SOWAEUMED

COORDINATION & SUPPORT ACTION

SOWAEUMED

SOWAEUMED Project nº 245843 "Network in solid waste and water treatment between Europe and Mediterranean countries"

PUBLISHABLE SUMMARY

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SOWAEUMED (Network in solid waste and water treatment between Europe and mediterranean countries) is a project co-funded by the European Commission in its 7th Framework Programme under the Grant Agreement no 245843 running from 1st Dec. 2009 to 31st November. 2012.
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1. EXECUTIVE SUMMARY

Population growth among Europe's North African neighbors, Morocco and Tunisia in particular, is putting increasing pressure on the demand for clean water. As supplies slowly dwindle, there is a growing need for efficient technologies to improve water quality and treatment in a bid to cut down on waste water. Supporting initiatives in Morocco and Tunisia, two Mediterranean Partner Countries (MPCs) suffering from scarce water resources, the EU FP7-funded project 'Network in solid waste and water treatment between Europe and Mediterranean countries' (SOWAEUMED) set out to help these two countries improve their water quality and treatment.

The water in Morocco and Tunisia is not only scarce but is also under threat from pollution. The SOWAEUMED project have been working with research groups in Moroccan and Tunisian laboratories to develop new systems based on conventional, advanced, and nanotechnologies. These will address both the demands on water as populations in these countries increase and the need for new treatment regimens which will make the valuable resources cleaner and safer.

By sharing expertise in clean water technologies – including cutting edge nanoscience - the SOWAEUMED project offers hope for a transformation in basic sanitation in a region beset by water scarcity and pollution. SOWAEUMED project aims to tackle the problems by bringing together researchers with various scientific profiles in a cooperation platform. SOWAEUMED foresees the synergic work of the partners by improvement of scientific relationships, exchange of know-how and experience between the participating centers, including training in MS of Ph.D. students and/or post-doctoral researchers, to upgrade S&T research capacities of centers in MED countries dealing with waste treatment technologies both conventional, advanced and nanoscience based. SOWAEUMED includes one SME (Environmental Engineering) in order to give the project a complementary and applied - business dimension. To be able to participate in the project on an equal-footing basis, the different technological developments of the groups is balanced by reinforcement of MED countries research infrastructure and improvement of their human potential. This is achieved by upgrading research equipment in the laboratories of less developed countries. Thus, the transfer and exchange of know-how is accelerated and the potential of the groups can be better exploited. This approach has prepared laboratories from MED countries to participate more efficiently in European projects. Moreover, it has enabled MED countries to increase their contribution in the ERA, making them interesting partners to scientists from MS.

SOWAEUMED includes partner institutes and universities (based in Spain, Sweden, Croatia, Morocco and Tunisia) to design and roll out new solid waste and waste water treatment technologies. It will also foster the exchange of know-how and experience, as well as upgrading the research capacities of the partner organizations from Morocco and Tunisia. So far, SOWAEUMED's efforts have been supported by governments, business associations, chambers of commerce, which all accept the need to improve water and waste management.

This connection between the Moroccan and Tunisian laboratories and the wider research community has allowed research results, ideas and new technology to be shared. Furthermore, it has an impact on waste and waste water treatment technologies research and technology transfer on Safety, Environmental and Health aspects, as well as the methods for achieving effective bi-directional technology transfer between the EU and MED countries including also the social, political and cultural factors and the exploitation and use considering the social and political implications for creating new businesses (eg spin off) often associated with emerging technologies and models for Praxis Business Innovation in the Technical – Social – Economic - Political Innovation. It has also empowered the laboratories in the MPCs to enhance their contribution in the European Research Area, and increased interest in them from European scientists as potential research partners.

2. PROJECT SUMMARY

PROJECT CONTEXT

North Africa may be just the other side of the Mediterranean Sea from Europe, but when it comes to basic sanitation, it sometimes feels like a world away. Many communities on the southern Mediterranean rim deal with waste - both human and industrial - in dangerously complacent ways, leaving unhealthy pollutants in the water stream. The region certainly needs clean water. Of the 500 million cubic meters of wastewater discharged annually by households in urban areas in Africa's Mediterranean countries, more than one quarter is simply released into the water stream or spread on the ground. In Morocco, of the 10,800 tonnes of household waste produced each day in urban areas, only 2% is recycled or put into landfill, while the rest is discharged into the wild, adding to water pollution.

While the situation there has improved over the past 30 years, a deficient management of scarce water resources, threatened by pollution of increasing concern from various sources, contributes to aggravating the situation. The main four major problems affecting the water, its quality and treatment involve:

1. Proper research on the issues of climate change, water shortages and the development of new technologies for desalination, reuse of waste, water flows and transfers of water between areas
2. Gaps in regulations in the sectors of water and its treatment
3. Establish good practices in decentralization of the management of water and recycling, involving the private sector
4. Peoples' right to access to water in terms of quantity and quality

Regarding the considered pollution sources, those commonly involved are, uncontrolled dumping of domestic and industrial waste without any previous treatment affecting the aquatic environments quality, massive employment of pesticides and fertilizers affecting groundwater, high concentration of activities in confined spaces that generate pollution exceeding the power of self-purification of waters, accidental landfills often located on the banks of rivers, and rivers, already weakened by successive drying and water companies activities.

The heavy dyes and chemicals used by the Tunisian textile and the Moroccan tanning industries often seep untreated into local sewerage systems, and sometimes even back into the local water. These problems have, until recently, been compounded by weak environmental rules and a poor understanding of the link between sewage, water pollution and disease.

