



# Section 9

Water Education

## 9.1. Higher Education Institutions (HEIs) and Professional Development Centers

### 9.1.1. Kazakhstan

#### Al-Farabi Kazakh National University

The Al-Farabi Kazakh National University (Al-Farabi KazNU) is the first Kazakh University that entered the world's top 200 universities in 2020, taking 165<sup>th</sup> place in the global QS "World University Rankings". The University has 16 faculties. Experts for the water sector are trained at the [Geography and Nature Management Faculty](#), [Meteorology and Hydrology Department](#).

#### Major Events and Activities in 2020

**Scientific projects and research at the Meteorology and Hydrology Department.** The following [research projects](#) have been completed: (1) "Assessment of the Impact of Natural Factors and Economic Activity on Urban Waters (Almaty case study)" and (2) "Dynamics of the Surface Runoff of the Republic of Kazakhstan in the Context of Climate Change and the Scenario (Forecast) of its Change for the Period up to 2050". Research conducted under these projects addressed such areas as: climate change at global and regional levels; climate conditions and water resources in Kazakhstan; climate and air basin condition of Kazakhstan; impact of observed and expected climate change on river ecosystems; identification of patterns and consideration of the influence of urbanized and adjacent territories on the elements of hydrological processes occurring as a result of anthropogenic and natural changes in the hydrological cycle: Almaty case study.

#### Events

- annual Republican Student Subject Olympiad on "Hydrology" with the involvement of teams from Al-Farabi KazNU and L.V. Gumilev [Eurasian National University](#);

- annual [Republican Contest](#) of Student Research Papers organized by the Ministry of Education and Science of the Republic of Kazakhstan (MES RK);

- discussion meeting "Youth and SDG 6 as accelerators of the Sustainable Development Goals: initiatives in Kazakhstan" organized by the Ban Ki-moon Institute for Sustainable Development at Al-Farabi KazNU (10 December).

**Publications.** The list of publications 2020 is available on [journal.kaznu.kz](http://journal.kaznu.kz), [pps.kaznu.kz/ru/Main/ChairPublications/101/3/0/2020](http://pps.kaznu.kz/ru/Main/ChairPublications/101/3/0/2020), [cawater-info.net/training/kaznu-kz.htm](http://cawater-info.net/training/kaznu-kz.htm)

Source: KazNU, <https://www.kaznu.kz/en>

#### Kazakh National Agrarian Research University

The Kazakh National Agrarian Research University (KazNARU) was founded in 1929. The University inclu-

des in its structure the Research Institute of Water Problems and Land Reclamation, the Research Institute of Agricultural Innovation and Ecology, the Water, Land and Forest Resources Faculty, and the Farmers High School.

#### Major Events and Activities in 2020

**Scientific projects and research of the Water Resources and Land Reclamation Department.** Completed projects (1) "Transboundary River Basins of the Republic of Kazakhstan and the People's Republic of China: Scientific and Applied Base for Sustainable Water Supply of Population and Economy under Climate Change and Economic Activity for the Period until 2050"; "Improved Water Use Efficiency in Rice Irrigation Systems of Kazakhstan".

**Publications.** The articles in the publications recommended by the Committee for Control of Education and Science at the Ministry of Education and Science of Kazakhstan for 2018-2020 are available on [https://www.kaznaiu.edu.kz/page/department/?name=su\\_resurstary\\_zhane\\_melioratciia&var=okytushyprofessorlar\\_kuramynyn\\_gylymi\\_basylymdary\\_369&lang=ru](https://www.kaznaiu.edu.kz/page/department/?name=su_resurstary_zhane_melioratciia&var=okytushyprofessorlar_kuramynyn_gylymi_basylymdary_369&lang=ru). The articles published in international scientific journals with the impact factor are available on [https://www.kaznaiu.edu.kz/page/department/?name=su\\_resurstary\\_zhane\\_melioratciia&var=impakt\\_faktorly\\_zhurnalдар\\_371&lang=ru](https://www.kaznaiu.edu.kz/page/department/?name=su_resurstary_zhane_melioratciia&var=impakt_faktorly_zhurnalдар_371&lang=ru)

Source: <https://www.kaznaiu.edu.kz/>

#### German-Kazakh University

The German-Kazakh University (GKU) was founded in 1999 with the aim of training students in line with the German standards. GKU has been the only German university in Kazakhstan and Central Asia up to present time. The World Politics Faculty of GKU has developed and carries out the training program "[Integrated Water Resources Management](#)". Within GKU, the [Natural Resources Institute](#) was established. GKU offers the [Central Asia Youth for Water Network \(CAY4W\)](#) and the [Central Asian Journal of Water Research \(CAJWR\)](#). The Natural Resources Institute was the first one in Central Asia that received the status of the [UNESCO Chair for Water Resources Management](#) in 2016.

#### Major Events and Activities in 2020

#### Natural Resources Institute

#### Scientific projects, research, competitions

- ESERA (Ecosystems, Society and Economics of the Region of Aral) [project](#), as part of which the research was carried out to assess the phyto-fauna and

dynamics of saxaul distribution on the dried Aral Sea bed, the current state of socio-economic infrastructure and the impact of climate change on environmental and socio-economic indicators in the region;

- regional project “Gender Aspects of Water Resource Management in Central Asia and Afghanistan: Supporting Young Researchers Through Publication of Articles in the CAJWR” implemented under WB led Central Asia Energy – Water Development Program (CAEWD) (October 2019-June 2020). On the CAJWR website, scientific articles and a collection of works of the project participants were published; 6 online conferences were organized;

- student research competition on sustainable management of natural resources in Central Asia and Afghanistan (July 2019-June 2020). The results of the study were presented at the regional Climate Conference, and an article was prepared for the CAJWR journal;

- a study tour “Renewable Energy Trip” was organized to explore the best practices in RES in three Central Asian states; students visited 12 sites and two round tables were organized (21-29 September);

- scientific internship under the project “Green Education and Science for Central Asia”, in the process of which the food, energy, water and land use nexus on example of Shengeldy village, Almaty province and the climate data for decision-making on water resources at basin level – case study of the Balkhash-Alakol basin – were studied (July-December);

- the international project “Global Disruptive Tech Challenge 2021: Restoring Landscapes in the Aral Sea Region” was launched to identify and support disruptive technologies and innovative approaches to landscape restoration in the Aral Sea region and Central Asia (19 November).

