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## EDITORIAL

Dear readers,

DESSIN project is progressing with firm steps in its first year of existence. After almost twelve months of work, investigations are starting to give the first results and Demo Sites are gaining more interest from local stakeholders and outsiders.

In the second newsletter of the DESSIN project we will dig deeply into the Westland Demo Site and its project leader, Marcel Paalman, who talks about the success in the Dutch area and the goals they are trying to achieve.

The dissemination activity has increased since the sixth month of the project, and several members of the DESSIN team have attended different events (workshops, conferences, local meetings) in order to explain the objectives and the methods of the project tasks to scientific community, partners, researchers, among others.

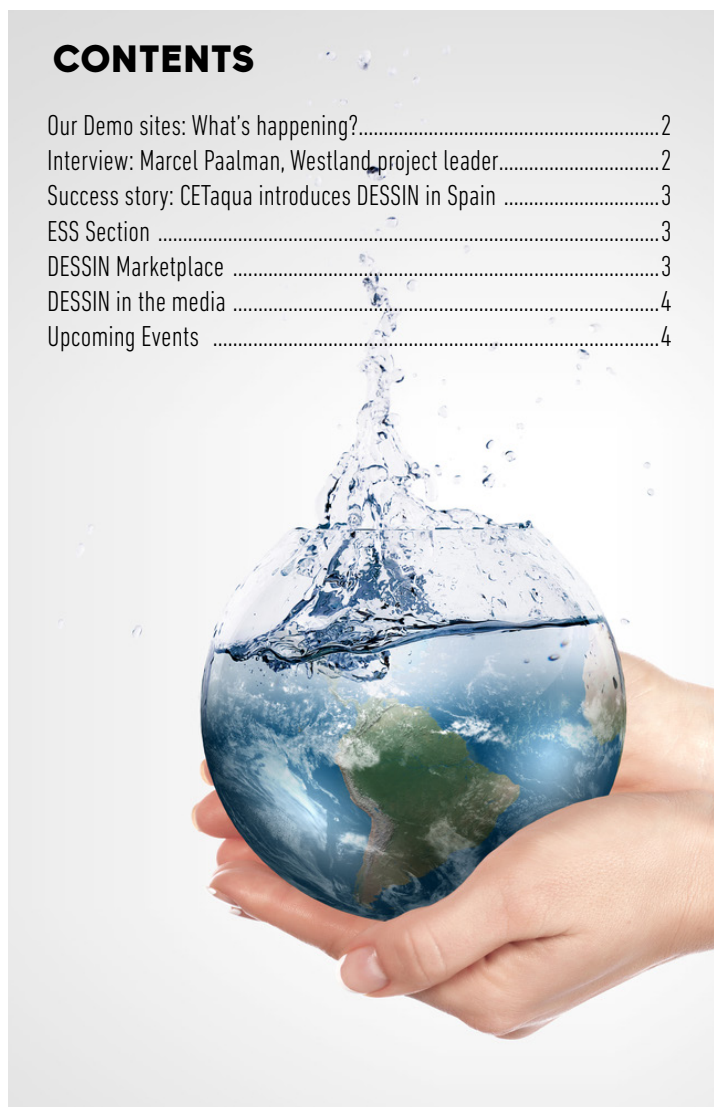
Focused on benefiting the water for social and practical uses, DESSIN is looking forward for a second year in which it is expected to reach higher goals and flatten out the path through the main aim: innovative solutions for water scarcity and water quality related challenges and demonstrate a methodology for the valuation of Ecosystem Services (ESS).

Best regards,

DESSIN Team

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## OUR DEMO SITES WHAT'S HAPPENING?

### WESTLAND (NETHERLANDS)

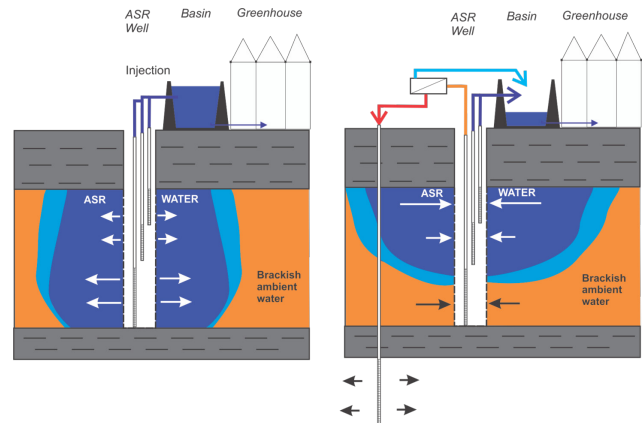
Freshwater resources in coastal areas are limited, while demands are high, resulting in problems like seasonal water shortage, overexploitation of freshwater aquifers, and seawater intrusion. The Westland Demo site is located near the North Sea in the surrounding of Rotterdam and is one of world largest horticulture areas of the world.