In short, MED countries current challenges focus on the protection of water resources through legislation and appropriate studies, the dangers associated with pollution caused by fly-tipping on the surface and its impact on groundwater, the implementation of effective technologies for treating wastewater, training and education on environmental pollution, the proper management of water resources and gain awareness of local people about the dangers of contaminated water on human and animal health.

But a new initiative bringing researchers, policy makers and businesses together from the entire Mediterranean region is aiming to turn the tide on water treatment. By sharing expertise in clean water technologies – including cutting edge nanoscience - the SOWAEUMED project offers hope for a transformation in basic sanitation in a region beset by water scarcity and pollution. SOWAEUMED project aims to tackle the problems by bringing together researchers with various scientific profiles in a cooperation platform. This includes partner institutes and universities (based in Spain, Sweden, Croatia, Morocco and Tunisia) to design and roll out new solid waste and waste water treatment technologies. It will also foster the exchange of know-how and experience, as well as upgrading the research capacities of the partner organisations from Morocco and Tunisia. So far, SOWAEUMED's efforts have been supported by governments, business associations, chambers of commerce, which all accept the need to improve water and waste management.

SOWAEUMED foresees the synergic work of the partners by improvement of scientific relationships, exchange of know-how and experience between the participating centres, including training in MS of Ph.D. students and/or post-doctoral researchers, to upgrade S&T research capacities of centres in MED countries dealing with waste treatment technologies both conventional, advanced and nanoscience based. SOWAEUMED includes one SME (Environmental Engineering) in order to give the project a complementary and applied - business dimension. To be able to participate in the project on an equal-footing basis, the different technological developments of the groups is balanced by reinforcement of MED countries research infrastructure and improvement of their human potential. This is achieved by upgrading research equipment in the laboratories of less developed countries. Thus, the transfer and exchange of know-how is accelerated and the potential of the groups can be better exploited. This approach has prepared laboratories from MED countries to participate more efficiently in European projects. Moreover, it has enabled MED countries to increase their contribution in the ERA, making them interesting partners to scientists from MS.

SOWAEUMED partners are aware of the large number of existing funded projects (EU - MED) focused on specific research to solve some problems dealing with water and waste treatment technologies, (MEDA WATER PROGRAMME, LIFE-TCY projects, etc...). However, SOWAEUMED have been working to increase the actual capacities of Mediterranean partners by a significant number of specific measures to ensure the transfer of knowledge from the EU towards the south, so as to promote Building Capacities of MED partners, rather than solve specific problems through scientific research.

In this perspective, SOWAEUMED have strengthened the capacities of various institutions of the Mediterranean region in two key sectors such as water and waste control and treatment technologies, through five main vectors north (EU - MS) - south (MED countries) such as

- Vector 1: Strengthening the scientific and technological capacities of partner institutions promoting the synergic work of participants of various scientific profiles improving their relationships.
- Vector 2: Capacity building MED in education and training
- Vector 3: MED strengthening operational capacities in their environment based on implementation of new waste treatment technologies.
- Vector 4: Institutional strengthening of MED centres through mobility between partners and training in new technologies and methodologies in MS of Ph.D. students and/or post-doctoral researchers,
- Vector 5: Strengthening MED through demonstration and exchange of know-how and experience between the participating centres (Case Studies) and advanced legislation on environmental control and prevention.

PROJECT AIMS

The objective of SOWAEUMED have been to put together and generate a stable sustainable bi-regional and integrated scientific platform of international excellence to collaborate in the development and implementation of new solid waste and waste water treatment technologies research in specific topics of interest between Member States, Associated Countries and Mediterranean Region Countries which has contributed to a threefold objective:

- To create the optimal conditions in order to favour the establishment of a sustainable networking, permanent dialogue, specific cooperation activities and a communication flow, including dissemination activities of the priorities towards Mediterranean Partners R&D research entities and policy makers such as funding agencies, learned bodies and national science policy bodies to boost their scientific and technological research potential to allow a similar foot basis cooperation.

- To promote interregional and intraregional cooperation key actions concerning with the identification of eventual difficulties, needs and long term priorities to further strengthening the established relationships and looking for legal, administrative and financial solutions to these problems, based on a

better knowledge of the scientific and technological systems on both sides, as well as a closer dialogue between EU and MED policy makers.

- To stimulate and support the participation of MED region research stakeholders in future joint proposals at national and international level such as FP7, with a first emphasis on the People Programme in order to enhance their human resources through training and teaching activities.

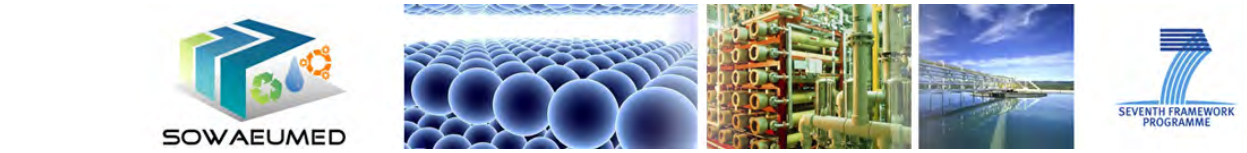
The SOWAEUMED project specific objectives have been:

1. To establish a solid basis and cooperation platform for strategic partnerships among research centres and industries from the EU and MED countries to promote integration, to increase research excellence and to achieve scientific and technological critical mass. This has been the key to develop both the existing potentialities and future EU-MED joint actions, i.e, the submission of high quality proposals for joint research under future Calls (NMP and ENV Work Programmes), and the INCO Programme.
2. Elaboration of an Action Plan to drive economic development through research, training-mobility and technological development activities in the selected topic or economic sector. This Action Plan comprises regionally specific activities.
3. To gain first-hand knowledge of the state-of-the-art in specific areas of solid waste and waste water treatment technologies research as a basis for joint research and establish a research agenda based on the pre-selected scientific topics of interest. Identify best practice amongst the partners in the selected research fields and define strategies to transfer this know-how to other interested laboratories in SOWAEUMED
4. To establish a permanent dialogue amongst the partners across different levels of responsibilities, to support the definition of the research priorities and the development of innovation policies of the EU and MED, in the field of the selected research topics.
5. To hire experienced researchers and young researchers to reinforce the human potential of the MED centres.
6. To foster relationships and exchange research results as the foundation for identifying robust state-of-the-art topics for future dialogues, involving Government – Academia and Enterprises (Triple Helix).
7. Acquisition and upgrading of specific research equipment of the partner laboratories in the MED centres in order to accomplish for the appropriate harmonization of the human resources, encouraging the common use of existing resources and access to the Large Infrastructures.
8. To foster the scientific and technological formation of specialist as well as to carry out recruiting actions of already formed scientists that will contribute to achieve the indicated critical mass.
9. To disseminate the research by means of the website, priority reports, road maps and collaborative models to key stakeholders, decision makers and influencing agencies impacting future S&T collaborative policies, work programmes and funding mechanisms in the EU and MED. Diffusion of FP7 calls, AECID calls, CDTI calls, etc.
10. To establish appropriate association and clustering with ongoing EU research projects on the related field with complementary objectives. This will provide both a synergism + best exploitation of the committed resources.

SOWAEUMED CONTRIBUTIONS

- To balance research institutions by reinforcement of MED countries research infrastructure and improvement of their human potential by upgrading research equipment in the laboratories of less developed countries and hiring new researchers for MED institutions.
- To transfer and exchange of know-how will be accelerated and the potential of the groups be better exploited, especially through the key contribution of the involved SME
- Identifying potential interested enterprise on the SOWAEUMED results and participation in RTD joint proposals or private agreements, introducing a business dimension within each of the proposed workshops and establishing contacts with Chambers of Commerce and Industry in both EU and MED countries.

- Reinforcing the research links with leading universities, institutes and industrial companies in MED countries, especially by the establishment of joint participation of EU and MED partners in NMP and ENV work programme Calls.
- Increasing the critical mass of academic and industrial researchers from MED region in order to compete with other geo-strategic areas (China, India, Korea, etc.), promoting an efficient transfer of the generated knowledge to the industry.
- Providing a fluent mutual coordination reinforcing RTD cooperation at bioregional and multilateral level, as recommended by the European Commission contacting and coordinating with The Community external policies, European Development Fund (EDF) and European Regional Development Fund (ERDF) targeting the Mediterranean region, the Euro-Mediterranean Regional Programme for Local Water Management, MELIA CSA (Mediterranean Dialogue on Integrated Water Management), CDTI Spanish Industrial Technological and Development Centre, AECID-PCI International Cooperation Spanish Agency for Inter-universitary cooperation programme with MED countries, OFFICE NATIONAL D'ASSAINISSEMENT (ONAS, Tunisia), Tunis International Centre for Environmental Technology (CITET, Tunisia), Ministry of Land, Water and Environment of Morocco, The Development Cooperation and Economic Cooperation Instrument (DECI), the INCONTACT and INCONet projects, the Competitiveness and Innovation framework Programme (CIP) and the Enterprise Europe Network (EEN) and other bilateral CE and EU Member States and Associated States Programmes.
- To impact of waste and waste water treatment technologies research and technology transfer on Safety, Environmental and Health aspects, as well as the methods for achieving effective bi-directional technology transfer between the EU and MED countries including also the social, political and cultural factors and the exploitation and use considering the social and political implications for creating new businesses (eg spin off) often associated with emerging technologies and models for Praxis Business Innovation in the Technical – Social – Economic - Political Innovation.



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NETWORK IN SOLID WASTE AND WATER TREATMENT BETWEEN EUROPE AND MEDITERRANEAN COUNTRIES

Are you ready to *discover*?

International workshop WCI in Hadrumete. 22-24/11/12. Tunisia

THE CONTEXT

Scarce water resources threatened by pollution

African countries of the Mediterranean river basin located in a climatic zone with high intra-and interannual variations in precipitation are those ranked among the most threatened by the consequences of global warming. A deficient management of scarce water resources, threatened by pollution of increasing concern from various sources, contributes to aggravating the situation.

Four major problems affecting water, its quality and treatment

1. Proper research on the issues of climate change, water shortages and the development of new technologies for desalination, reuse of waste, water flows and transfers of water between areas
2. Gaps in regulations in the sectors of water and its treatment
3. Establish good practices in decentralization of the management of water and recycling, involving the private sector
4. Peoples' right to access to water in terms of quantity and quality