## Events

- Summer School on Aral 2020 in the Aral district of Kyzylorda province organized under the ESERA project with the support of IFAS and the “Barsakelmes” Nature Reserve (25-30 August);

- Online Scientific Conference “Silk Road of Knowledge” – a platform to build strong cooperation between all stakeholders in the field of climate change and environment (24-27 November);

- training seminar “Climate Change Adaptation and Mitigation in Central Asia: Climate Change, Water Security and Governance” organized for young civil servants of Central Asia and Afghanistan with the support of OSCE Program Office in Nur-Sultan and CAREC (21-22 September);

- a round table on “Energy saving and energy efficiency in the construction sector” (8 December);

- roundtable discussion on “Education policy on renewable energy and energy efficiency” as part of the Renewable Energy Trip 2020, offline and online (15 December);

- VII International Scientific Online Conference “Integration, Partnership and Innovation in Building Science and Education” (11-14 November).

## CAY4W

As part of the Eco-Talk project, 3 practical webinars aimed at gradual improving and designing eco-business ideas of participants (25-29 May), 3-month online monitoring program and school-intensive (September-December), and a presentation of projects and awarding of winners (14-15 December) took place. Online national and regional student contests were held on SDGs (March-June). Regional Olympiad finalists took part in an intensive online school Eco-Talk 2020, as well as in the ESCAP online 4<sup>th</sup> North and Central Asian Multi-Stakeholder Forum on Implementation of SDGs.

Source: UNESCO Chair on IWRM at GKU, <https://dku.kz/>, <http://www.academic-waters.org/en/>

## Nazarbayev University

Nazarbayev University (NU) was established in 2010. The University is comprised of 7 Schools, including the Graduate School of Public Policy (GSPP). One of priority fields of the University is water resources management.

### Major Events and Activities in 2020

A group of GSPP specialists conducted the “Water Security Review in Central Asia”.

### GSPP events

- a virtual research seminar “The Aral Sea Basin: Water for Sustainable Development in Central Asia” in partnership with Lee Kuan Yew School of Public Policy and Institute of Water Policy (17 August);

- online International Conference “Sustainable Development Goals in Central Asia and Challenges of COVID-19” in partnership with the National University of Singapore’s Lee Kuan Yew School of Public Policy and the Astana Civil Service Hub (15-16 October);

- online event “Earth Day workshop on Plastics and the Environment” dedicated to the 50<sup>th</sup> anniversary of the Earth Day (22 April). The workshop topics – “Ocean Plastics” and “Pacific Ocean Trash” – are directly related to water education.

**Publications.** NU won prestigious award in the “Publication Leader in Web of Science Core Collection in the last three years among universities of the Republic of Kazakhstan” nomination.

- S.Xenarios, A.Assubayeva, L.Xie, J.Sehring, D.Amirkhanov, A.Sultanov and S.Fazli “A Bibliometric Review of the Water Security Concept in Central Asia” in the “Environmental Research Letters” journal, Volume 16, Number 1 (IF:6.09);

- Economic, environmental, and pathogenic impact of point-of-use water heating in continental cli-

mate households by Nurzhan Maldenov, Igor Kolyagin, Dinara Dikhanbayeva, Enrico Marsili, Luis R. Rojas-Solorzano (Energy for Sustainable Development 59 (2020) 144-150);

■ A. Makhatova, B. Mazhit, Y. Sarbasov, K. Meiramkulova, V.J. Inglezakis, S.G. Pouloupoulos (2020) Effective photochemical treatment of a municipal solid waste landfill leachate. *PLoS ONE* 15(9): e0239433, <https://doi.org/10.1371/journal.pone.0239433>;

■ A. Kuntubek, N. Kinayat, K. Meiramkulova, S.G. Pouloupoulos, J.C. Bear, V.J. Inglezakis (2020) Catalytic Oxidation of Methylene Blue by Use of Natural Zeolite-Based Silver and Magnetite Nanocomposites. *Processes* 8(4): 471, <https://doi.org/10.3390/pr8040471>;

■ A. Baimenov, D.A. Berillo, S.G. Pouloupoulos, V.J. Inglezakis (2020) A review of cryogels synthesis, characterization, and applications on the removal of heavy metals from aqueous solutions. *Advances in Colloid and Interface Science* 276: 102088, <https://doi.org/10.3390/pr8040471>;

■ S.G. Pouloupoulos, G. Ulykbanova, C.J. Philippopoulos (2020) Photochemical mineralization of amoxicillin medicinal product by means of UV, hydrogen peroxide, titanium dioxide and iron, *Environmental Technology*, <https://doi.org/10.1080/09593330.2020.1720300>.

Source: Nazarbayev University, <https://nu.edu.kz/en/>

## Taraz Regional University named after M.Kh. Dulati

The Taraz Regional University named after M.Kh. Dulati (TarRU) was established by the Order of the Kazakh President No.752 of 11 October 2019 and on the basis of the order of the Committee of State Property and Privatization of the Ministry of Finance of the Republic of Kazakhstan No.346 of 3 June 2020 on the merger of TarSU and TarSPI. Specialists for the water sector are prepared at the Water Management, Environment and Construction Faculty established in 1962. The Faculty has 8 departments, including for Land Reclamation and Agronomy; Water Resources; Ecology; Life Safety, as well as research and production units – Research Institute of Geoecology and Land Reclamation, Scientific Research Center “Senimdilik” and scientific student clubs “Hydropower Engineer”, “Ecologist”, “Land Reclamation”, “Land Surveyor”, “Januarlar Elemi”, and “Globe”.

