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Wetskills-Romania 2013



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Abstract. Wetskills is an international student exchange program, focused on a challenge between mixed teams of international students to find integral, creative and multidisciplinary solutions for water issues.

Keywords: international, exchange program, mixed teams of, multidisciplinary solutions

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1. Introduction

The Wetskills Water Challenge is a two-week event for students from all over the world. The Challenges are organized during formal water sector related events where the Dutch water sector shows itself. The participating students develop their own innovative and creative concepts for broad water issues in a changing world, sponsored by organizations within the water sector. In multidisciplinary and intercultural teams, the participants gain more in-depth knowledge on the challenge topic by workshops of renowned water experts and field trips. Moreover there will be attention for development of presentation skills and collaboration in intercultural and multidisciplinary teams. The Wetskills Water Challenge already took place in China, Morocco, The Netherlands, Indonesia, Oman, South Africa and Egypt. The eighth Wetskills Water Challenge is currently being held in Romania.

Twelve selected students from the University Politehnica of Bucharest and Technical University of Civil Engineering worked together with students from Dutch universities and organizations on water related issues, in mixed teams.

2. What is Wetskills about?

Each team of students had to focus on one specific case study, on which they work during an extensive two-week program in Bucharest (29th May- 13th June). The case studies were formulated by organizations of the Dutch water sector with projects or interests in the Romanian water sector (Berson UV, Waterschapsbedrijf Limburg, Hoogheemraadschap Rijnland, MARS and UTES consortium, consisting of Dutch and Romanian organizations). At the end of the two-week pressure cooker, each team must present their concept with an attractive Poster and a catching 'Elevator Pitch'.

3. Study cases

3.1. Small-scale sludge treatment techniques

Investigation of the possibilities of (modular) decentralized small-scale sludge treatment techniques like incineration at WWTP scale, gasification, torrefaction, pyrolysis, etc. to implement it in the research area. It can also be a chain of techniques. The students were asked to pay attention to aspects like: robustness, durability (consumption of energy and resources and production of waste), minimal operator intervention, feasibility (payback time, NPV), scalability, modularity/transportability, etc.

3.2. Management of Aquifer Recharge and Storage (MARS)

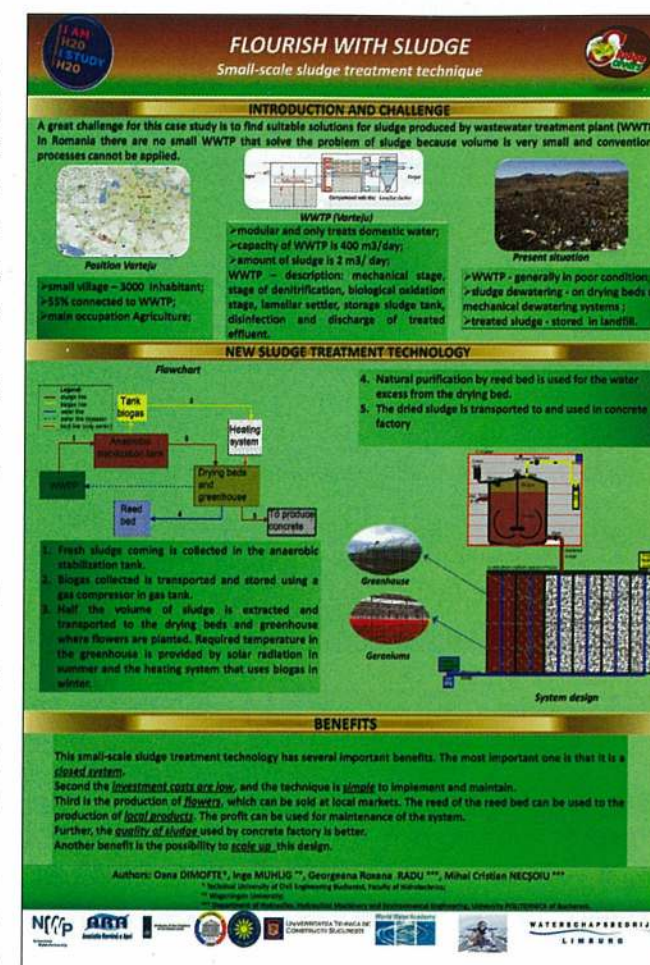
To combat droughts and floods and to improve water supply, buffering techniques are needed. The technique of Managed Aquifer Recharge and Storage (MARS) is recognized worldwide as an important tool for the solution of this problem. The Netherlands is a leading country with respect to application of MARS and its governance issues. The case study requested the students to identify solutions for applying MARS in Romania

3.3. Macro algae in the Black Sea

The amounts of macro algae ending up on the Black Sea coast of Romania seems to have increased over the last years. Especially on the recreational beaches this has caused a high discomfort to tourists as the dying and rotting of these algae results in bad smell, and therefore in a decrease of the recreational value of the beaches. The project team was requested to consult the client on the impact of geological and polluter factors on integrated management.