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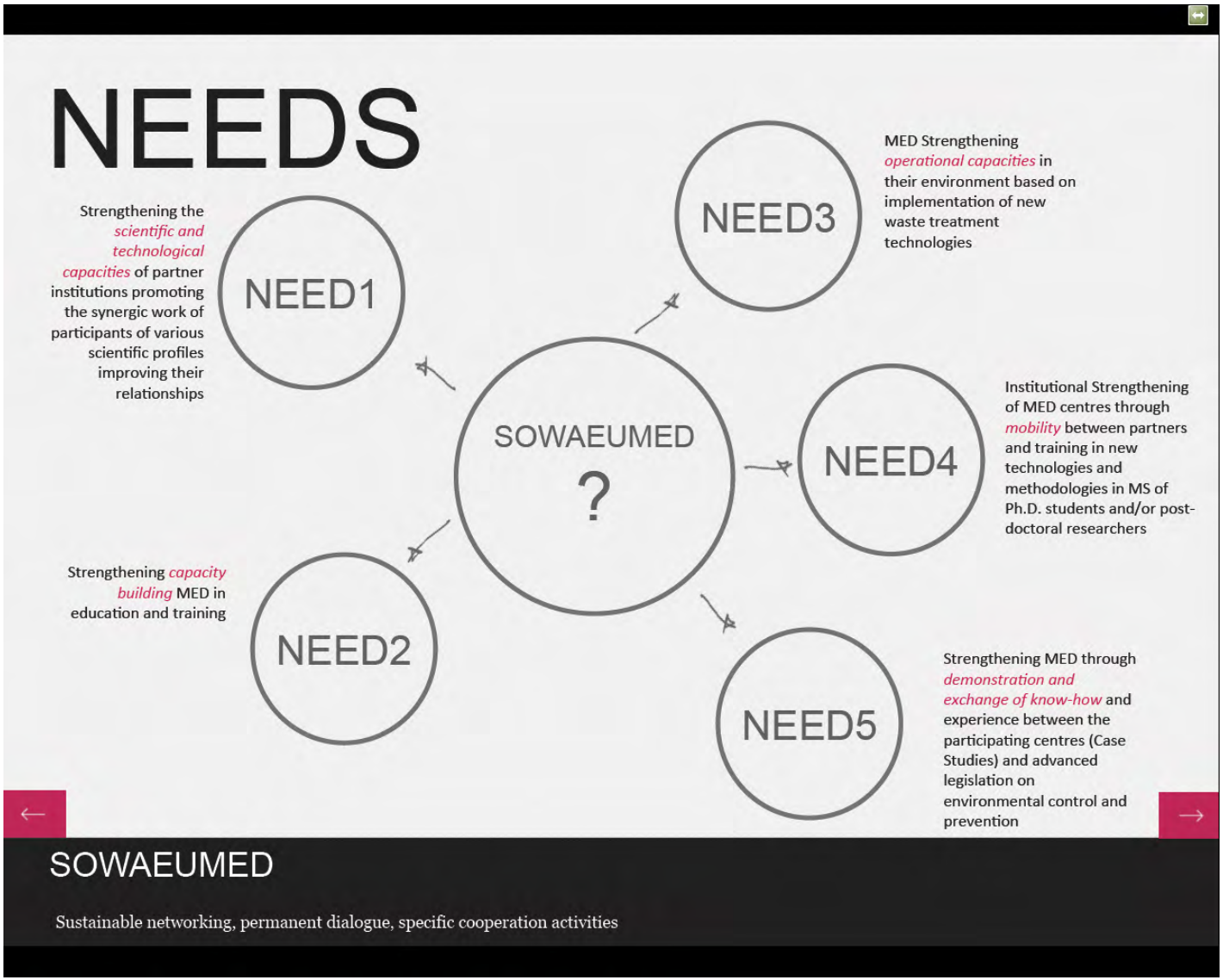
Sustainable networking, permanent dialogue, specific cooperation activities