## 9.1.2. Kyrgyz Republic

### Kyrgyz-Russian Slavic University named after B.N. Yeltsin

The Kyrgyz-Russian Slavic University named after B.N. Yeltsin (KRSU) was established in 1993. Education at the University is delivered in 24 fields and specializations. Water specialists are trained at the Architecture, Design and Construction Faculty on Integrated

## Major Events and Activities in 2020

**Scientific projects and research.** The University in cooperation with the TOO “Kazakh Research Faculty of Water Management”, RSE Zhambylvodkhoz, RSE Yuzhvodkhoz, RSE Shu-Talas Basin Inspection, RSE Kazyuzh-giprovodkhoz, and KazNIIVH undertakes the following research efforts: (1) “Development of Resource-Saving Irrigation Technology using Organic Ameliorants in the Adaptive Landscape Farming System”; (2) “Development of Horizontal and Vertical Drainage Operation Regime and Technology for Regulation of Irrigated Land Conditions”; (3) “Assessment of the Environmental Status of Zhambyl Province and Ways for Solution”; (4) “Justification of Technology and Organization of Construction and Sediment Control in Maintaining Canals in the Ili-Balkash Water Management Basin”; (5) “Development and Research of Multi-Product Hydrocyclone Pumping Units”; (6) “Research on Water Supply Problems in the Absence of Reliable Sources and Development of Artificial Underground Reservoirs”.

## Events

■ International Scientific and Practical Conference “Current Problems of Ecology and Nature Management” (14 February);

■ International Scientific and Practical Conference “Agro-Industrial Complex in the context of the Fourth Industrial Revolution and Environmental Problems related to the Process of Land Reclamation” (11 April).

Source: TarRU, <https://tarsu.kz/ru/>

## South Kazakhstan State University named after M. Auezov

The South Kazakhstan State University named after M. Auezov (SKSU) is a state multidisciplinary higher education institution. The University is comprised of 7 faculties, Distance Learning Institute, six higher schools, including the Higher School of Agricultural Sciences, where training is conducted on Water Resources and Water Use (6B08610) and Water Supply, Sewage and Water Protection (6B07330). SKSU launched the Dissertation Council for awarding the Doctor of Philosophy (PhD) degree in Safety of Life and Environmental Protection.

Source: <http://ukgu.kz/en>, <http://ap.ukgu.kz/en>

Water Resources Use and Protection and Hydraulic Engineering. The Faculty consists of 9 departments, including Water Resources and Engineering Disciplines Department (WREDD).

## Major Events and Activities in 2020

**Scientific projects and research.** WREDD undertook the research efforts on: (1) “Full-scale adoption of in-

novative hydraulic design of water intake facility on the Zhetykupruk River for water supply to diversion HPP"; (2) "Adoption of innovative design of hydraulic structures in the project of improvement of the right and left banks of the Ak-Bura River in Osh".

**Events.** The Department's lecturers and graduate students made presentations on: (1) "Designs of Hydraulic Structures for the Diversion HPP on the It-Agar River in Toktogul District, Jalal-Abad Province" at the Conference of the Architecture, Design and Construction Faculty "Theory and Practice of Architecture and Design in Mountainous Kyrgyzstan"; (2) "Hydraulic and channel processes during water diversion from rivers into the systems of diversion HPPs" at the round table of the Ministry of Education and Science of Russia "Development of scientific and technical potential of the Kyrgyz-Russian Slavic University through the development of cooperation with the leading Russian universities and scientific organizations". (19 November).

### Publications

#### ■ research materials

1. G.I. Loginov, K.A. Orozaliev, S. Aitbek uulu, B.B. Kurmshiev, Project of bank improvement within the Ak-Buura river section from A. Navoi Street to S. Vakhapov Street in Osh city, the Kyrgyz Republic. Collected papers "Improvement of hydraulic calculation methods for culverts and wastewater treatment facilities". SSTU Journal named after Yu. Gagarin. V. 1, No.1 (45) Saratov 2020. pp. 18-25;

2. O.V. Atamanova, G.S. Adjigulova, Laboratory research of turning structures for high-velocity channels. In the collection: Modern problems and prospects of construction, heat and gas supply and energy supply development. Proceedings of the X National Conference. Saratov, 2020. pp. 50-53;

3. G.S. Adjigulova, N.P. Lavrov, O.V. Atamanova, Turning structures for high-velocity channels. Improvement of Hydraulic Calculation Methods for Diversion and Purification Structures. 2020. V. 1. No.1 (45). pp. 5-8;

4. O.V. Atamanova, G.S. Adjigulova, N.P. Lavrov, Functional features of network structures in high-velocity channels in mountain-piedmont zone. Improvement of Hydraulic Calculation Methods for Diversion and Purification Structures. 2020. V. 1. No.1 (45). pp. 9-14.

#### ■ educational materials

1. G.P. Frolova, N.V. Yakovleva, Manual. Methodological recommendations for practical exercises on the "Geology" discipline, "Construction" section. KRSU 2020. – 192 p;

2. G.I. Loginov, Textbook for practical exercises in the "Pumps and pumping stations" discipline/ Kyrgyz-Russian Slavic University. – Bishkek, 2020. – 55 p.

Source: WREDD, <https://www.krsu.edu.kg/>

## Kyrgyz National Agrarian University named after K.I. Skryabin

The Kyrgyz National Agrarian University named after K.I. Skryabin (KNAU) was established on the 30<sup>th</sup> of January 1993. Training of personnel for the water sector is conducted at the Hydromelioration, Ecology and Land Management Faculty (HELMF).

**Events.** HELMF lecturers and students participated at the: (1) 11<sup>th</sup> Central Asian Leadership Program on Environment for Sustainable Development (14-18 September); (2) Regional Scientific and Practical Online Conference "Silk Road of Knowledge" organized by GKU (24-27 November).

