, the main campus of AQU. In the first session, the Acting Vice Rector of AQU Dr. Hasan Dweik welcomed the partners and thank them for their visit and cooperation in this project. He also mentioned that AQU is always looking for more interactive cooperation with partners all over the world. Dr. Dweik briefly presented the history of AQU and the ongoing development of the university in terms of academic program and research. In the end he reiterated their willingness to further enhance cooperation with all partners in new projects in the future (Figure 25). The second session took place in the newly established WaSec Lab (Figure 26). Master students presented the progress of their thesis . Specifically: a) Subhi Yaghi is working in the municipality of Jericho on the turbidity problem with the of drinking water. The focus on the Wadi on Ein AL -Sultan spring which considered as one of the main water sources for Jericho City. The title of his master thesis "Towards sustainable agriculture solution for saline soil and brackish water base irrigation". b) Anas Haddad present his thesis idea of bio-methane production from waste form processing Date fruit with two methods (an aerobic method, and un-aerobic methods). The title of his thesis is "Bio-Methane production of using Date fruit waste." Both thesis topics belong to the water food nexus. In the second day the AQU team showcased to the partners the "Abu Dis Solid waste dumbing site" and discuss the impact on the health, air pollution, surface water and ground water of the local community.

Fig. 26 Visting the Wasec laboratories in Al Quds University.

4th Tester workshop at Al- Quds University

Jerusalem – Abu Dis, Palestine 28th May 2022

By Amer Sawalha and Sameer Hijazi

The fifth tester was hosted by Al-Quds University (AQU) in Jerusalem – Abu Dis the main campus of AQU. The welcoming speech was presented by the Acting Vice Rector of AQU Dr. Hasan Dweik. Afterwards the following lectures took place: a) Amer Sawalha presented "Date Palm Biomass and its potential as CO_2 sink." b) Ben Sonneveld presented "Water management in a transboundary basin: Overview of the WaSec course." c) Lia presented "Simulating water flows in a river basin: Policy applications to the Jordan River Basin." Once the presentations were completed the presented posed different problem-questions related to their presentations and the students solve them and discussed their answers . In the end of the workshop the participants evaluated through a prepared form the effectiveness of the event (Figure 27)

Fig. 27 The participants of the fourth tester workshop

5th Tester workshop at Princess Sumaya University for Technology

Amman, 26th July 2022

By Walid A. Salameh

The fifth tester was hosted by Princess Sumaya University for Technology (PSUT) in Amman. The University President of PSUT Prof. Mashhoor Al-Refai in the main Hall of the University greeted all the partners of the WaSec Project (Figure 28). Afterwards the tester workshop took place in the WaSec Computer laboratories that were established for the project. During the two lectures took place: a) "Isotopes in tracing the potential Ground Water Pollution" by Prof. Saed Khayat, Palestine Technical University Kadoorie (Figure 29) and b) "Isotopes Techniques in Water Quality Management" by Prof. Amer Marei, Al-Quds University. The students showed great interest in both presentation because of the innovative techniques used for monitoring groundwater. Overall, the tester workshop was successful and provided important feedback (Figure 30).

Fig. 28. The University President of PSUT Prof. Mashhoor Al-Refai welcomed the partners of the project.

Fig. 29. Saed Khayat presenting

Fig. 30. The group photo of all participants during the tester workshop at PSUT.

WASEC Quality Assurance

By Maya Dimitriadou

For WaSec, Quality Assurance was an ongoing activity that lasted throughout the whole duration of the project.
In the framework of WP3 a Quality Plan Manual (QPM) was developed. Its objective was to ensure the production of concrete and high–quality results in line with the project plans.
Its aim was to facilitate the project's management and guide all partners on the evaluation and quality issues, by establishing a coherent set of guidelines by which all aspects of the project were managed and measured.
In this context, the main purpose of the QPM was to define the methodology to adopt to ensure a proper assessment and control of project activities, results deliverables and impact. It described the principles/mechanisms for quality and performance control; the main indicators to be used in the project lifecycle; the data gathering process; tools and role of partners.
During the project, the meetings, deliverables, training, dissemination and exploitation activities have been evaluated. The tools that have been used were tailor-made questionnaires that were circulated to the participants of the events. The results of the surveys show high satisfaction from the participants.

