

DESSIN

ANNUAL MAGAZINE 2015

01 | Water scarcity in Europe, an unknown reality



When the water scarcity problem is discussed, it is common to regard this as an issue that only concerns the developing countries, with dry climates and few resources that will have to face such a hard challenge.

Even though the use of freshwater has grown more than twice the rate of population increase in the last century, there's still enough freshwater on the planet for everyone. However, the truth is that water scarcity affects the entire globe, including modern urban areas as we also can find in Europe. In 2007, at least 11% of

the European Union population and 17% of its territory had experienced water scarcity¹. Water scarcity can cause economic losses in key water-using sectors and environmental impacts on biodiversity and water quality, deterioration and loss of wetlands, soil erosion, land degradation and desertification.

In this context, the DESSIN project looks forward to find innovative solutions for water scarcity and also an improvement of water quality with special focus on European urban areas.

Prediction shows that around 2030 the number of river basins under water scarcity is expected to increase by up to 50%².

¹ Report on the Review of the European Water Scarcity and Droughts Policy, European Commission.

² Modelling done under the project ClimWatAdapt. Report on the Review of the European Water Scarcity and Droughts Policy, European Commission.



02 | DESSIN proposals to water scarcity problems and improvement of water quality

DESSIN objectives are focused on the effective implementation of the Water Framework Directive (WFD) and developing new technologies in order to demonstrate a methodology for the valuation of ecosystem services (ESS) as catalyzer for innovation.

The methodology is focused on improving the services provided by freshwater ecosystems, elaborating a selection of the optimal solutions in the water cycle, considering both their impact on the water body and their economic implications.

Water Framework Directive: In 2000, the European Union took a groundbreaking step when it adopted the Water Framework Directive (WFD). It introduces a new legislative approach to managing and protecting water, based not on national or political boundaries but on natural geographical and hydrological formations: river basins. It also requires coordination of different EU policies, and sets out a precise timetable for action, with 2015 as the target date for getting all European waters into good condition³.

DESSIN solutions: Technological, monitoring, modeling and management approaches in order to gain resource-efficiency and competitiveness in the water sector in Europe.

DESSIN proposes new solutions, such as: a) decentralized water treatment units b) real time control of large scale systems c) sewer mining d) storage of freshwater in aquifers.



To validate and test those new methods, the DESSIN project is using five demonstration sites across Europe.

Those demo sites are located in Westland (Netherlands), Llobregat (Spain), Athens (Greece), Emscher (Germany) and Hoffselva (Norway). The first three sites deal with the water scarcity issue, while the last two are working on water quality improvement.

³ European Commission <http://ec.europa.eu/environment/pubs/pdf/factsheets/water-framework-directive.pdf>

03 | The ESS Evaluation Framework



One of the main problems when implementing new technologies or methods is the limitation of existing comprehensive methods for comparing the new technologies with the established ones.

Considering this, DESSIN aims to develop the Ecosystem Services Evaluation Framework, which will enable a standardized evaluation of impacts from innovations, integrating the environmental, economic and social

dimensions to generate additional arguments for market uptake and practical implementation of innovations.

With the creation of the ESS Evaluation Framework, DESSIN will enhance the improvements of the WFD programmes of measures, while also providing innovative technologies in the European water sector and beyond.

DESSIN will use existing data from mature sites to validate the ESS methodology for the evaluation of impacts of technology in aquatic ecosystems. Experience gained from previous experiences will help DESSIN's technicians to implement the ESS approach at their demo sites.



04

Interview with Ignacio Martín, an outside view

“The extremely relevant number of very knowledgeable partners will make the difference”



Ignacio Martín is the leader of ESE Action Group of the Water EIP, a group that aims to develop a consensual and agreed methodology to assess the tangible and intangible benefits from natural and constructed ecosystems in environment

and monetary terms. His main task is to coordinate the different AG members' activities towards the consecution of the ESE AG goal, foster the dialogue and discussion among them and act as liaison between the European Commission and the AG members.

What are the connections between the DESSIN project and the ESE Action Group?

DESSIN project is fully in line with the essence of the ESE AG. For this reason, when the ESE AG was endorsed by the European Commission (EC), and after some discussions with the DESSIN project coordinator, we both identified many similarities. As a result, it was decided to join forces and look for a common understanding of both initiatives. In addition, it was also recognisable from the EC that the DESSIN project shall look for interactions with relevant parallel on-going activities in the same field. Then it was accepted that the suitable network, among others, was the ESE AG

What are the special characteristics of DESSIN, from your point of view?