An excursion to the KNAU Water Museum was held for students of the "Orok" school to study interactive stands, the process of express analysis of drinking water, etc. (10 February).

Source: <http://knau.kg/ru/>

## American University of Central Asia

The American University of Central Asia (AUCA) founded in 1993 is an international, multi-disciplinary learning community. Its curriculum includes the Preparatory Program (New Generation Academy), 15 undergraduate majors and 10 graduate degree programs. In September 2020, the new [Environmental Sustainability and Climate Science](#) Department was opened to train specialists in this specialization. AUCA consists of the Technical School of Innovation, which offers seven fields of specialization, including Ecology and Energy Efficiency, the [Tian Shan Policy Center](#), and the [Center for Environment and Development](#).

### Major Events and Activities in 2020

**Scientific projects and research.** The regional project under the PEER program "Integrated water resources management (IWRM) and strategic environmental assessment (SEA) of Kabul and Amu Darya Rivers" has been completed. The project results were reflected in the book "Water Resource Management in Central Asia and Afghanistan: Current and Future Environment and Water Problems" edited by Dr. J.E. Kulenbekov and B.D. Asanov, which is to be published by Springer Nature in 2021. The ongoing projects are (1) "Assessment of Water and Land Resources of Small Transboundary Bodies in the Amu Darya River Basin by Means of Remote Sensing" (regional) that studies the climate change impact on water resources in the Amu Darya River basin – Surkhandarya (Uzbekistan) and Karatag (Tajikistan); (2) "Air Quality Monitoring in Bishkek"; (3) "Green Economy Learning at Tertiary-level Education in Kyrgyz Republic" that is to develop new courses on green economy, adapt existing courses on green modeling and green job evaluation, and conduct a series of trainings for university teachers.

**Events.** AUCA hosted the online seminar dedicated to the Desertification and Drought Day (17 June).

Source: [www.auca.kg/](http://www.auca.kg/)

### 9.1.3. Tajikistan

#### Tajik Agrarian University named after Shirinsho Shotemur

The Tajik Agrarian University named after Shirinsho Shotemur (TAU) was established in 1931. TAU prepares water specialists at the [Hydromelioration Faculty](#) including the departments of land reclamation, land rehabilitation and protection, operation of irrigation and drainage systems, hydraulic engineering, land management, structural mechanics and hydraulics.

#### Major Events and Activities in 2020

**Scientific projects and research.** The Hydromelioration Faculty carries out research on the following topics: "Development of modern technology and techniques for water filtration, soil conservation and economically profitable irrigation of crops", "Impact of land reform on the effective use of irrigated land",

"Assessment of technical condition of hydraulic structures".

#### Events

- meeting of the Council of Rectors from the leading 28 Agrarian Universities from 10 CIS countries on "Organization of education under the coronavirus pandemic" (21 May);

- meeting of the Steering Committee attended by 15 Universities to discuss joint training on the base of agriculture and water management faculties (13 August);

- workshop "Development of educational standards and curricula based on the international educational standards" under the project "Improvement of Agricultural Curricula based on the International Educational Standards" (17-18 September).

Source: <http://www.tajagroun.tj/ru/>

### 9.1.4. Turkmenistan

#### Turkmen Agricultural University named after S.A. Niyazov

The Turkmen Agricultural University of S.A. Niyazov was founded in 1930. The University consists of 8 faculties, including the Land Reclamation and Hydraulic Engineering Faculty, which trains specialists in Hydromelioration and Land Construction and Cadastre.

The Botanical Garden, Scientific and Production Center for Livestock Husbandry and Veterinary Medicine, Makhtumguly Scientific and Production Experimental Center, Research-Production Center of Akhalteke Horse Breeding, and Agrosenagat secondary vocational schools in Ashgabat, Mary and Lebap velayats<sup>72</sup> are in the structure of the University. The training centers of the German company Claas and the John Deere (USA) are functioning at the University.

#### Major Events and Activities in 2020

**Scientific projects and research.** TAU post-graduates and students conducted research on growing sugar beet, corn, vegetables and cucurbits using irrigation water-saving methods in the agricultural polygon in Gokdepe etrap<sup>73</sup>, Akhal velayat. The results were published as "Recommendations on design of drip irrigation systems for crops, vineyards, orchards and forest plantations".

**Events.** [Practical exercises](#) were held for students of the Turkmen State Agricultural University at the "Turkmen-

suvelymtaslama" Institute<sup>74</sup> (2 July), as well as the [online training](#) on water saving irrigation (17 September).

The University organized an exhibition to mark the 25<sup>th</sup> anniversary of Turkmenistan's neutrality.

Source: <http://tohu.edu.tm/>

#### Turkmen Agricultural Institute

The Turkmen Agricultural Institute (TAI) was established in 2010 at the Ministry of Agriculture and Environment Protection of Turkmenistan. The Institute prepares water specialists at the Hydromelioration and Agricultural Mechanization Faculty in the following fields: operation of irrigation and drainage systems, hydromelioration. The Institute has the Research and Production Center and Training and Production Facility.

#### Major Events and Activities in 2020

**Main events and activities.** TAI held the contest of scientific works "Science – Beginning of Development", the video conference<sup>75</sup> "Integrated Natural Resource Management and Sustainable Land Management" (10 February); workshop sessions<sup>76</sup> on "Implementing Innovation and Digital Methods in Agriculture" (13-21 January 2021) and a seminar "Agriculture Monitoring using Satellites" (10-12 February 2021).

