



Tempus

UZWATER

**Master in environmental science and sustainable
development with focus on water management for
Uzbekistan higher education**

Sustainability Plan

for partner universities in Uzbekistan

2016



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1. Rationale

In order to ensure continuity of the UZWATER Master Programme and the Study Centres beyond Tempus funding each partner University in Uzbekistan developed Sustainability Plan. Each partner University has taken mid- and long-term views towards environment protection situation and sustainable development in Uzbekistan.

The report contains the vision towards further development of the study programme, including the aims, the results, the activities that will lead to those results, study programme marketing, involvement and support from public and private stakeholders, list of community partners, round table discussions and other public events, practical placement and employment of graduates.

The Sustainability Plan grounded on the real problems of the regions and the country. It investigated labour market needs, enrolment perspective of Master degree students, co-operation with social and industrial partners, possible external financing sources.

The report also describes potential activities of the Study Centres, i.e. how they will contribute to the development of Study Programme as well as region and the country.



2. Samarkand Agricultural Institute (SAI)

2.1 Programme Vision

The project developed set of modules, related with sustainability, use of scarce resources like water in Central Asia and Uzbekistan. SAI has used these modules as source of novelty and innovations in related field and implement different modules for different programs, both in BA and MA level.

Idea is "Ikea for education", were everyone can build or renovate its study program, using related modules. Involvement and support from public and private stakeholders is important prerequisite for successful study process.

2.2 Applied projects

SAI has prepared a list of applied projects addressing environmental/water/sustainability issues of the south-east region of Uzbekistan. Applied projects are an important component of the Uzwater project. It is meant to contribute to the development of the country. It is realizing through master thesis work, and thereby foster knowledge, specialisation and practical skills of the students. Practical placement of the students at companies, industrial enterprises, municipalities or other institutions is encouraged. Partial goals are established for each semester and results are presented in the form of research paper.

List of applied projects:

- Soil and water conservation practices for sustainable agriculture in Uzbekistan.
- Conservation tillage and crop rotation with high-biomass producing cover crops.
- Adoption of alternative crops to improve soil and water quality for increasing agricultural productivity and farm incomes.
- Soil ecology and fertility status.
- Introduction of alternative crops (potatoes, sunflowers), optimization of fertilizer use.
- Conservation tillage, soil fertility management, and crop diversification.
- Improving irrigation system performance. Development of the agro-technology for creating the conditions of stable control of the soils organic matter in the irrigated agriculture.
- Improving soil quality using plant-microbes association.
- Economics of crop-soil-water management practices.
- Establishment of production functions for crops and systems.



- Costs and effects of restructuring land and water use.
- Water- and nutrient-use efficiency.
- Efficient and sustainable use of available water.
- Establishment of ponds for sustainable fish production.
- Planting of trees and shelterbelts: growth, irrigation needs.
- Landscape planning for trees, ponds and crops.
- Introduction of conservation agriculture through bed and furrow systems.
- The use of sub-irrigation for fruit and vegetable crops.
- Irrigation scheduling and nutrient management to meet crop water needs and reduce pollution potential.
- Hydrology, agrichemical transport, and soil erosion under different water management conditions using a rainfall simulator.
- Soil amendments to improve infiltration and permeability.
- Water quality impacts on fruit and vegetable cropping systems.

The projects will be carried out together with agricultural enterprises, farms and other agribusiness organizations of Samarkand, Kashkadarya, Surkhandarya and Djizak regions of Uzbekistan; research institutions under Ministry of Agriculture and Water resources; Tashkent state agrarian university, Tashkent institute of irrigation and melioration, Andijan agricultural institute, SSU and SACEI.

2.3 Study Centre

Centre belongs to The Department of Agriculture and Amelioration and established by special order of rector. The department was founded in 1929, simultaneously with the foundation of the Institute. There are 2 professors, 8 associated professors in the department. The work at the Centre is part of duties of faculty of Department. Activities of the Centre:

- Provide workplace for laboratory classes at BA and MA level,
- Together with retraining department of Institute, provide trainings and retrainings for teachers of professional colleges, environmental inspectors,
- Provide research opportunities for postgraduate students of SAI, SSU and SSACEI,
- Provide access to printed and online literature and materials on SD and environmental studies.