For me, as a coordinator of the ESE AG, the most interesting and special characteristic of DESSIN is the incorporation of the ecosystem approach to their solutions. It is very relevant to include and to implement ESS measures and methodologies in conjunction with the development of real technological solutions. This interdependency might path the way of a larger use of the ESE approach and as a consequence, increases the relevance and its use by the water management positions across the whole water value chain. The DESSIN project is a very good example of this smooth interaction and the way ESS supports the better of the most promising technical solution in the water sector.

How do you grade the first year of life of the DESSIN project?

It is running on time in terms of deliverables. Besides, its progresses from the technical point of view are very promising. It is expected a prominent step forward with regard to the technologies implemented. Following up to the first findings coming from the activities already finished, the next steps could offer very useful solutions.

In your opinion, what are the strengths and weaknesses of the DESSIN project?

As strengths, the extremely relevant number of very knowledgeable partners is remarkable. It will make the difference, indeed. All members of the consortium are very well organized and with very defined tasks, which will make this project a real success. On the other hand, the repeatability and reproducibility of the studied solutions will be a challenge. The DESSIN Project is limited in resources and activities due to the budget constraints and it will be a challenge to lay the foundation of a larger implementation of the technical solutions in other demo cases, and under other boundary conditions.

What are the challenges of the implementation of the ESS methodologies in Europe?

The inconsistency in methods to quantify and map ESS challenges, the development of robust values of ESS in national accounts, and broader policy and natural resource management decision making. To help decision makers gain a better understanding of how development goals both affect and depend on ecosystem services is critical to a larger use of ESS approach. Besides, there are some multiple social, environmental and economic benefits when applying ESS in the water cycle. However, some disconnections between some regulatory and other bodies, mainly related to traditional practices, appear in a larger use of this approach. ESS is a relatively new approach to be used in close cooperation with/involving stakeholders, which allows all the key actors along the water value chain to negotiate with stakeholders, to participate in the development of inter-sector water allocation plans, elaborate policy recommendations together with the stakeholders towards water markets, to set up interdisciplinary approaches of economic instruments, etc.

05

Demo Sites: five places to investigate deeply



EMSCHER (Germany)

The Emscher team is working on innovations in treatment of sewer overflows and real-time control of large-scale systems to support a river conversion process, and therefore the WFD implementation for this heavily modified water body, in order to contribute to the increased value of ESS.



HOFFSELVA (Norway)

As an important natural element in the urbanized environment of the lower catchment part, Hoffselva team wants to demonstrate local treatment solutions for overflow from CSOs, combining technologies, acting at local and system level and enabling cost-efficient implementation of the Water Framework Directive.



WESTLAND (Netherlands)

The Westland team aims to demonstrate the potential to further improve the efficiency of freshwater supply from brackish aquifers by combining aquifer storage and recovery (ASR) solutions and desalinization with an innovative well design. This will have a strong impact in particular on provisioning ecosystem services (ESS) of the region.



ATHENS (Greece)

In Athens, the researchers are looking into sewer mining, exploiting state-of-art information and communication technology solutions for distributed monitoring and management of multiple sites, combined with small packaged plants. There also will be testing of reused water characteristics on the soil, which is a major component of ESS specifically relevant for arid regions.



LLOBREGAT (Spain)

The Llobregat team looks forward to maximize the use of the existing deep injection system (ASR) in the Drinking Water Treatment Plant by validating and demonstrating the flexibility of the system, where the aquifer receives different water qualities, while the Water Framework Directive compliance is ensured.



06

Demo Sites: the faces of the project



EMSCHER

Nadine Gerner

EMSCHERGENOSSENSCHAFT

Diplom Biologist, specialized in
Freshwater, Marine Ecology and
Ecotoxicology



HOFFSELVA

Herman Helness

SINTEF

Research Manager
in Building and
Infrastructure, Water
and Environment



WESTLAND

Marcel Paalman

KWR

Senior scientific,
researcher in the field of
Geohydrology



ATHENS

Katerina Antoniou

NTUA

Civil Engineer specialized
in Environmental Systems
Engineering



LLOBREGAT

Marta Hernández

CETAQUA

Hydrogeologist
specialized in Managed
Aquifer Recharge

The DESSIN project research work is spread all across Europe

Located in five different countries, the demonstration sites at Emscher (Germany), Hoffselva (Norway), Westland (Netherlands), Athens (Greece) and Llobregat (Spain) aim to demonstrate and promote innovative solutions to water-related challenges, with a focus on water quality issues related to the implementation of the Water Framework Directive (WFD) and water scarcity issues.

By bringing together public and private water management organizations and end-users, technology providers (SMEs), supporting RTD experts and relevant public authorities, the demo sites are also demonstrating a methodology for the valuation of Ecosystem Services (ESS) as catalyzer for innovation in water management.