Source: <http://tohi.edu.tm/ru/index.php>

<sup>72</sup> Province

<sup>73</sup> District

<sup>74</sup> UNDP/GEF project "Energy Efficiency and Renewable Energy for Sustainable Water Management in Turkmenistan"

<sup>75</sup> FAO/GEF project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey"

<sup>76</sup> "New & Innovative Courses for Precision Agriculture" Erasmus+ project

## 9.1.5. Uzbekistan

### Tashkent Institute of Irrigation and Agricultural Mechanization Engineers

The Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIAME) began its work in 1923. Nowadays, the Institute is comprised of seven faculties, 36 departments, the Center for Advanced Training and Retraining of Staff, International House Tashkent Lyceum, Innovation and Research Cluster on Water Resource Management, UNESCO Chair on Water Diplomacy, Water Management and Environmental Protection, "Eco GIS" Center, Scientific Training Center in Urta Chirchik district, Tashkent province, State Unitary Enterprise "Regional Center for Retraining and Advanced Training of Farm Managers and Staff". TIAME has 2 branches – in Bukhara<sup>77</sup> and Karshi. There are also colleges, such as the Beshkent Agricultural College, Pakhtaabad Agricultural College, and Kumkurgan Agro-Industrial College.

TIAME was ranked 201+ in the overall global universities ranking "University Impact Ranking-2020" by the *Times Higher Education* (THE) in the areas "Clean water and sanitation", "Life on land" (22 April). Currently, TIAME is the only HEI in the history of Uzbekistan recognized by two major international rating agencies THE and *Quacquarelli Symonds* (QS). For the first time in the country, TIAME graduates were awarded a digital bachelor's degree with QR code.

#### Major Events and Activities in 2020

**Scientific projects and research.** The Institute's teaching staff, master and doctoral students carry out research: at the Kokand HPP, Big Fergana Canal and Chartak reservoir; in the experimental fields in the Republic of Karakalpakstan and Khorezm province; in the fields of Tashkent and Syrdarya provinces. 29 international projects have been implemented.

Meetings were held as part of the following the projects (1) Erasmus + "NICOPA: New and Innovative Courses for Precision Agriculture" (10 August); (2) Erasmus+ "DSinGIS: Doctoral studies in Geoinformatics Science", which will provide equipment for the Joint Research Center of Geoinformatics<sup>78</sup> to be established at TIAME (11 August); (3) "Development of New Technologies to Monitor and Control Water Resource Use to Combat Salinization and Improve Land Productivity and Food Security in the Aral Sea Region" under the "Research Partnership in Science and Technology for Sustainable Development/SATREPS program"<sup>79</sup> (27 August); (4) New Master's Degree Curricula for Sustainable Bioeconomy in Uzbekistan (BioEcUz) (10 October).

#### Events

- Conference "The Future of the Aral Sea through the Eyes of Youth" (14 February, Karshi branch); International Scientific Conference "Construction Mecha-

tics, Hydraulics and Water Resources Engineering" (CONMECHYDRO 2020) (23-25 April); XIX Scientific-Practical Conference of young scientists, masters and gifted students "Modern Problems of Agriculture and Water Management" (14-15 May); Online webinar "Uzbek-German cooperation projects in the field of water resources management" (26 June); XXIII International Scientific Conference "Formation of Living Environment" (FORM-2020) (24-25 September); 1<sup>st</sup> International Conference on Energy, Civil and Agricultural Engineering 2020 (14-16 October); 7<sup>th</sup> International Scientific Conference "Integration, Partnership and Innovation in Construction Science and Education" (IPICSE 2020) (11-20 November); International Scientific Conference dedicated to the 10<sup>th</sup> anniversary of the Consortium of Agricultural Universities for Development in Central Asia and the Caucasus (CASCADE) (10-11 December).

- World Water Day events: poster exhibition "Water is Life!" and discussions on "Climate Change Impact on Water Resource Management in Uzbekistan" (13 March); intellectual game "Innovative ways of water use in the context of climate change" (16 March); video contest "Water and Climate" (17 March); contest of the best innovative technologies in the field of agriculture and a seminar "Water and Climate Change" (18 March).

- International schools: summer school "Basics of water resource management: integration of theory, practice and science" for master students at GKU and TIAME, students of CA and Afghanistan (17-28 August); winter school "Tashkent water security lectures" organized together with German partners (10-11 December).

**The following Centers have been opened:** Professional Development Center as part of the "English as a Medium Instruction" project supported by the British Council (10 February); Innovative Scientific and Practical Research Center in cooperation with JSCB Turonbank (19 November); Integrated Water Resource Management Laboratory (SRIB) within the USAID-funded SMART Waters project by CAREC/Ministry of Water Management of Uzbekistan (10 December); cluster of digital technologies for sustainable management of natural resources (30 December); polygon of modern water-saving technologies and a lysimetric station at a TIAME Research training facility jointly with UNDP "Sustainable Management of Water Resources in Rural Areas in Uzbekistan" project (18 March 2021).

**Capacity building.** (1) "Summer Field School 2020" for the students of "Environmental Safety in Water Management". As part of the School "Trails Building Work Shop" and "International Planning and Design" projects were implemented; (2) guest lectures by foreign experts: "Sustainable Soil Management and Digital Agriculture" (14 February, Eurasian Center for Food Se-

<sup>77</sup> The Bukhara branch celebrates its 10<sup>th</sup> anniversary in 2020

<sup>78</sup> <http://www.dsingis.eu/>

<sup>79</sup> Japanese government program to promote collaborative international research aimed at bilateral cooperation between the Japan Science and Technology Agency (JST), JICA, and the host country

curity at Lomonosov Moscow State University), “Water-saving irrigation technologies and efficiency of water use in agriculture” (26 February, Institute of Water Problems, Hydropower and Ecology of the Academy of Sciences of the Republic of Tajikistan); “Hydrological modeling” (27 February, IWMI), “History of Irrigation and Reclamation in Spain” (28 February, University of Lleida in Barcelona, Spain) were held.

The Center for Advanced Training and Retraining of Staff at TIAME held: the workshop “Irrigation Methods and Techniques” (13 February); advanced training courses for water managers of the Republic of Kyrgyzstan (10 March-10 April); the online training seminar “Sustainability assessment of the water-energy-food nexus in the case of irrigated agriculture: A systematic review” (6 July).