Possible experiments at the Study centre:

Precipitation

- Simulations of rainfall catchment, long duration, on dried are; relations on drainage and rain volumes,
- Measurements concerning the saturation time determination,
- Rainfall on saturated area,
- Rainfall on impermeable ground,
- Measurements on successive precipitations,
- Analysis of slope influence on previous adjustments,
- Measurements of the combined effects of surface runoff and sub-soil flows.

Wells

- Measurements for the determination of the equipotential surfaces and the depression cone of a driven well in pumping conditions, comparison with the results from the theory,
- Measurements of the pumping effect on neighboring wells; interaction of the respective depression cones,
- Lowering of waterbed during digging by means of wells.

2.4 Potential Funding Sources

The education sector in Uzbekistan is mainly funded from the public budget at three levels: central, regional and local. Higher educational institutions, affiliated academic lyceums, and teacher training institutions in the regions, are funded from the central budget.

Training specialists in higher education institutions are supported by state education grants and on a contract basis. The state education grants are paid out of the central republican budget.

A new procedure of normative planning and budgetary funding of HEIs based on expenditure per student was introduced on 1 September 2010. The budget bid for each HEI is calculated taking into consideration the basic normative expenditure for training one student.



3. Samarkand State University (SSU)

3.1 Programme Vision

TEMPUS UZWATER Study centre in SSU will be continuing after financing from EU. Our team members preparing few grant proposal for funding conducting classes, research on alternating energy sources and water resources management in Zarafshon valley. Jointly with the Uzbekistan UZWATER centre partners doing joint research on water resources management issues and alternating energy sources in the regional and national level.

The project developed set of modules, related with sustainability, use of scarce resources like water and Renewable Energy sources in Central Asia and Uzbekistan. SSU has used these modules as source of novelty and innovations in related field and implement different modules for different programs, both in BA and MA level. Involvement and support from public and private stakeholders is important prerequisite for successful study process.

3.2 Stakeholders for possible master thesis work

List of stakeholders:

1. Southwest branch of power supply government cooperative association UZBEKENERGO. Samarkand, Republic of Uzbekistan.
2. UZKORSILICON Uzbek-Korean JV, Navoi region, Republic of Uzbekistan.
3. SUNTHEC Uzbek-China JV, Navoi region, Republic of Uzbekistan.
4. Samarkand Branch of Special Secondary Education System Republic of Uzbekistan. Samarkand, Republic of Uzbekistan.
5. Green Chemistry NGO. Samarkand, Republic of Uzbekistan.
6. Samarkand regional department of nature protection. Samarkand, Republic of Uzbekistan.
7. Zaravshan river basin protection (NGO). Samarkand, Republic of Uzbekistan.
8. Samarkand regional water resources management department (governmental). Samarkand, Republic of Uzbekistan.

3.3 Applied projects

List of applied projects:

- Study technology of obtaining of thin-film solar sells;
- Investigation optical and photo-electrical properties of multi-component solar elements;
- Calculation basic parameters Solar heating system for Uzbekistan climatic conditions;
- Modeling and calculation basic parameters silicon based solar sells;



- Water resources of Zarafshan river basin: principles of complex use and protection problems;
- Hydraulic regime of mountains water-storage basin and their role in National economy (On an example Kattaqurgan and Tallimarjon water-storage basins);
- Quality changes in the ground water in Samarqand and Bukhara regions;
- Water resources of the rivers of Fergana valley and problem of their rational use;
- Water regime small mountain rivers in the south slop of the Qortepa mountains and problems rational use water resources;
- Role Zarafshon valley irrigation constructions for water supply agriculture landscapes;
- Role mountains glacier in saturation of the rivers and change flow regime (On an example Tien Shan glacier);
- Quality rating ground and over ground waters of the foothills flat grounds north slop of Chaqilkalon mountains;
- Middle and lower Zarafshon's wind resources and use for getting electricity;
- Role mountains water-storage basin on rational water use (On an example Qoratepa va Tosinsoy water-storage basins);
- Problems rational use torrent water (On an example Qalqama water-storage basin);
- Protection of water resources Navoi region and their rational use;
- Hydrological regime of the river Shohimardon and influencing on it;
- Agricultural Climate resources of the Xorazm region and their role in agriculture;
- Hydro chemical compound and hydro chemical analysis of the River and drainage channel waters (On an example Southwest part of Uzbekistan);
- Water use rating in irrigated lands (On an example Qarshi irrigation region);
- Evolution of mechanic and chemical erosion acceleration on the Chirchiq river basin;
- Change of environment under the influence of hydraulic engineering constructions (On an example Fergana region);
- Changing regime of ground waters under influence irrigation farming development (On an example Nurobod region);
- Influence of the Ravotxo'ja water distributor in Zarafshon river;
- Uzbekistan's mountain glaciers and their basic characteristics;
- Investigation of the formation of flows To'palang river;



- Investigation of the correlation flows and water flow discharge of Zarafshon basin rivers;
- Investigation of the formation of flows Sherobod river;
- Ground waters of the Middle Zarafshon valley and their usage.