The only available water source which can be used without desalination is rainwater. The graphic shows the demand of freshwater of the horticulture sector (red) and the water supply by rainwater (blue). While winter presents an excess of rainwater, during the summer there is a shortage (black). To overcome the mismatch in time the rainwater has to be harvested and stored somewhere. This can be in aboveground basins, but these basins are limited in volume and only a part of the annual rainwater supply is stored and can be used as irrigation water.

However, additional rainwater can be stored by using and developing Aquifer Storage and Recovery (ASR). The situation for ASR is complicated in the Westland area because of brackish/saline groundwater. To store and recover freshwater effectively in a coastal area, a Multiple Partial Penetrating Well (MPPW) system is developed and tested at the Westland demo site in cooperation with a horticulture tomato farmer.

Because the density of saline water is higher than freshwater in time a stratification of freshwater (top) and saline water will occur. In order to optimise freshwater recovery, more water is infiltrated at greater depth in the aquifer, whereas at the abstraction stage freshwater is recovered in the upper layer of the aquifer (see figure 1).

Because always a part of the freshwater will be mixed by saline groundwater, the recovery of freshwater is about 60%. To improve the recovery an additional source is added, the so called Freshkeeper, which abstracts water out of the (mixing) groundwater zone.



Application of the MPPW and combination with the Freshkeeper at the Westland Demo Site (Figure 1)

This fresh/brackish water can be stored deeper into the 2nd aquifer layers of desalinated by reverse osmosis. The DESSIN project is trying to combine the MPPW-ASR with the Reversed Osmosis (ASRO).

Moreover, within DESSIN the pilot case will be turned more into a showcase, with the aim to scale-up and to apply to other locations. The Westland site has gained international interest already. In September the location was visited by a Vietnamese delegation led by the vice minister of agriculture (Mr. Hoang Van). In the Mekong delta region of Vietnam there are also problems with increasing salinization and structural shortages of freshwater for agriculture purposes.

## INTERVIEW// MARCEL PAALMAN - WESTLAND PROJECT LEADER



"The aim is to develop an efficient system to store and recover freshwater in a brackish/saline groundwater environment"

Marcel Paalman is a geochemist engineer and received his PhD for a study on the behavior of pollutants in sediments under various estuarine conditions at the University of Utrecht. Afterwards, he worked for many years at various public organizations on water policy subjects such as the implementation of the European Water Framework Directive. Since 2009 he works for KWR Watercycle Research Institute in the Netherlands and is developing new tools and technics related to the water cycle.

What has the Westland Demo Site achieved in the first 10 months of activity?

Westland's first achievements began during the summer, as the Freshkeeper was installed and tested and the groundwater was analyzed on particles and solutes. Due to the success of the Westland Demo Site in Netherlands the opportunities of ASR for water management (eg as tool for preventing flooding) were recognized and a Foundation Waterbuffer is now established. Our long term goals are to improve the concept of ASRO (ASR in combination with Reversed Osmosis) and also turn the site into a showcase location.

Is the Demo Site using new technologies? What kind of future and practical applications could these technologies have?

Yes, we have been using a new development of the Multiple Partial Penetrating Well system in the first place and are now combining it with the Freshkeeper. The aim is to develop an efficient system to store and recover freshwater in a brackish/saline groundwater environment. The technology can be practiced in other deltaic areas with an abundance of saline water and a shortage of freshwater. Because most people live in deltaic areas, the technology contributes to the supply of freshwater for drinking water, agricultural use, etc.

Which characteristics make the Westland Demo Site unique?

In the first place of course the presence of the horticulture sector, with a high production of vegetables and very effective use of natural sources, such as water and nutrients. Secondly, we are the only location where ASRO is developed, applied and shown.

Why did you choose Westland? Which problems poses and which are the solutions you are searching?

The problem for the Westland horticulture farmers is the availability of irrigation water (always enough, with good quality and a suitable price). The subsurface storage and recovery of freshwater contributes to the goals of the sector, improving the self-sufficiency and climate resilience in water supply.