**Cooperation.** A Memorandum of Cooperation was signed between the Ministry of Innovation of RUz and TIAME. Meetings and negotiations on future cooperation were held with representatives of CLAAS and Lindsay (Germany) and Irriport (Germany); with Mr. Brian Farrell, Head of International Projects at Mississippi State University, with discussion of the joint master’s programs (USA), Mr. Johannes Holzner, Professor at the Weinstein-Trizdorf University of Applied Sciences (Germany), and Mr. N.S. Yakovchik, Director of the Institute for Retraining and Professional Development of the Belarusian State Technological University.

**Participation in the events.** Videoconference “Implementation of joint training programs to train engineers” (29 January); World Energy Congress (World Sustainable Energy Days) (WSED) 2020 (4-6 March, Wels, Austria); International Conference on Sustainable Futures: Environmental, Technological, Social and Economic Matters (ICSF-2020) (20-22 May); VIII International Conference Arch-Eco (22 May); meeting organized by WB “Exchange of views with representatives on improving water security and adapting to climate change in the framework of the Water and Energy Program in Central Asia” (August); practical seminar on agriculture digitalization with John Deere in the foreign cluster “Silverleaf” in Pakhtakor district, Jizzak province (15 October); online dialogue “Automated land use design systems and international experience” (23 October); research seminar “Sustainable Entrepreneurship: Basics, Tasks, Trends” (29 October).

**Participation in exhibitions and contests.** TIAME staff, doctoral students, undergraduates, and students participated in the exhibition “Modern Laboratory Equipment and Developments by Gifted Students” (6 February); Republican Youth Contest within the framework of the “Uzbekistan Youth against Climate Change” project, and “Hydro Leaders” team of the Hydromelioration Faculty won the 1<sup>st</sup> place (27 July); science fair (16-18 September); C.A.T Science Accelerator 2.0 program competition with the Defuse-it project, which aims at developing an irrigation water treatment device with an intelligent control system; International Week of innovative ideas InnoWeek 2020 (3-8 November).

**Publications.** The article of Mr. U. Umurzakov, TIAME rector, “Towards innovations – make progress” was published in the newspaper “Narodnoe slovo” No.227 (798)

(29 October). In the QS’s magazine QS-GEN (Global Education News) the following articles were published: “TIAME – the only Uzbek institution represented in QS EECA rankings” in the 1<sup>st</sup> issue and “Making history TIAME in 2022” in the 2<sup>nd</sup> issue.



Based on the research efforts of TIAME, in 2020, 74 monographs, 39 textbooks, and 119 teaching aids were published. Additionally, 561 articles in the national scientific journals and more than 845 articles in foreign journals, including 512 articles in journals included into the “Scopus” and “Web of Science”, were published.

**Awards.** TIAME staff members were awarded the badge “Excellent water professionals of the Republic of Uzbekistan”, order “Glory of Labor”, medal “Turan Birimdigi” of the Kyrgyz branch of the “Yangi Ovoz” Union of Central Asia Writers and Historians.

Source: TIAME Administration, <http://tiame.uz/>

## National University of Uzbekistan named after Mirzo Ulugbek

The National University of Uzbekistan (NUUZ) was officially established on the 12<sup>th</sup> of May 1918. The University has in its structure 15 faculties, including Geography and Natural Resources Faculty and Geology and Geoinformation Systems Faculty. Specialists for the water sector are trained at the Land Hydrology Department: bachelors are trained in hydrometeorology and hydrology, and master’s students get further education in hydrometeorology, hydrology, and climate change and climate risk assessment. There are also PhD and DSc programs on “Land hydrology. Water resources. Hydrochemistry”.

### Major Events and Activities in 2020

**Scientific projects and research** of the Land Hydrology Department:

Fundamental project “Studying River hydrological regimes and water formation patterns in Uzbekistan and adjacent territories in the context of climate change” and applied project “Development of technology for better efficiency and operational reliability of variable-regime irrigation canals”. As a result, two monographs were prepared: (1) “Water formation patterns in mountain rivers in the context of climate change”; (2) “Ensuring the operational reliability of irrigation canals and technologies for their improved efficiency”.



The academic staff of the Department is engaged in the following international projects: "Cryospheric Climate Services for improved Adaptation" (CICADA); "Developing Climate Resilience of Farming Communities in the Drought Prone Parts of Uzbekistan" (UNDP); Climate Adaptation and Mitigation Program for Aral Sea Basin (CAMP4ASB); Central Asia Research and Adaptation Water Network: CARAWAN.

Within the framework of Uzbek-Indian cooperation 2021-2023, the tender for the project "Assessment of Dam and Climate Change Impacts on Water Scarcity and Drought in Arid and Semi-Arid River Basins in India and Uzbekistan" was won.

The department employee B.E. Adenbaev defended his doctoral dissertation (DSc) in 11.00.03 "Land hydrology. Water resources. Hydrochemistry".

**Events.** International Scientific and Technical Conferences: (1) "Current Problems of Geology and Geoinformation Systems" (29 April); (2) "Integrated management and reclamation of saline soils for food security: new approaches and innovative solutions" (12-16 October).

*Source:* Land Hydrology Department, Geography and Natural Resources Faculty, National University of Uzbekistan named after Mirzo Ulugbek

## Samarkand State University

The Samarkand State University (SamSU) was founded in 1927. There are 18 faculties at the University. The Geography and Ecology Faculty has 4 departments, including Hydrometeorology and Ecology and Life Safety Departments.

### Major Events and Activities in 2020

The University launched the Agro-Biotechnology and Food Security Faculty, which focuses on the crop development and teaching modern agronomists in handling land and water rationally. Close cooperation with local agricultural cooperatives and agro-industrial clusters is developed to ensure effective integration of education and production.