Despite the physical borders that separate the five demo sites, the links between their investigations and the cooperation among their teams form the basis of the DESSIN project. From the momentarily cold lands around the Emscher to the still warm region of Llobregat, more than fifty scientists and investigators work daily in order to find the solutions and new techniques the project aims to develop.



07 | Timeline: a look over the years



Kick off
Brussels

29/01
2014

Experts on ESS
met in Berlin

May
2014

Freshkeeper
explains its benefits
to the world

December
2014



Barcelona
pilot test starts in
San Joan Despi DWTP

March
2015

2014

March
2014

DESSIN
communicates
to the World
(website launch)



03/11
2014

WA2-WA3
joint meeting
in Athens

04/11
2014

December
2014

Networking with
ESS platforms
and European
roundtables



Installation
of Reverse
Osmosis
membranes in
Westland case

April
2015



Launch of Emscher
demo site as showcase
of cross-current lamella
settlers and RTC system
in the sewer network



May
2015

October
2015

January
2016

Hoffselva partners install the container with
cross-flow lamella settling

Aigües de Barcelona (AB)
completes the flexibilisation
of ASR injection system

May
2016

Software development
for ESS evaluation:
user guides and system
documentation

2017

June
2015

AMI-SM
technologies
ready to start
in Athens



December
2015

Ecosystem
Services
Methodologies
ready to use

December
2017

Final report of the
project summarises
main achievements



08

Partners: who is on the team?

Denmark



DHI is an independent, international research and consulting organization. The main objectives are to advance in technological development and competence within the fields of water, environment and health.

Germany



The University of Duisburg-Essen (UDE) has a focus on water-related topics, to which about 15 departments contribute. Two of these are contributing to DESSIN: The Department of Aquatic Ecology and the Department of Hydraulic Engineering and Water Resources Management.



Adelphi is a leading think tank for policy analysis and strategy consulting. They offer creative solutions and services on global environment and development, challenges for policy, business and civil society communities.



As a SME from Germany, UFT's main business activity is development, construction and installation of hydro-mechanical and electrical equipment for storm water tanks and other treatment structures.



Ecologic Institute is a private not-for-profit think tank for applied environmental research, policy analysis and consultancy. Since 1995, the Institute has built a reputation for excellence in transdisciplinary and policy-relevant research.



Emschergenossenschaft (EG) is a self-governing, non-profit public corporation. Its main tasks are waste water treatment, ecological restoration and maintenance of rivers, flood protection, ground and rainwater management.



IWW is offering research, consulting and development services for the water sector, covering the entire drinking water supply chain: active water resources management, water technology, water networks, water quality analysis, applied microbiology and water economics.



SEGNO is a profit-oriented research and development (R&D) performing SME, active in consulting and development services. SEGNO applies systems for use in visualization, databases, journaling and also implements logical solutions in PLCs.

The Netherlands



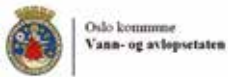
KWR is the research institute of the ten Dutch drinking water companies, their current shareholders. This joint research collaboration program has resulted in a powerful knowledge base and an extensive collective memory for the drinking water sector.



BdB is a SME that is active as a manufacturer of reverse osmosis (RO) and other water treatment installations. The SME focuses on the horticultural industry and also manufactures installations for other industries, including chemical, car wash and food.



Norway



Oslo Water and Sewerage Works (VAV) is a self-financing company within the municipality of Oslo. VAV supplies water and collects/treats sewage for the city's 624,000 inhabitants.



SINTEF is a multidisciplinary private research institute that performs contract research and development for industry and the public sector.



Inrigo Water AS is a Norwegian SME, developing and commercializing technology for treatment of drinking water, treatment of municipal and industrial wastewater, as well as developing new concepts for water recycling.



LKI is a small import and wholesale company, supplying the different parts of Norwegian on- and offshore industry with technical solutions and instrumentation for measuring and controlling different parameters.

Greece



The NTUA is the leading technological and engineering school in Greece. NTUA is the main research partner for the Athens demonstration site, in collaboration with EYDAP. It provides input to innovation development, focusing on solutions for water scarcity and drought.



EYDAP supplies approximately 4,300,000 customers with water through an extensive network of 2,020,000 water meters and 9,500 km of water pipes. The sewerage sector serves 3,500,000 residents with sewers spreading over almost 6,000 km.



CHEMiTEC is active in Greece, Cyprus and Balkan Countries in the sectors of industrial process water, municipal potable water, waste water treatment and environmental technologies, supplying also innovative technologies.

Spain



Cetaqua is a non-profit foundation that integrates, manages and conducts research, technological development and innovation projects on the integral water cycle, benefitting from both academia and industry.