## SUCCESS STORY

### CETAQUA INTRODUCES DESSIN IN SPAIN

DESSIN scientist Marta Hernández held a presentation at the Iberian Conference on Hydrogeology, which was organized by the International Association of Hydrogeologists (IAH) and took place in Valencia, Spain, the 8th of September. The about 110 attendees consisted of members of the scientific community, students and technicians from the National Geological Survey (IGME institute). The aim of the conference was to meet and share different experiences of the research and demonstration projects on hydrogeology carried out by Spanish researchers.

The DESSIN presentation took place in the session about Managed Aquifer Recharge. Marta Hernández describes her contribution: "I presented the case study of Barcelona and the first results we obtained in the preliminary tasks, comparing the water quality of pre-potable water in Sant Joan Despí waste water treatment plants, with previous experiences worldwide. Moreover, I also presented the geological profiles we obtained during the drilling works carried out in July 2014."

The presentation of the ASR system in Barcelona was followed with interest by the rest of participants and DESSIN was introduced positively to the Spanish hydrogeological community.



The attendants at the Iberian Conference on Hydrogeology in Valencia, Spain

## ESS SECTION

### INITIAL STATE-OF-THE-ART REVIEW

Current progress in the development of the Ecosystem Services (ESS) Evaluation Framework in Work Area 1 (WA1) of DESSIN focuses on building upon the state-of-the-art on assessment tools, methodologies and discussions of water-related ESS, which are ultimately relevant for assessing the introduction of new technologies into the water sector. Incorporating the ESS Evaluation Framework into the larger context of the ESS may better facilitate the creation of additional incentives and arguments for market uptake and practical implementation of water innovations.

To this end, the DESSIN Framework is being developed to corroborate with the MAES<sup>1</sup> and CICES<sup>2</sup> ecosystem typologies and ecosystem service categories as the basis for the Framework's classification system. Furthermore, the conceptual frame under consideration is an adaptation of the European Environmental Agency's Driver, Pressure, State, Impact, Response (DPSIR) scheme<sup>3</sup> which describes the interactions between society and the en-

vironment. Besides making reference to the DPSIR elements, the adapted approach aims to show the linkages between elements of freshwater ecosystems and changes in ESS by means of selected indicators/proxies.

Review work under WA1 has also focused on current discussions regarding the links between ecosystem biophysical functions and processes and the provision of ESS. The linking of these two areas has posed considerable challenges to ESS assessment and economic valuation studies, and remains a contentious topic today. This initial state-of-the-art review is being condensed into an internal report that will inform about the decisions regarding which concepts will be integrated and developed further into the ESS Evaluation Framework in the second year of the project.

<sup>1</sup> Mapping and Assessment of Ecosystem Services, for more info visit <http://biodiversity.europa.eu/maes>

<sup>2</sup> Common International Classification of Ecosystem Services, for more info visit <http://cices.eu/>

<sup>3</sup> The DPSIR Framework used by the EEA, for more info visit [http://ia2dec.ew.eea.europa.eu/knowledge\\_base/Frameworks/doc101182](http://ia2dec.ew.eea.europa.eu/knowledge_base/Frameworks/doc101182)

## DESSIN MARKETPLACE

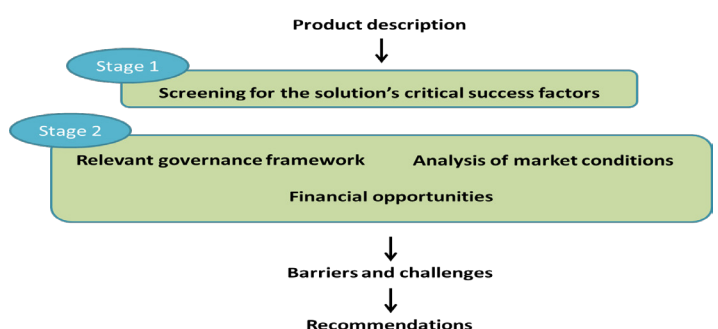
### BUSINESS ENVIRONMENT REPORTS ON WATER QUALITY AND QUANTITY SOLUTIONS

This autumn, two specific business environment reports (outside-in) on water quality and quantity challenge solutions are being finalized. These outside-in reports strive to serve as sample assessments that integrate all relevant aspects and criteria for the positioning of technology providers that are relevant to ecosystem services (ESS), as well as to current or new markets.