NEEDS
Strengthening the scientific and technological capacities of partner institutions promoting the synergic work of participants of various scientific profiles improving their relationships
NEED1
NEED3
MED Strengthening operational capacities in their environment based on implementation of new waste treatment technologies
SOWAEUMED
?
NEED4
Institutional Strengthening of MED centres through mobility between partners and training in new technologies and methodologies in MS of Ph.D. students and/or post-doctoral researchers
Strengthening capacity building MED in education and training
NEED2
NEED5
Strengthening MED through demonstration and exchange of know-how and experience between the participating centres (Case Studies) and advanced legislation on environmental control and prevention
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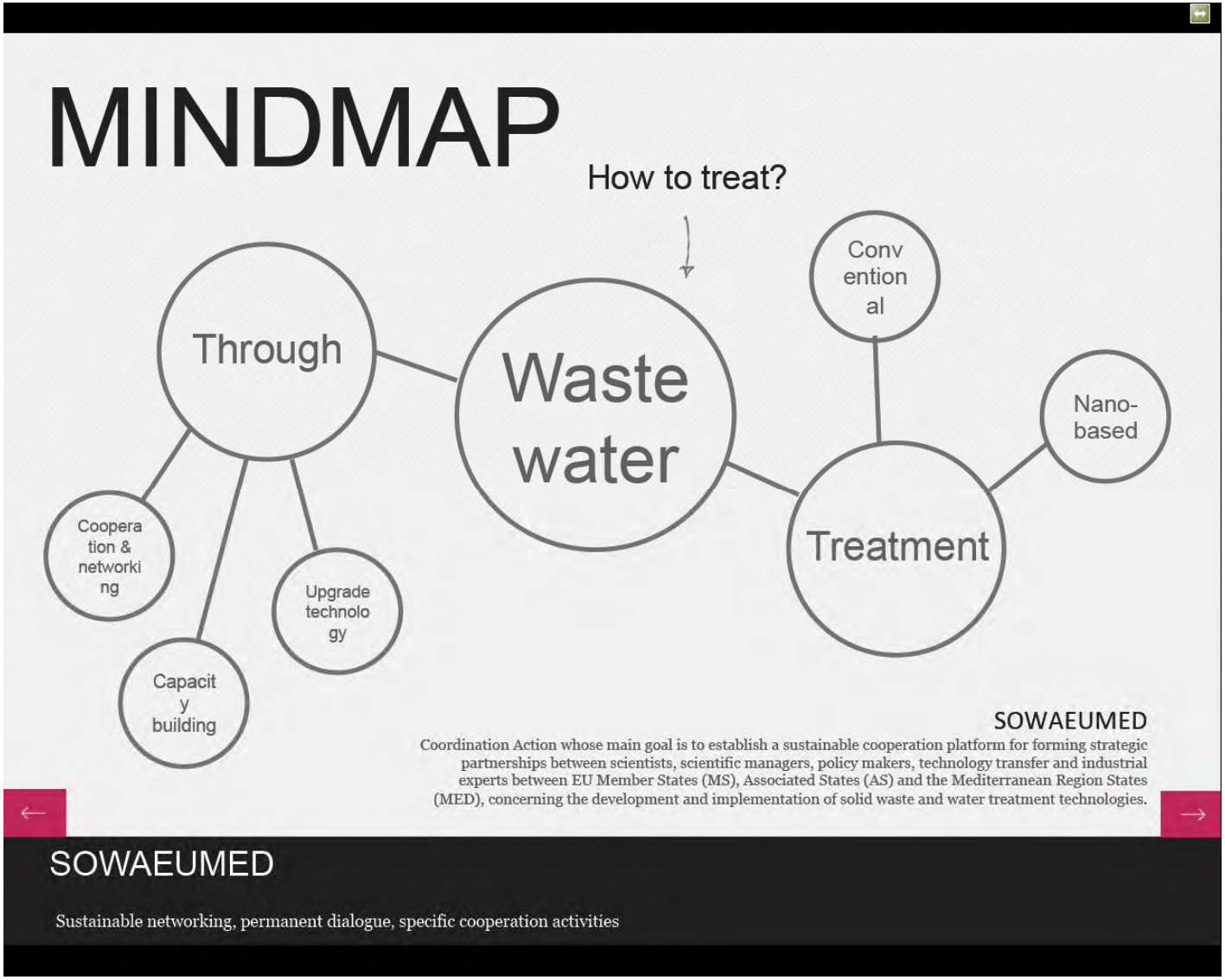
MINDMAP
How to treat?
Waste water
Through
Conv ention al
Nano-based
Treatment
Coopera tion & networki ng
Upgrade technolo gy
Capacit y building
SOWAEUMED
Coordination Action whose main goal is to establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU Member States (MS), Associated States (AS) and the Mediterranean Region States (MED), concerning the development and implementation of solid waste and water treatment technologies.
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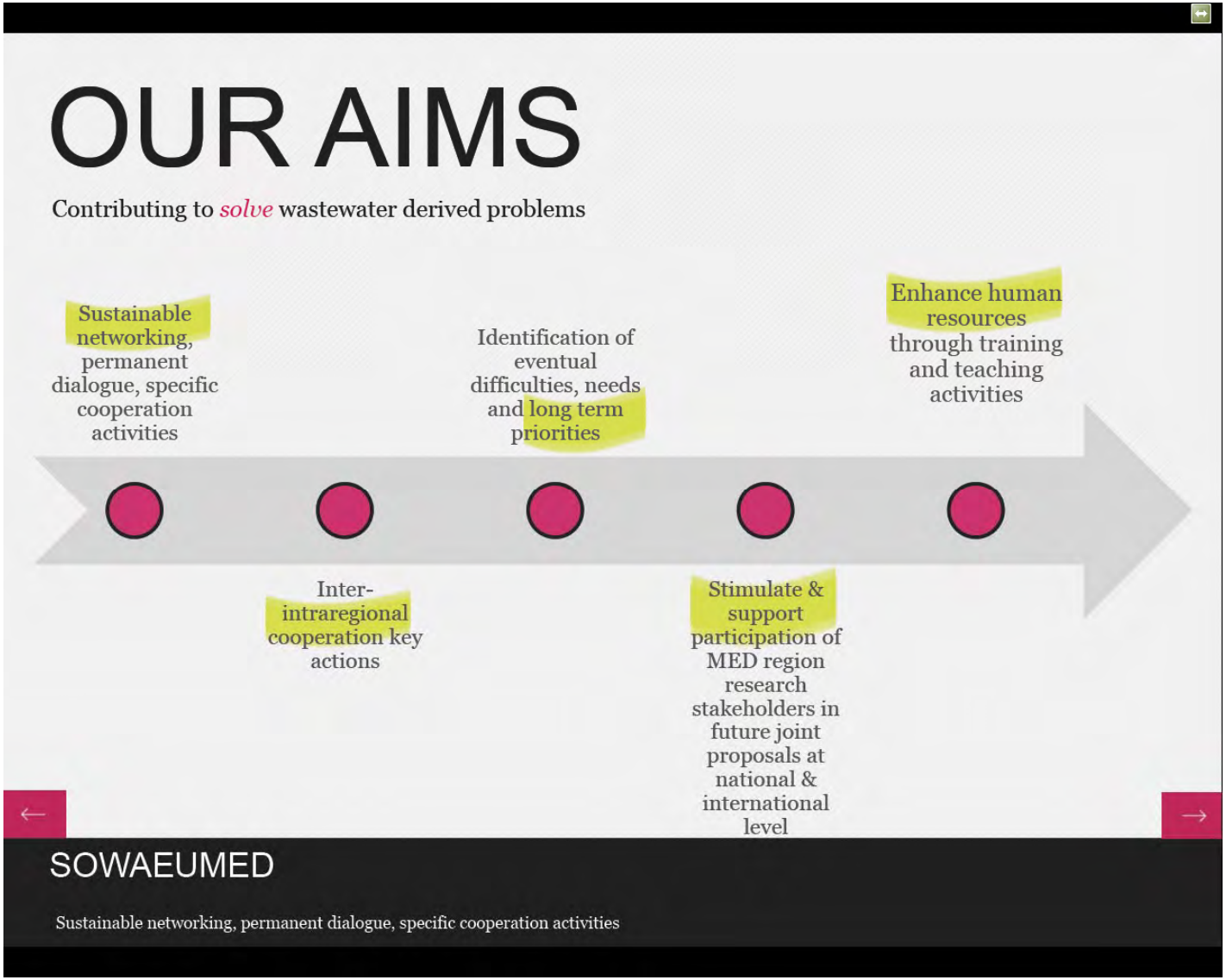
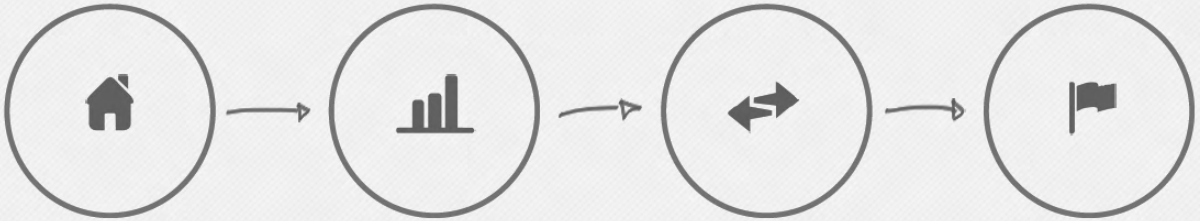