**Research projects.** (1) "Study, assessment and mapping of desertification process in mountain geosystems on the base of reference experimental plots (the Gubdintau Ridge case study)"; (2) "Analysis of possibilities of non-conventional energy generation on the base of natural resources (wind, water and solar radiation) in the Mirzachul Oasis".

**Publications.** Scientific Bulletin of SamSU. See <http://www.samdu.uz/ru/ilmiy-jurnal>

*Source:* <http://www.samdu.uz/ru>

## Karakalpak State University named after Berdakh

The Karakalpak State University named after Berdakh (Berdakh KSU) was founded in 1974. The University is comprised of 15 faculties, including the faculties of Biology and Geography and Natural Resources.

### Major Events and Activities in 2020

**Publications.** Scientific journals: E-journal "Science and Education in Karakalpakstan", Bulletin of the University.

*Source:* Berdakh KSU

## 9.2. Regional HEIs and Professional Development Centers

### 9.2.1. Regional Training Center at SIC ICWC

Water sector professional development courses in Central Asia were established at SIC by the ICWC decision (ICWC Protocol No.24 of 23.10.1999). The courses were founded by the ministries of agriculture and water resources of five CA states, SIC ICWC, BWO Amu Darya, and BWO Syr Darya. Later, these vocational training courses were transformed into the Regional Training Center (RTC) at SIC ICWC.

#### Major Events and Activities in 2020

SIC ICWC experts

- prepared video lectures on water diplomacy and information exchange in CA for the [Massive Open Online Course "Governance for Transboundary Freshwater Security"](#) organized by GWP (January). In October, the International Water Law Academy, established at the Wuhan University of China under the leadership of Prof. P. Wouters, joined the course as a partner in the implementation of the third module. Dr.Ziganshina became the member of the Academy and participated in the session "Does the World

[Need More International Water Law?](#)" organized by GWP and the Wuhan International Water Law Academy (27 October).

- held the following events:

- lectures and practical classes at TIIAME for (1) students of Hydromelioration faculty on the topic "Hydraulics (Hydrostatics and Hydrodynamics)" (January-June); (2) master's students of the Ecology and Water Resource Management Department on the topic "International and National Water Relations and Law" (January-March); (3) master's students of the Hydraulics and Hydroinformatics Department on the topic "Hydraulics and Hydrology Engineering" (October-December);
- guest lecture "Transboundary Water Systems and Water Security: good and bad lessons from Central Asia" for masters of the Nazarbayev University (22 October);

■ participated as members of the State Certification/Examination Commission in evaluation of master's theses on IWRM (5A450207) and Water Quality Management (5A450208) (19 June, TIAME via video-conferencing).

Within the framework of cooperation with GKU, Dr. Zi-

ganshina made presentations at the following events: Conference "Gender and Transboundary Water Resource Management in Central Asia" (12 June) and the Regional Scientific and Practical Online Conference "Silk Road of Knowledge" with the financial support of the Ministry of Foreign Affairs of the Federal Republic of Germany (25-27 November).

## 9.2.2. University of Central Asia (Kazakhstan, Kyrgyzstan, and Tajikistan)

The University of Central Asia (UCA) was founded in 2000 to promote the social and economic development of Central Asia, particularly its mountain communities, by offering an internationally recognized standard of higher education. UCA is comprised of: Undergraduate School of Arts and Sciences (SAS); Graduate School of Development (GSD) including the Mountain Societies Research Institute (MSRI) and its Knowledge Hub; School of Professional and Continuing Education (SPCE). UCA have formed the Green Community Club – an initiative to promote awareness of ecological issues and encourage participation in environmentally sustainable practices.

### Major Events and Activities in 2020

MSRI held:

■ regional conference "The Art of Neighborhoods: Border Dynamics, Natural Resources, and Mobility in Central Asia" (5 February, Bishkek);

■ a seminar for identification of environment-related development priorities for Kyrgyzstan (10 March, Bishkek);

■ exhibition "Fragile Water", which presented works prepared as part of the "Kyrgyz Mountains Environmental Education and Citizen Science" project (22 March, Bishkek).

**GSD Publications.** P. Khakimov, Climate Change in Afghanistan, Kyrgyzstan, and Tajikistan: Trends and Adaptation Policies Conducive to Innovation, Report No.55, March 2020, p.56.

M. Kulikov et al. Climate Impact on Local Communities in the Isfara River Basin/ Research Report No.5, 2020, p.49.

R.C. Sidle. Dark Clouds over the Silk Road: Challenges Facing Mountain Environments in Central Asia, Research Report No.8, January 2020.

## 9.3. Professional Development Courses and Trainings

### 9.3.1. Professional Development Courses and Trainings in 2020<sup>80</sup>

**CAMP4ASB training seminars:** training for specialists of the hydrometeorological services of Central Asia (20-24 January), online Conference "Training based on Modern Tools for Data Processing, Hydrological and Climate Forecasting" (18 June); meeting on capacity building program on hydrological reservoir forecasting to assess hydropower potential in the CA region (2 July); Webinar "Promoting Political Dialogue and Capacity Building for Central Asian Countries for the 26<sup>th</sup> Session of the Conference of the Parties to UNFCCC (30 September); scientific and technical seminar "Crop Yield Monitoring and Forecasting Systems in Central Asia" (7 July); webinars with the participation of representatives of IPCC (25-26 November).

**UNESE and UNESCO webinars** on SDG indicator 6.5.2: supporting countries in preparing national reports for the 2<sup>nd</sup> reporting exercise (12 May-June).

**MASHAV seminars:** MASHAV International Agricultural Training Center – "Water Resources Management. Design of Urban and Agricultural Water Supply Systems. Irrigation and Filtration of Irrigation Water" (21 May).