3.4 Study Centre

- To create the retraining center for southwest power supply government cooperative association on base UZWATER study center in Samarkand State University;
- Provide workplace for laboratory classes at BA and MA level;
- Provide research opportunities for postgraduate students from SSU, SAI, SACEI.

4. Samarkand State Architectural and Civil Engineering Institute (SSACEI)

4.1 Cooperation with stakeholders

SSACEI is the second largest HEI in Uzbekistan on the training of the water specialists. It does a strong cooperation with the governmental and private organizations as well as NGOs and public communities as „makhallas“ and “shirkats“. Thus, institutions are interested in the water experts on the bachelor and master levels experts on the bachelor and master degrees.

The list of organizations, NGOs and public communities:

1. Environmental Protection Department-governmental;
2. Regional Governmental Department (Khokimiyat);
3. Regional “Vodokanal”;
4. Department of regional and local water resource management;
5. Shirkats (communal water/wastewater service);
6. NGO Zaravshan river basin protection;
7. Makhallas: Semurg, Lolazor, Panjob, Amir Temur.

Established close contacts and cooperation with the above mentioned organizations and public communities around SSACEI will support local and national activities. Regular round table discussions with stakeholders will be organized.

4.2 Applied projects

List of applied projects:

- Water resources management in Central Asia region;
- Ground water resources management in Samarkand city;



- Water wells rehabilitation and regeneration: sustainable water resources management;
- Chupon ota well field: sustainability and water resources management;
- Dagbit well field: water wells rehabilitation and well reconstruction.

4.3 Study Centre

Study Centre will serve as research hub for water resources management issues on the regional and national level. Young water experts and students will be invited to organize "Young water experts" club. The club will unite NGOs and local makhalls and shirkats. The Centre will organize classes for master students on sustainable water resources management in Central Asia.

5. National University of Uzbekistan (NUUz)

5.1 National Training Centre on ESD

National Centre will provide information and study materials on Sustainable Development (SD) and Education for Sustainable Development (ESD) for wide groups of students and teachers of Uzbekistan. The Centre will combine resources from other programs and projects working in the areas of SD and ESD.

List of stakeholders:

State Committee of the Republic of Uzbekistan for Nature protection;

Ecological Movement of Uzbekistan;

NIGMI (Research Hydrometeorological Institute);

Tashkent Research Institute "VODGEO";

Tashkent Waste water treatment plant (Salar station);

Research Institute "HYDROINGEO".

5.2 List of possible applied projects for master thesis work

- Study of waste water treatment process on waste water treatment plant in Tashkent;
- Study of anaerobic digestion of various organic substrates for biogas production;
- New approaches for automatic control of water quality;
- Development of biological methods for water quality assessment;
- Bioindication using green plants for sustainable urban management.



6. Tashkent Technical University (TTU)

Training Centre

The Centre worked out the action plan for the targeting to widen the scope of scientific researches, sophistication of preparing the highly qualified scientific and scientific-pedagogic personnel, and on the systematic base attract students into the conducted scientific and research work. The staff at the center has considerable research, education and practical experience. The training centre will attend in developing of teaching curricula, organisation of training courses, field work and workshops. Staff members involved into the centre activities will consult their colleagues from other universities; they will supervise MSc and PhD theses. There is also long term experience of cooperation with EU universities and universities in Central Asia. The centre will develop a field based teaching for water desalination. Staff members will also be involved into the development, testing and marketing of equipment to use solar energy for water supply and water treatment.

7. Urgench State University (UrSU)

7.1 Programme vision

The university administration and project local team will provide organizational support after project finish. Long-term implementation of the Master program, methodical and pedagogical help for teachers and students, quality assurance actions, sustainable admission process, etc.

The project sustainability proposes close ties with local stakeholders. The list of the project local partners includes six main organizations which support will play important role in project results long-term dissemination.