OUR AIMS
Contributing to solve wastewater derived problems
Sustainable networking, permanent dialogue, specific cooperation activities
Inter-intraregional cooperation key actions
Identification of eventual difficulties, needs and long term priorities
Stimulate & support participation of MED region research stakeholders in future joint proposals at national & international level
Enhance human resources through training and teaching activities
SOWAEUMED
Sustainable networking, permanent dialogue, specific cooperation activities

WORKFLOW



- Fostering relationships
- Equipment upgrading/acquisition
- Education, training & exchanges
- Dissemination & interactions

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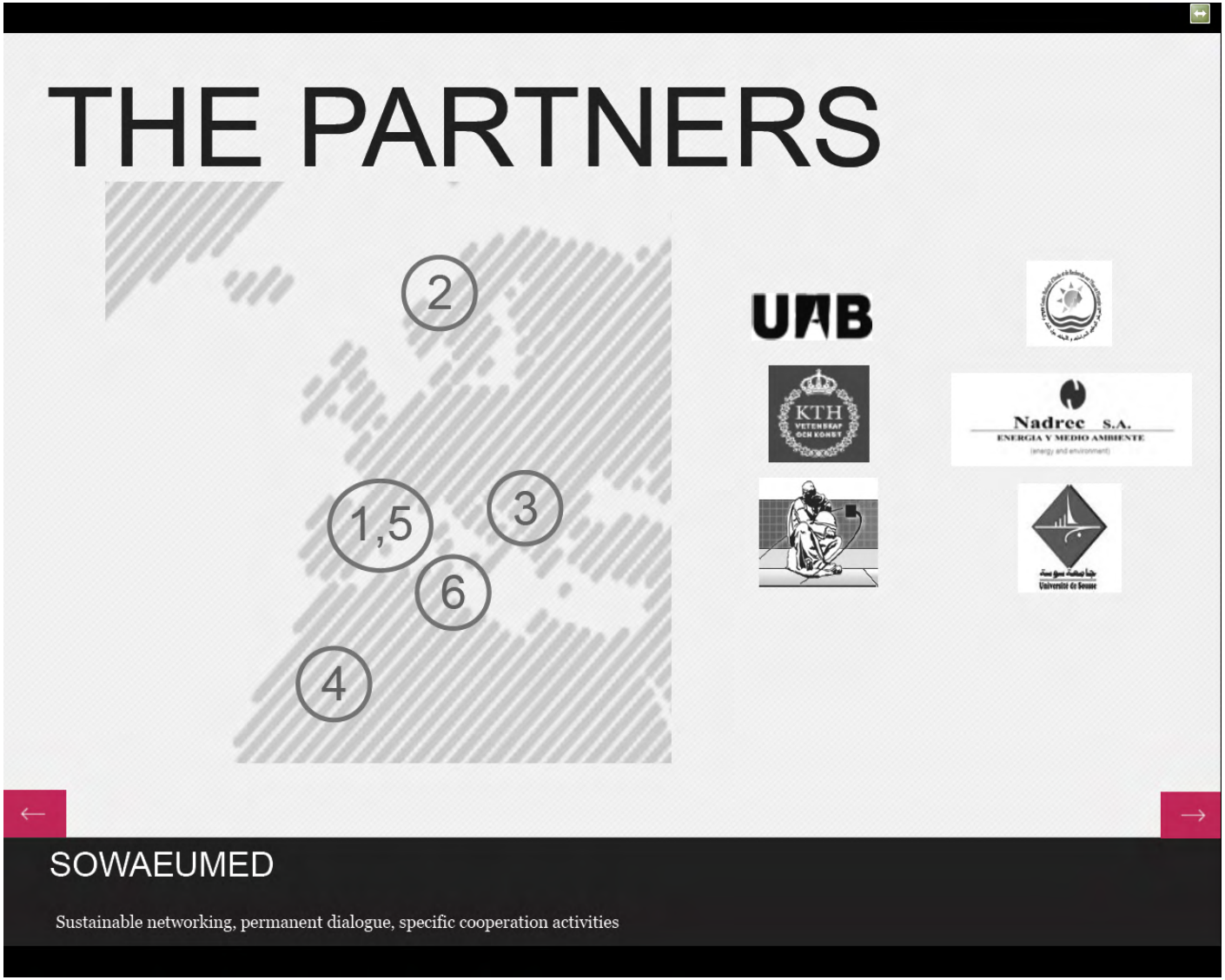
THE PARTNERS
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1,5
3
6
4
UAB
KTH
VETENSKAP
OCH KONST
Nadrec S.A.
ENERGIA Y MEDIO AMBIENTE
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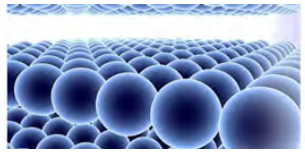