3.4. Satellite treatment of drinking water

Upgrading drinking water quality to meet the evolving standards requires huge investments. Traditionally, large scale centralized water treatment is applied, followed by an expansive distribution network. To improve water quality at the consumer's tap both the water treatment as well as the distribution network need to be ad-



dressed. The students had to develop a vision/concept that is a basis for a framework approach to improve water quality at the consumer's tap in both urban and rural areas to meet the current European standards, using satellite treatment as primary solution.

3.5. Underground Thermal Energy and Storage (UTES)

Reducing and recycling the use of sustainable energy is a hot topic worldwide. To improve and increase the contribution of sustainable energy the use of soil energy is promoted. The advantage of the underground is that large amounts of energy can be buffered either by open systems for heat exchange or by closed systems. In warm periods excess heat of buildings, other constructions, industrial processes or from the air can be stored in the soil and in cold periods it is used for heating. Energy neutral buildings can be constructed as the low underground temperature at

MARS ON EARTH
SIMPLE SOLUTIONS TO COMPLEX WATER PROBLEMS

THE CHALLENGE
The technique of Managed Aquifer Recharge and Storage (MARS) is recognized worldwide as an important tool for solving water problems. The challenge is to see if MARS techniques can be applied on the Ottenia Plain in Romania.

COMBINING participation of the farmers with MARS techniques can be beneficial for the area; if properly used it can SOLVE the POOR WATER QUALITY and the water shortage in this area, and also in other areas like the Ottenia Plain.

AN INTERGRADED SOLUTION is needed in order to solve the Ottenia Plain problems.

MARS TECHNIQUES
AIR, ASFR, BARRI FILTRATION, SOIL AQUIFER TREATMENT, SURFACEDAM, DUNE FILTRATION, PERCOLATION TANK, RAINWATER HARVESTING, SAND DAM, RECHARGE RELEASES, INFILTRATION POND.

SOLUTION
1. Rehabilitate the irrigation system. Shave off peaks by leading water into buffer lakes which infiltrates into the aquifer.
2. Recovery of the soil from pollutants caused by agriculture. Infiltrate "clean" water for flushing the pollutants out of the underground.
3. Monitoring and Managing the water quality in the region. Farmers participation to manage their use of fertilizers properly. Monitoring the pollutant content in the aquifer.
4. Clean water for households and agriculture. Water availability throughout the year and free of pollutants.

FOR THE FUTURE
Rehabilitate irrigation system. Benefits: Creates and stores a buffer of water in the underground to supply clean water in times of drought and flooding. Participants are responsible for their own clean water. Water infiltration flushes the pollution out of the underground. Infrastructure for transporting water is already available. Monitor & Manage water quality. Recover soil. Things to think about: Room for the buffer lakes and the infiltration sites. Proper dissemination of knowledge about fertilizer usage.

the beginning of the summer is used for cooling purposes.

4. Overview of the program

The Romanian students never had an experience like this before and, in the beginning, they were curious and impatient. Some of the Dutch Students had already participated in similar competitions, and a part of them don't know what to expect.

The teams were formed based on an application form and preferences that made possible obtaining the optimal personnel for each case study.

The program started with the essential social part-a study trip/team-building weekend to Campulung-Bran-Brasov. That was the timeframe where the students teams started bonding, making the after-coming working time flow easily.

The first working days took place in the Laboratory of Multiphase fluids flow and wastewater treatment (University Politehnica of Bucharest),

under the close supervision of Prof.Mrs. Diana Robescu, Vice-dean of the Power engineering Faculty. The first morning was about introducing the students of what was the expected outcome. The participants got a training of making an attractive Poster and presenting an inspiring so-called elevator Pitch by Mr.Johan Oost. Afterwards the teams started exploring their assignments with the help of the supervising team, containing of Mr. Johan Oost (coordinator of the Wetskills program and project leader of this Wetskills event), Mrs. Janneke Diels (Dutch supervisor within the Wetskills organisation) and Dr.ing. Elena Manea (Romanian supervisor). After just two days of work, the students presented their Plans of Actions in one to two pages, each well justified and researched. The team of experts and the supervisors advised each team on their future work in order to help them develop an innovative solution for the case-study. During this period they also visited University Politehnica of Bucharest and found out about the new and innovative research topics that are developing there.