**ICARDA seminars:** "Digital Discussion Forum: Big Data Solutions to COVID-19 & Food Security Impacts", (9-30 June).

**ISEPEI Project series of webinars** "Bridging ICTs and the Environment" (22-28 July).

**Xylem Analytics Australia series of webinars** on water: "Water Quality Monitoring Sensors and Systems, Weather Monitoring and Data Loggers" (1 and 28 July, 28 August); "Data Loggers and Controllers, Telemetry Solutions and Signal Converters"; "Water Sampling Solutions"; "Flow Monitoring Solutions"; "Water Level Monitoring Solutions".

**NASA Applied Remote Sensing Program Trainings (ARSET):** ARSET webinars "Satellite Remote Sensing for Agriculture" (14, 21 and 28 April, 5 May); ARSET training "Groundwater Monitoring using Observations from NASA's Gravity Recovery and Climate Experiment (GRACE) Missions" (25 June); introductory training "Understanding Phenology with Remote Sensing" (30 June, 7 and 14 July); ARSET webinar "Using Earth Observations to Monitor Water Budgets for River Basin Management" (21 and 28 July, 4 August).

<sup>80</sup> Due to the COVID-19 pandemic, events were held in the online format

**ADB Water and Deltares seminar series:** Collaborating on Innovative and Sustainable Solutions for Integrated Water Management: "Resilient City Toolbox for Urban Resilience Planning" (11 August); "Understanding Disease Transmission and Health Risks through Water Systems" (25 August); "Dynamic Adaptive Policy Pathways and Climate Adaptation" (8 September); "Yellow River – A Hydrological Basin Approach" (22 September); "Future of Hydrological Forecasting" (6 October).

**ADB, IHE Delft and IWMI webinar** "Improved Decision-Making for Water Security Using Water Accounting" (18-19 November).

**NEWAVE project e-Lecture Series** "Water Governance – Theoretical Perspectives" as part of the EU Research and Innovation program Horizon 2020 (17 November-17 December).

**Webinars by the World Bank and the Eurasian Center for Food Security/Agrarian Center of the Lomonosov Moscow State University:** "Food Security and the Food Policy Implications of the COVID-19 Crisis" (24 November); "Food Policy Research and Capacity Building in the Eurasian Region" with the International Food Policy Research Institute/IFPRI (2 December).

**Capacity Building Courses** for Kyrgyz Water Specialists at TIIAME (Tashkent) within the USAID/CAREC Smart Waters project (10-22 March).

**The Geneva Water Center and DiploFoundation distance learning course** "International Water Law and the Law of Transboundary Aquifers", 4<sup>th</sup> edition (5 October-14 December). The Geneva Water Center developed the module "Hydropolitics and Water Diplomacy" in cooperation with GKU and SDC, which is an elective course of the GKU master's program on IWRM.

### 9.3.2. Professional Development Courses and Trainings in 2021<sup>81</sup>

**11 December 2020-28 February** – "Introduction to Groundwater Governance" GGRETA course;

**19 January** – Webinar "Impact of Climate Change on Governance and Security of the Republic of Tajikistan";

**21 January** – ICID Webinar "General Challenges of Irrigation Schemes Management under Different Scales: with Special Consideration on Institutional and Organizational Aspects of System Management";

**25-29 January**, Tashkent – Winter school "Capacity Building of NGOs, Development of Cooperation and Partnerships with Government Agencies, Advocacy and Assessment of Local Community Needs" in the framework of the EU-supported "Innovative Uzbekistan" project;

**28 January** – IWMI-USAID webinar "Remote Sensing for Irrigation Water Management";

**1-5 February** – IWMI/SDC series of webinars "Solar Irrigation for Agricultural Resilience";

**1 February-18 April** – GGRETA course "Introduction to Groundwater Modelling";

**2, 16 February; 2, 16 March** – ADB/IWMI series of webinars "Science and Innovation for a Water-Secure Future for All";

**9, 16, 23 February** – ARSET trainings "Mapping and Monitoring Lakes and Reservoirs with Satellite Observations";

**19 February** – seminar "Learning from historic irrigation and drainage structures" by the Irrigation and Water Forum, UK's national section of ICID;

**25 February** – Water Resource Management in Israel;

**4, 11, 18 and 25 March** – MASHAV International Webinars "Implementing Pressure Irrigation Systems for Intensive Agriculture";

**23 March** – webinar "Webinar on Irrigation and Drainage in the Republic of Uzbekistan: state-of-the-art and future plans";

**12 April-11 May** – GGRETA course "Groundwater Quality in Transboundary Aquifers";

**5 May** – seminar "Drought Management and Mitigation in Central Asia";

**6 May** – webinar "Jobs for Young People in the Land Sector";

**17-20 May** – seminar "Methodological Recommendations for Calculating Greenhouse Gas Emissions and Reporting under the Paris Agreement for Central Asian Countries";

**16, 23 and 30 June** – ARSET series of webinars – "Using Google Earth Engine for Land Monitoring Applications" <https://appliedsciences.nasa.gov/joinmission/training/english/arset-using-google-earthengine-land-monitoring-applications>;

**17 June-4 September** – series of webinars on climate security [https://climatesecurity.cgiar.org/?tab=news\\_event](https://climatesecurity.cgiar.org/?tab=news_event);

**13 July** – webinar "Towards the 9<sup>th</sup> World Water Forum";

**14, 16 and 21 September** – ARSET series of webinars – "Monitoring Coastal and Estuarine Water Quality: Transitioning from MODIS to VIIRS" <https://appliedsciences.nasa.gov/join-mission/training/english/arset-monitoring-coastal-and-estuarine-water-quality-transitioning>;

**27 September-22 November** – distance learning course "Integrated and Adaptive Water Resources Planning, Management and Governance" <https://www.mcgill.ca/osas/cpd/water-management-online-course>;

**11 October-19 December** – distance learning course "International Water Law and the Law of Transboundary Aquifers" <https://www.unige.ch/formcont/cours/water-law>.

<sup>81</sup> Due to the COVID-19 pandemic, events will be held in the online format