The sample approach is developed on the basis of DESSIN-specific pilot projects. The Emscher case in Germany has been used for the water quality focus report, while the water quantity focus report has been based on the Llobregat case in Barcelona. The reports have been compiled using interviews with the project stakeholders as well as a specific market analysis.

The outside-in reports are structured according to five key steps: (1) a product description (including the respective solution package), (2) an initial screening for the solution's critical market success factors, (3) a detailed analysis including the relevant governance framework, an analysis of the market conditions and financial opportunities, (4) barriers and challenges, and (5) recommendations for SMEs and policy recommendations.

The reports are typically compiled in a way that the methodology and criteria identified are transferable to other cases. In particular, the screening tables can also be used when analyzing a different solution and/or market. Potential markets are looked at beyond the two cases wherever possible. The reports will thus provide an essential support service to the ESS technology providers and be one part of the overall DESSIN solution package.



Structure of the Outside-In Report: adelphi, 2014



## DESSIN ACHIEVEMENTS ATHENS INTERNAL MEETING

Almost 50 people from the DESSIN project participated in the Work Area (WA) 2 & WA3 coordination meeting at the EYDAP – Athens Water Supply and Sewerage Company headquarters in Athens at the 3rd and 4th of November.

The meeting was initiated to discuss the progress of the activities in WA2 and WA3, and to define actions and goals for the next months of the project. It was also organised with the intention to give the researchers of these areas the opportunity to meet each other and look for common issues and options for collaboration.

During the preparations of the meeting, it was concluded that the research (WA2) and demonstration (WA3) activities are strongly linked to the development of the Ecosystem Services Framework in WA1, as this should be applied for each of the pilot cases. Therefore, it was decided to include a dedicated session on WA1 developments at Day 2 of the meeting. Athens was chosen as location, as this gave the opportunity to visit the decentralised waste water treatment pilot at Metamorfoosi (Athens). The meeting location and logistics were organised by the National Technical University of Athens (NTUA) and EYDAP, who also offered access to their waste water facilities, where the DESSIN pilot takes place.

On the second day of the meeting, the participants visited the DESSIN pilot site in Athens, which is located at KEREFYT, the Sanitary Engineering Research and Development Center of EYDAP.

There was the chance to see the automated packaged treatment plant in place, while the representative of Chemitec, the company that manufactures the plant, presented the two components of the system; the Reverse Osmosis container and the Membrane Bio-Reactor container. He explained how sewage will be extracted from the network and presented the urban green space that will be irrigated with the reclaimed water. The ICT components of the system will be adjusted soon in support of operating and monitoring the plant. A devoted office building in close proximity to the plant will serve as meeting room and computer room where the monitoring web-platform of the developed solution will be demonstrated.

Finally, the participants visited the centre's laboratory, where a representative of EYDAP presented the quality testing process and equipment that will also be employed for testing purposes of the Athens pilot.

## UPCOMING EVENTS

	<p><b>8-13 DEC</b></p> <p><b>Groundwater Resources Assessment and Management in Arid and Semi Arid Regions</b>          Organiser: Department of Geology, Andhra University and AGGS          Country: Visakhapatnam, India  <a href="http://iah.org/events/groundwater-resources-assessment-and-manage-">http://iah.org/events/groundwater-resources-assessment-and-manage-</a></p>
<p><b>21-23 JAN</b></p> <p><b>II Workshop: Study, development and management of water in soils and volcanic islands</b>          Organiser: Universidad de Las Palmas de Gran Canaria          Country: Las Palmas de Gran Canaria, Spain  <a href="http://iah.org/events">http://iah.org/events</a></p>	
	<p><b>8-10 FEB</b></p> <p><b>The New Developments in IT &amp; Water Congress</b>          Organiser: Royal Dutch Water Association and IWA          Country: Rotterdam, Netherlands  <a href="http://iwconferences.com/the-new-developments-in-it-water/">http://iwconferences.com/the-new-developments-in-it-water/</a></p>
<p><b>12-15 APR</b></p> <p><b>7th World Water Forum</b>          Organiser: The World Water Council and the Korea Water Forum          Country: Daegu and Gyeongbuk, Korea  <a href="http://eng.worldwaterforum7.org/main/">http://eng.worldwaterforum7.org/main/</a></p>	
	<p><b>28-30 APR</b></p> <p><b>Cities of the Future Conference</b>          Organiser: TRUST and IWA          Country: Mülheim an der Ruhr, Germany  <a href="https://conference.trust-i.net/">https://conference.trust-i.net/</a></p>

## PARTNERS