The future days were spent at The Technical University of Constructions, where Prof.Ioan Bica invited the Wetskills participants to stay, or working at the Apartments where the Dutch participants stayed. A few days before the final presentation in EXPOAPA, pre-presentations were held. The teams worked together in this case, advising each-other on ways that could improve the posters. This is how having five extraordinary posters was possible. The final evaluation took place during EXPOAPA.

5. EXPOAPA

The final product was an inspiring elevator pitch and poster, presented within EXPOAPA. The posters were presented through a poster market, and each team presented their solution on 12 June in Balcescu Hall, to an international oriented jury, their clients and the public of EXPOAPA. This presentation event was led by Prof.dr.ing.Vladimir Rojanschi.



The Wetskills jury consisted of:

- Chair: Mr. William Allis (Bannet Fleming);
- Governance expert: Mr. Dennis van Peppen (AgencyNL / Partners for Water);
- Scientific expert: Prof. SergiuCallos (Technical University of Chisinau);
- Technical expert: Mr. NicoloePitu (RAJA Consultanta);
- Business expert: Mr. Richard Tromp (Hubert Stavoren BV).

The jury focused on the following criteria: creativity, technical feasibility, social, economic & environmental aspects, exportability and Pitch & Poster presentation. Based on the public opinion and the set criteria, the jury decided upon the winning team. The winning team was announced at the plenary closing ceremony of the EXPOAPA.

The winning team "AquaSonic" proposed a solution for eliminating the Algae in the Black Sea, a known problem for the Romanian seaside. The award and participation diplomas were handed by His Excellency, Mr. Ambassador Matthijsvan Bonzel from the Dutch Embassy in Romania. The prize was, from the students point of view, worth to fight for - participation in the Wetskills Water Challenge in the Netherlands part of the YWP program of the International Water Week in Amsterdam (4-8 November 2013).

6. Wrap-up

After the presentations, that took place in the final Conference Day each team got positive feedback, and the possibility to better explain their work to the jury and the audience. The competition was high, and making a difference between the teams was almost impossible. Each case solution had its importance and up points. Those days, seeing the People's Palace, the Technical exposition and being a part of the Technical Conference, was another new experience to all the students. Few of them were a part of something similar before.

The program also represented an opportunity for the students to meet the ambassador of Nederland His Excellency, Mr. Ambassador Matthijsvan Bonzel, Mr.Vasile Ciomos president of ARA (Romanian Water Association) and Dr. Daigger

Sound and safe
Algae-free beach without chemicals

CHALLENGE
During the summer season, macro algae pollute the shore of the Black Sea and therefore the beaches as well, creating inconvenience for tourist and locals.

SOLUTION
The ultrasonic vibrations pass through the water in an all around pattern causing the spores inside the algae cells to resonate and break, damaging the ability of algae to grow and reproduce.

IMPLEMENTATION
The effect of ultrasonic waves on algae.

BUSINESS PLAN
Algae grow in water with a depth of <10 meters. Ultrasonic transducers are placed so they use their optimal range of 250 meters and over the complete length of the beach (8 km). There are 272 ultrasonic transducers needed to keep the Marmara beaches clean during the summer months.

ADVANTAGES
A clean and safe and non disturbing solution for humans, fish and other aquatic life, without the use of chemicals. The concept makes use of a proven technology. Low maintenance and operational costs. <1 Lei / room / day investment cost. Return of investment within two operational years. Not disturbing the tourists, the navigation or any other recreational and socio-economical activities. The concept is applicable for all beaches. Economic bloom for tourism in Romania.

TOURISM
Socio-economical growth. Competitive quality of the beach. Easy accessible recreational area.

ENVIRONMENT
A chemically-free, bio-safe, eco-friendly and non-toxic solution for algae removal. Does not harm aerobic & anaerobic bacteria. Does not affect the marine currents.

ADMINISTRATION
Decreasing the costs of collecting, depositing and eliminating of the algae. Improvement of the image. Daily operations of the waste water treatment plant are not affected.

Illuminating Water

We are what we drink

Challenge

One of the big challenges in Romania is to improve drinking water quality for towns and villages. The quality is threatened by microbes which influence odor, color and taste of the water and causing health risks. Amara will function as a case study to introduce a new concept in order to minimize these threats.