Meetings evaluations

Regarding the meetings, the following parameters were examined: agenda, general organization, adherence to the timetable, communication through the online platform used (for hybrid meetings), the venue of the meeting, the presentations as well as the satisfaction of the participants in relation to their expectations and the added value of the meetings. The average satisfaction for all the parameters is presented in the following table (Table 2)

Table 2. Meeting evaluation

		Satisfaction
KoM	Dead Sea, Jordan	85%
1st	Kavala, Greece	88%
2nd	Madrid, Spain	80%
3rd	Amsterdam, Netherlands	82%
4th	Tulkarm, Palestine	89%
5th	Dead Sea, Jordan	To be finalized

Deliverables

The deliverables were also evaluated and accepted by the consortium. A few remarks that were made were discussed among the partners and, where necessary, the documents were improved.

Networking events

Three networking events took place during the project, the 1st and the 2nd, in December of 2020 in Jordan and Palestine respectively and the 3rd in April 2021 in Jordan. (Table 3) The people who participated in the events' evaluation surveys came, besides from Universities not belonging to the partnership, also from other public or private organizations such as Edama (Sustainability Association from Jordan), the Ministry of Local Administration in Jordan, PSD (Public Security Directorate) Renewable section in Jordan, the Jordan Standards and Metrology Organization, NARC (National Agricultural Research Center of Jordan), the Cities and Villages Development Bank of Jordan, Green Path Solutions (a private company), The Jordan Atomic Energy Commission – JAEC, the Jordan engineering Association Energy committee, the Ministry of Planning and International Cooperation, UN, the Royal Scientific Society of Jordan, the Water Authority Jordan, the Ministry of Agriculture of Palestine, the Palestinian Energy and Natural Resources Authority and the Palestinian Water Authority. The average overall satisfaction from the events is shown in the table below

Table. 3 Networking events evaluation

Networking event		Overall Satisfaction
Jordan	December 2020	92%
Palestine	December 2020	93%
Jordan	April 2021	93%

The attendants of the networking events were pleased with the discussions and the interaction between participants coming from diverse organizations, as well as with the courses offered and their availability for distance learning. The topics of the courses, the foundation of important master programs for the developing countries and the different specialty of the professors were positively commented on. A few observations were made regarding the lack of courses on Water-Energy related software and about operation and maintenance of water systems and on practical issues in general.

Table. 4 Training and tester workshop evaluation

		Satisfaction
Training workshops		
AquaChem	May 2021	84%
Climate change	June 2021	83%
FWEN	July 2021	85%
Water as an ecosystem service	Oct. 2021	86%
Tester workshops		
UJ	Jan. 2022	82%
PTUK & AL-QUDS	Mar. 2022	93%
AL-QUDS	May 2022	90%
PSUT	July 2022	To be finalized

Training and Tester Workshops

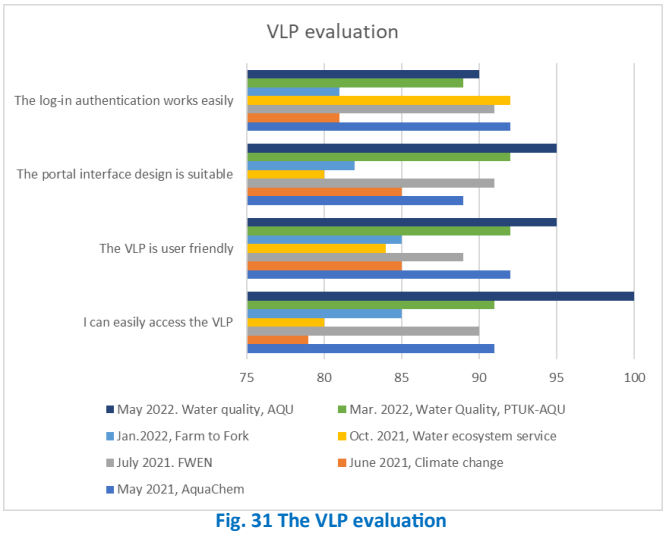

Fig. 31 The VLP evaluation

Four Training and four tester workshops took place in WaSec project (Table 4). The survey examined the details of the structure of the courses and the functionality and user friendliness of the platform. The average overall satisfaction for all the questions is shown in the table below

Regarding the Virtual Learning Platform (VLP) that was developed for the offering of the courses it was evaluated as follows: As it is shown, some problems with the platform that existed in the first workshops have been solved and the VLP has been improved (Fig. 31).

In general, as it is concluded from the surveys, the project is considered successful, and the results of it are highly evaluated and commented.

WaSec Final Conference "Sustainable Water Management"

Dead Sea, Jordan, 27th July 2022

By Fahmi Abu Al-Rub

An International Conference was organized by Jordan University of Science and technology. All institutions of the region relevant to water management were invited to participate (including other HEIs) (Figure 32). The focal point was the implementation of Sustainable water management in the region to help water security and the socio-economic development of the region. Another important aspect was introducing the new courses. Finally, presentations of other relevant projects were conducted.