MEET THE EU TEAM

Qualified *rockstars*

Manuel Valiente

Analytical Chem. Prof. (UAB) Coordinator of serveral EU FP5-7 projects. 165 papers, 30 thesis, 9 patents

Mamoun Muhammed

Chair Professor of Materials Chemistry (KTH). >200 papers, 20 patents. Coordinator of several EU FP projects

Bogomil Obelic

Senior scientist at RBI. > 50 papers. Participant in several EU FP projects.

Marco Arredondo

Industrial Engineer. Director of Renewable Energy, responsible for carrying out industrial projects both in production plants for biomass energy

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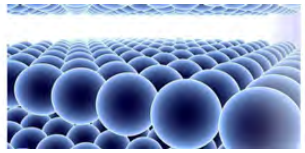
Sustainable networking, permanent dialogue, specific cooperation activities



MEET THE MED TEAM

Qualified *rockstars*

Laila Mandi

Environmental Sciences Prof. at UCAM. Director of the National Centre of Studies and Research on Water and Energy,

Seffen Mongi

Professor in Inorganic and Applied Chemistry (SOU).

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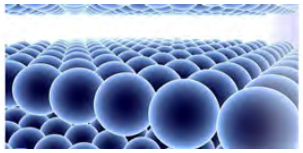

ACTIVITIES

To provide *training, forum and establish connections*

To consolidate *interactions, entrepreneurship and confidence*

Reinforcing R+D infrastructure by upgrading or acquisition of selected equipment

Research priorities, road maps and collaborative models to *impact* future S&T collaborative policies

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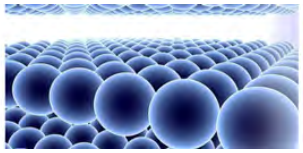
Sustainable networking, permanent dialogue, specific cooperation activities



CASE STUDIES

To provide *training, forum and establish connections*

To provide training on the latest scientific and technological advances, to provide a forum for researchers to present their own work (talks and posters) and to establish connections between researchers. It was planned to seek support from local universities and governments and to ask for national resources to help the organization of the case studies. Interested **local industries and Chambers of Commerce** and Industry have been invited to attend and to sponsor some of the events.

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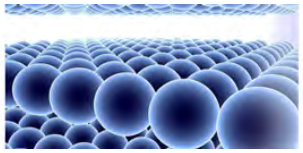
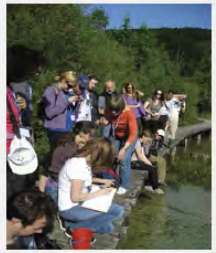


CASE STUDIES

I Case Study *Plivitce lakes, Croatia*
May, 2011


Lectures and demonstrations in the **conventional and advanced waste treatment technologies** will deal with actual **on site cost effective applications** such as reverse osmosis (portable, large-scale) and advanced adsorbent filter media (ion exchange resins, activated alumina, ferric oxide and zeolites)

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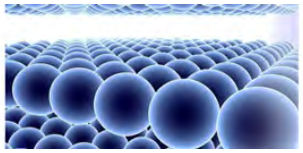

CASE STUDIES



Demonstration of good practices implemented along the project, to populated areas in MED region affected by an intensive tourism and urbanism activity and waste pollution, especially small villages.

II Case Study *Meliane river, Tunisia*
November 2011

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WORKSHOPS

To consolidate *interactions, entrepreneurship and confidence*

Between the researchers and other important players in the development, application and implementation of emerging technologies for waste treatment, from the research development of processes on one hand and public policy issues related to research and also start-up companies on the other. Furthermore, these activities were performed in **order to build contacts and confidence between the researchers and economic and social actors**. Representatives from interested industrial companies and from government agencies were invited to actively participate in these workshops. The workshops were structured on: plenary sessions, specific seminars, round tables, practical sessions and visits to companies and institutions involved.

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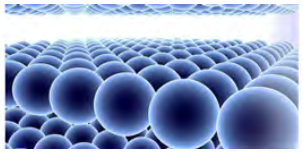

I WORKSHOP

I Workshop *Sousse, Tunisia*
November, 2011

The objectives of this workshop were the innovative aspects of water treatment and waste management, introducing new technologies, describing the state of the art and case studies related, discuss key controversial issues, sharing of experiences among different countries. More than 80 participants (researchers, engineers; specialists...) from 6 countries (Tunisia, Spain, Morocco, Egypt, Croatia, Sweden) attended in Hadrumetum Eco-Industries. The topics addressed include, Biological wastewater treatment , Textile wastewater treatment, Innovative technology Adsorption and biosorption techniques, Monitoring and control session.

The event was noticed and highly commented in the local press, on the one hand because of the momentum it has communicated and also the quality of researchers and public companies present.