Students internships at the stakeholders organizations, round-table discussions, seminars and conferences on actual problems of the project follow-up activities, joint research activities, especially supervising of applied master projects, activities on the Master program alumni career developments and sustainable employment.

The goals of programme development:

- to provide long-term effectiveness of project final results both at the university and higher education system level;
- to develop sustainable educational strategies and approaches for the further implementation of Master program;



- to compose sustainable bases for the future transformation of proposed program to the international or double-degree Master course.

7.2 Stakeholders

List of stakeholders:

| # | Name of stakeholder organization | Contact information |
|---|---|--|
| 1 | Khorezm branch of State Committee for Nature Protection of the Republic of Uzbekistan | 220100, Yoshlik Street 1, Urgench, Uzbekistan, contact phone: +(0362) 2271291 |
| 2 | Basin Water Organization “Amudarya” | 220100, Az-Zamakhshariy Street 63, Urgench, Uzbekistan, contact e-mail: amu_bvo@mail.ru , contact phone: +(0362) 2273374 |
| 3 | Management of Irrigation Water Basin | 220100, Munis Khorazmiy Street 1, Urgench, Uzbekistan, contact e-mail: xavza_xorazm@mail.ru , contact phone: +(0362) 2231405 |
| 4 | Management of Urgench city’s Water Channels | 220100, Al-Beruniy Street 15, driveway 5, Urgench, Uzbekistan contact phone: +(0362) 2247535 |
| 5 | Khorezm branch of Uzbekistan’s Farmers Council | 220100, Khonka Street 19, Urgench, Uzbekistan, web-site address: www.uzfk.uz |
| 6 | Management of Special Secondary and Vocational Education of Khorezm region | 220100, Sheroziy Street 23-A, Urgench, Uzbekistan, contact e-mail: xorazm@markaz.uz , contact phone: +(0362) 2288205 |

7.3 Applied projects

List of applied projects:

- Methods of water resources protection.
- Wastewater treatment.
- Economical and ecological problems of water resources management in Khorezm region.
- Legal basics of water resources usage and protection.
- Influence of groundwater pollution to the environment and human life.
- Study of water balance of irrigated territory of Khorezm region.
- Analysis of the Aral sea current condition.
- Current issues of using of the Amudarya river water resources.
- Study of sedimentation balance of Tuyamuyun storage reservoir.



- Ecological issues of demographic processes (case of Lower Amy Darya region).
- Salinization of irrigated lands and its environmental consequences.
- Lack of water resources and problems of desertification.
- Lakes of Khorezm region and its ecology.
- Improvement of melioration conditions of irrigated lands.
- Optimal use of transboundary water resources is the key to sustainable development.
- New Approaches to Adaptive Water Management under Khorezm region.
- Water management is an interdisciplinary field concerned with the management of water resources.
- The trends of decreasing water resources in the lower reaches of the Amu Darya river.
- Methods of effective use of water and biological resources.
- Degradation of the Amu Darya delta; the disappearance of the gene pool of plants and animals.

7.4 Partnership Support and Communication

Proposes the further development of international collaboration with EU partner universities and local stakeholders. Dissemination of the project results and outcomes through mass media, development of program alumni database for sharing with stakeholders and potential employer organizations, seminar and conferences with project partners on further promotion of collaboration and cooperation.

The project team will carry out program results and outcomes evaluation twice a year, after each semester. Both external experts from the list of stakeholders and university internal monitoring staff will participate in evaluation procedure. University Council will approve evaluation criteria and methods. Annual results of evaluation will be announced on the study center's website and sent to all local stakeholders and partners. One of the key elements of project sustainability is Master program adaptation.

7.5 Study Centre

The centre is considered to serve as the important tool of reaching long-term goals of further development of the project outcomes.

UZWATER study center at Urgench State University (UrSU) officially opened on April 15, 2015 during the visit of the EU partner universities to Urgench and Nukus. The center is created in order



to arrange proper educational process for the future Master program students. Moreover, this center will serve as the additional source of educational materials and databases for the Master students from other Uzbek partner universities.

7.6 Potential Funding Sources

Funding support will include search for the grant opportunities both on the national and international levels. Teaching staff invited for teaching in the framework of the Master program will be funded by the university. The university current staff support rules allows upgrade additional financial support for the best professors and teachers, which also will be used as a tool of project sustainable development.