Fig. 32. The participants of the conference.

Fig. 33. Fahmi Abu Al-Rub and Saed Khayat provided a small overview of the WaSec project.

Fig. 34. George Zaimes, provided in detail the many accomplishments of the WaSec Project.

Specifically, Fahmi Abu Al-Rub, JUST and Saed Khayat Project Coordinator provided a small overview of the WaSec project (Figure 33). George Zaimes, IHU continued with presentation "WaSec Project: Objectives, and Tangible Outcomes" that provided in detail the many accomplishments of the WaSec Project (Figure 34). Afterwards a short video of the WaSec Project was also presented. Saed Khayat, PTUK presented "Higher Education in Post Pandemic Contingent Digital Transformation/ WaSec as a case study" that presented how the WaSec project innovative elements and character. Finally, Cornelia van Wesenbeeck, VU presented one of the courses in detail specifically "Water policy and governance in transboundary basins" (Figure 35).

There will also additional presentation from other projects focusing on sustainable water management from the region but also other regions. Specifically George Zaimes, IHU presented "Targeted approaches of nature-based solutions to mitigate nonpoint source pollutants" Othman Almashaqbeh, RSS presented "Performance of constructed wetland system for industrial wastewater treatment in Jordan," (Figure 36) Ahmed Al-Salaymeh, UJ presented "Nature Based Solutions for Domestic Water Reuse in Mediterranean Countries," Walid Salameh, PSUT, "Emphasis Project Open Call for Jordan: Applications on Water, Green Energy, and Climate Changes" and Fahmi Abu Al-Rub, JUST, had three presentations "Urban sustainable development Solutions Valuing Entrepreneurship / U-SOLVE Project: ENI CBC MED Project on SDGs," "U-SOLVE Project Open Call for Innovative Solutions for Water Problems in Jordan and Palestine" and "30 Euro-Mediterranean Network Facilitating Market Uptake of Innovations from SMEs-Emphasis: ENI CBC MED." Overall new innovative ideas on sustainable water management were presented and it was agreed upon that sustainable water management is a key issue for the welfare of the region. Most participants agreed on that a MSc program like the one developed in the WaSec project is a necessity for the region in order to provide the next generation of water managers (Figure 37).

Fig. 35. Cornelia van Wesenbeeck presented the course Water policy and governance in transboundary basins.

Fig. 36. Othman Almashaqbeh presented on the Performance of constructed wetland system for industrial wastewater treatment in Jordan.

Fig. 37. A group photo of the conference participants

International & Local Conferences

Conferences

- Ahmed Al SaLaymeh, UJ, presented the WaSec project at the 2nd water energy nexus conference held under the patronage of the Prime Minister of the Hashemite Kingdom of Jordan, H.E. Dr. Bisher Al-Khasawneh, during September 15-16, 2021 in Hilton Dead Sea Resort –Jordan
- Ahmed Al SaLaymeh, UJ, presented the WaSec project at the 10th Conference on Scientific Research was held Under the Patronage of H.E. Prof. Adnan Badran, Chairman Board of Trustees Jordanian Society for Scientific Research, Entrepreneurship and Creativity on November 27,2021 at Al-Ahliyya Amman University.
- Ahmed Al SaLaymeh, UJ, presented the WaSec project at presented a MENA Fuels Workshop "Enabling Conditions for Sustainable Synthetic Fuels in Jordan - Infrastructures and Industries" under the patronage of the Minister of Energy and Mineral resources at Fairmont Hotel – Amman. The workshop was conducted by the National University College of Technology (NUCT), supported by German Federal Ministry for Economic Affairs and Energy (BMWi) and implemented by the Wuppertal Institute for Climate, Environment and Energy, German Aerospace Center (DLR) and IZES.

Presentations

- George Zaimes, IHU, presented an overview to the master students of the Man, Biosphere and Climate Change (https://wbcc.geol.uoa.gr/)of the National & Kapodistrian University of Athens and the International Hellenic University on May 6th, 2021 that was held online.
- George Zaimes, presented an overview to the master students of the "Analysis and Management of Anthropo-genic and Natural Disasters" Program of the Greek Fire Academy and the International Hellenic University (http://mandisastermsc.teiemt.gr/) on May 7th, 2021 that was held in person and online

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WaSec Project

The purpose of WaSec **"is to bring together and strengthen the cooperation between companies and HEIs through the development of courses in Water Resources Management, while taking into consideration potential climate change impacts, with adaptive learning and teaching methods".**

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