Aigües de Barcelona is the main water operator in the Barcelona Metropolitan Area, supplying more than 3 million inhabitants. AB is the owner of the Llobregat demonstrative site, located in the biggest drinking water treatment plant of Barcelona.

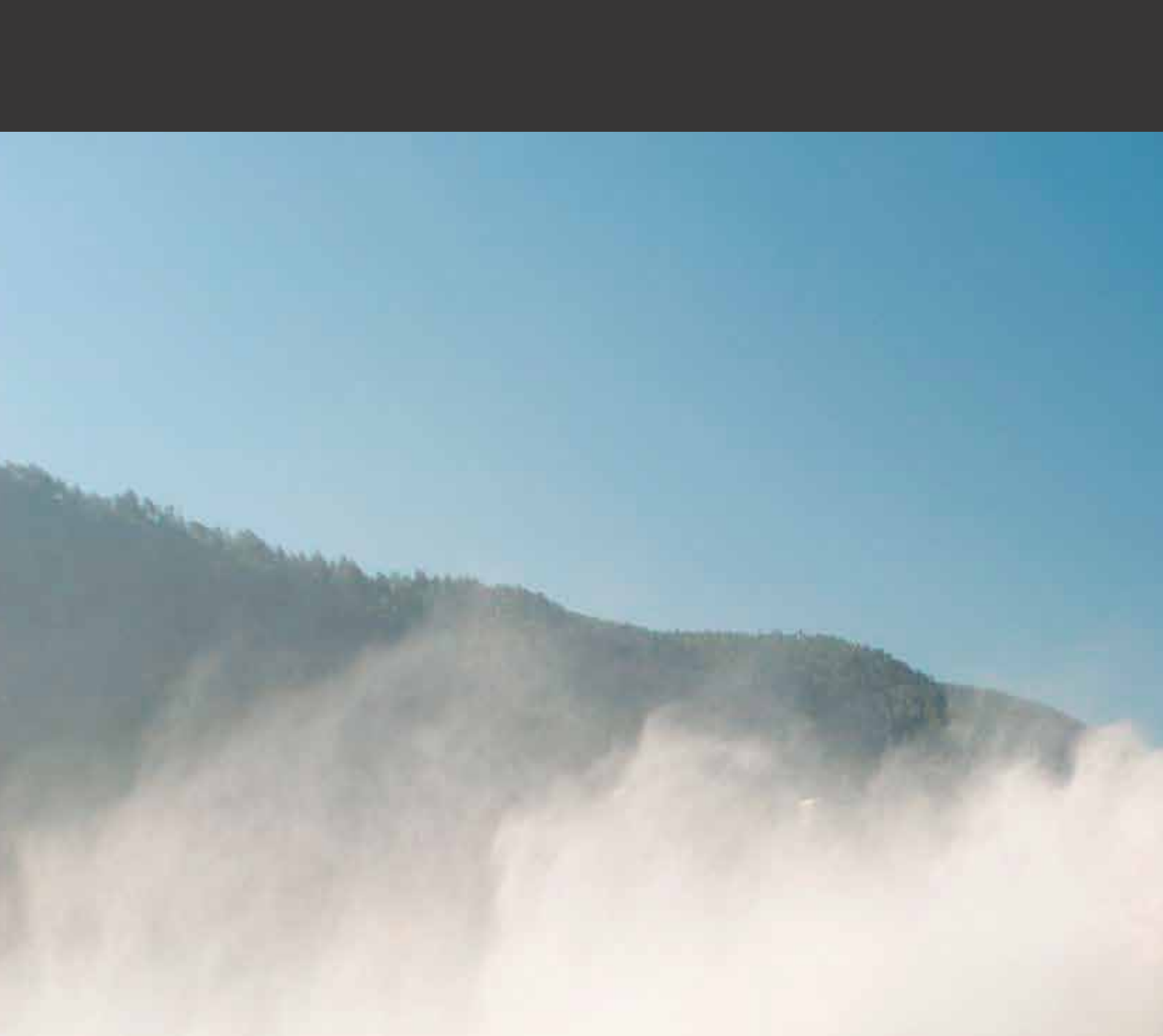


Amphos 21 is a SME, providing scientific and technical consultancy services, addressing a range of environmental issues, mainly associated with the management and disposal of hazardous wastes, contaminated groundwater/soils, water management, environmental planning and specific software development.

United Kingdom



TELINT offers innovative information management systems, which combine remote monitoring and management of mobile, distributed platforms, remote monitoring of sensors and acquisition of sensor data.



This project has received funding from the European Union's Seventh Programme for Research, Technological Development and Demonstration under Grant Agreement no. 619039. This publication reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.