Current situation

- Amara is a small town with 7000 inhabitants.
- Known for their healthy mud baths near Amara Lake.
- High water quality will favor this tourist industry and the environment.
- In Amara they use sodium hypochlorite to disinfect water.
- The water has a very bad smell and taste due to disinfection by products.
- Villages surrounding Amara do not even have drinking water treatment facilities and are exposed to health risks.

Concept

Step 1

Setting up a cooperation between the nearby villages. Important to bring all stakeholders together.

Step 2

Each village gets its own UV system. It disinfects the water by permanently altering the DNA of microbes. Monitoring and maintenance will be managed from a central point.

Step 3

Connecting the villages with strategically placed pipelines. In case of maintenance or system failure other villages can step in and help.

Advantages of UV

- No disinfection byproducts
- No chemical residual
- Non-corrosive
- Effective against chlorine resistant microbes (Cryptosporidium and Giardia)
- Safe and easy to operate

Advantages of a cooperation

- Relatively small investments costs
- Low maintenance and monitoring costs
- Low capacity training costs
- Reliable and high quality drinking water for every village

Conclusion

This concept can serve as an example to show the benefits of introducing a UV system in small towns and villages by cooperating with each other.

Adrian Aldea, Daniela Bunea, Laurentiu-Fanel Grigore & Xander Tekelenburg

TEAM

NTPP, ARA, University of Bucharest, Politehnica University of Bucharest, Berson

Get rid of your energy bills!

Storage of solar energy in summer to stay warm in winter

CHALLENGE

Develop a sustainable design to heat and cool a building in Romania

BACKGROUND

In Romania there are lucrative opportunities to implement a new technique to manage the temperatures in buildings. The current heating system in Bucharest has a low energy efficiency resulting in high energy costs and high environmental impacts. The land climate implies high temperature differences during the year. These conditions and the characteristics of the soil and the sun are the strengths of our design. The combination of energy storage in the ground and solar energy has a high potential to realize "energy zero" buildings in Bucharest. A great deal of energy can be saved by the implementation of our design and contribute in great extent to the 20-20-20 goal.

SYSTEM

Heating system

Water is heated by solar energy during the summer. The warm water flows into tubes in the soil where the heat is extracted and absorbed by the surrounding clay layer. The stored heat is used in the winter to supply a constant "heat" flow. An isolation layer is designed to prevent the loss of heat.

Summer → Heating

Cooling system

This system is only in use during the summer. It's an open water system with 2-3 wells to extract groundwater. The cold water pipes are connected to a heat exchanger which cools the water from the building.

Summer → Cooling

Electricity system

- Photovoltaic panels
- Hydropower turbine

REQUIREMENTS

- New or early stage construction project
- Large scale construction project
- Optimized thermal isolation envelope
- Unobstructed from the South
- Sufficient space

3D DESIGN

ADVANTAGES

- Up to 50% energy savings
- Recover investment costs in max. 5 years
- Possibilities for up-scaling
- Obtain green certificates

RECOMMENDATIONS

Realize an attractive zero energy plus system by:

- Obtaining subsidies for sustainable energy technology
- Selling the energy surplus to the market
- Using sustainable materials and focus on isolation
- Creating a green rooftop which increases cooling of the building during the summer and which isolates the building during the winter

TEAM

NTPP, ARA, University of Bucharest, Politehnica University of Bucharest, Berson

president of IWA (International Water Association).

The Embassy of the Netherlands in Romania representative, Mrs. Violeta Cozianu, was supporting the teams and the supervisors the entire time.

The students also participated in a meeting with the IWA President Dr. Daigger, that was scheduled at Politehnica University in order to discuss the influence and impact of young engineers in the water sector together with BSc, MSc and PhD students from the Politehnica University.

Each student had to write a blog for a day of the Wetskills adventure. Each of them was very enthusiastic and expressed it in each of the articles that can be read here

(<http://wetskillsromania.blogspot.ro>).

None of that wouldn't have been possible without the support of the Netherlands Water partnership, the Embassy of the Netherlands in Romania, the Romanian Water Association, Po-

litehnica University of Bucharest, Technical University of Constructions of Bucharest and the World Water Academy (The Netherlands). The steering committee, formed to prepare the Wetskills event in Romania are already planning to develop more events intercultural events between Dutch and Romanian students and a Wetskills in 2014.

"The Wetskills project has brought new friends and new extraordinary experiences. We met as strangers but I hope we will part as friends."

(Adrian Aldea, participant Wetskills-Romania, 2013)

Auditors:

Elena Manea (University Politehnica of Bucharest), Johan Oost (World Water Academy and Coordinator Wetskills Program) and Janneke Diels (Waterschap Groot-Salland and Project Officer Wetskills Program)