8. Bukhara State University (BSU)

8.1 Programme Vision

The following directions for the development of the Programme and the Centre were elaborated:

- Greater freedom in organising courses of studies;
- More interactive teaching methods (case studies, discussions, etc.);
- Adjustment of the requirements for the examinations;
- Promotion of language skills in English;
- Improvement of technical equipment;
- More practical applications or contacts to future employers.

8.2 Stakeholders

- Bukhara Regional Department of Environmental Protection;
- “Jayron” Ecocenter.

8.3 Study Centre

The Centre will actively participate in the design of the model to assure regional needs. Having participated in several Tempus projects, Centre will use leading experiences in the preparation of the model. Centre will provide recommendations for the other higher education institutions in the region. Moreover, content-oriented inputs with regard to the further dissemination of project results.



9 Karakalpak State University (KKSU)

9.1 Programme Vision

The project developed set of modules, related with sustainability, use of scarce resources like water in Central Asia and Uzbekistan. KKSU has used these modules as source of novelty and innovations in related field and implement different modules for different programs, both in BA and MA level. Idea is "Idea for education", were everyone can build or renovate its study program, using related modules.

Involvement and support from public and private stakeholders is important prerequisite for successful study process.

9.2 Applied Projects

KKSU has prepared a list of applied projects addressing environmental/water/sustainability issues of the north-west region of Uzbekistan. Applied projects are an important component of the Uzwater project. It is meant to contribute to the development of the country. It is realizing through master thesis work, and thereby foster knowledge, specialisation and practical skills of the students. Practical placement of the students at companies, industrial enterprises, municipalities or other institutions is encouraged. Partial goals are established for each semester and results are presented in the form of research paper.

List of applied projects:

- Soil and water conservation practices for sustainable development in Karakalpakstan;
- Control of use and protection of waters and lands of water fund;
- Technical means for the development of water saving technologies on mechanical – technological basis;
- Calculation theory of hydraulic devices for pump stations;
- Calculation of the use of a water reservoir processes;
- Improvement of the water preserving technology on an irrigation of crops;
- Development of theoretical bases of calculation of systems of giving and distribution of water in complexes of agricultural water supply;
- An assessment of stability of underground water-bearing systems of river valleys for water supply improvement;
- Hydrogeological systems of Karakalpakstan: modern vision and forecast of development;



- Soil ecology and fertility status;
- Improving soil quality using plant-microbes association;
- Economics of water management practices;
- Establishment of production functions for crops and systems;
- Costs and effects of water use;
- Water- and nutrient-use efficiency;
- Efficient and sustainable use of available water;
- Establishment of ponds for sustainable fish production;
- Planting of trees and shelterbelts: growth, irrigation needs;
- Landscape planning for trees, ponds and crops;
- Introduction of conservation agriculture through bed and furrow systems;
- The use of sub-irrigation for fruit and vegetable crops;
- Irrigation scheduling and nutrient management to meet crop water needs and reduce pollution potential;
- Hydrology, agrichemical transport, and soil erosion under different water management conditions using a rainfall simulator;
- Soil amendments to improve infiltration and permeability;
- Water quality impacts on fruit and vegetable cropping systems.

The projects will be carried out together with agricultural enterprises, farms and other agribusiness organizations of Karakalpakstan region of Uzbekistan; research institutions under Ministry of Agriculture and Water resources.

9.3 Study Centre

Centre belongs to the Department of Engineer Communications and established by special order of rector. The department was founded in 1990, simultaneously with the foundation of the Faculty.

There are 1 professor, 4 associated professors in the department. The work at the Centre is part of duties of faculty of Department. Activities of the Centre:

- Provide workplace for laboratory classes at BA and MA level,
- Together with retraining department of Institute, provide trainings and retrainings for teachers of professional colleges, environmental inspectors,
- Provide research opportunities for postgraduate students of KKSU,



- Provide access to printed and online literature and materials on SD and environmental studies.

9.4 Potential Funding Sources

The education sector in Uzbekistan is mainly funded from the public budget at three levels: central, regional and local. Higher educational institutions, affiliated academic lyceums, and teacher training institutions in the regions, are funded from the central budget.

Training specialists in higher education institutions are supported by state education grants and on a contract basis. The state education grants are paid out of the central republican budget.

A new procedure of normative planning and budgetary funding of HEIs based on expenditure per student was introduced on 1 September 2010. The budget bid for each HEI is calculated taking into consideration the basic normative expenditure for training of one student.