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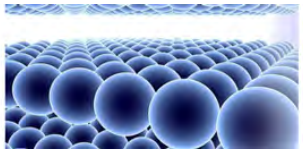

II WORKSHOP

I Workshop *Marrakech, Morocco*
May, 2012



Part 1: "Waste and water treatment technologies of social, economic and political interest", addressed issues such as: public policies of R&D. More than 80 participants discussed about the economic and social development; impact on the environment and impact on the health of the industry in general and in particular for the conventional, advanced and nano-based waste treatment industry

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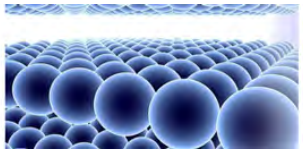

II WORKSHOP

I Workshop *Marrakech, Morocco*
May, 2012



Part 2: "Starting-up and managing companies in the field of Nano-based waste treatment technologies" was focused on innovative forms of promoting the creation of startup companies; evaluation of experiences in both regions, benchmarking of best practices,

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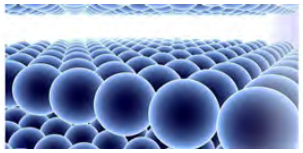

III WORKSHOP

II Workshop *WCI in Hadrumete, Tunisia*
November, 2012

Focus on **innovative aspects of Water Treatment and Waste Management**, presenting new technologies, describing the state of the art and related case studies, discussing the main controversial subjects, sharing experiences among different countries, valuating social and economical balances and launching a new projects

- International clusters. Waste Clsuter Initiative
- Regional cluster (Tunisia Water Cluster)
- Brookerage event

SOWAEUMED

Sustainable networking, permanent dialogue, specific cooperation activities

CAPACITY BUILDING

Reinforcing R+D infrastructure by upgrading or acquisition of selected equipment

Improve the S&T research capacities of MED centres to allow their promising activity to reach a good level in both scientific and technological results facilitating international collaboration on an equal-footing basis.

To learn more please visit our website:
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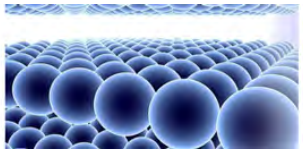
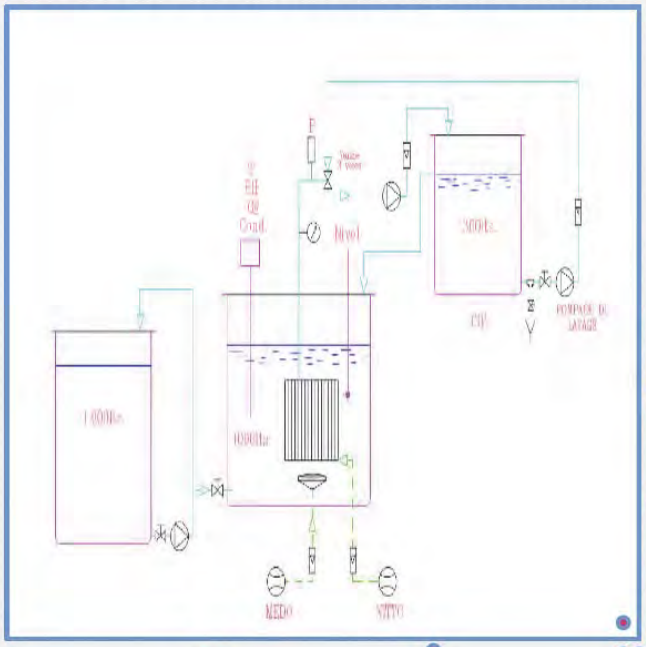
SOWAEUMED

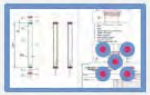
Sustainable networking, permanent dialogue, specific cooperation activities



CAPACITY BUILDING

Marrakech, Morocco R+D infrastructure by upgrading or acquisition of selected equipment





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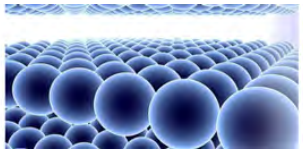
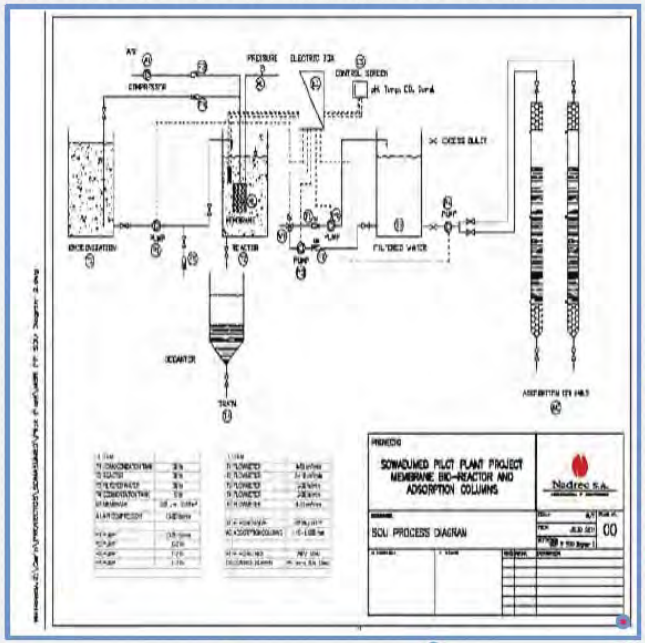
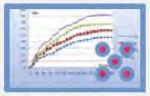
Sustainable networking, permanent dialogue, specific cooperation activities



CAPACITY BUILDING

Sousse, Tunisia R+D infrastructure by upgrading or acquisition of selected equipment



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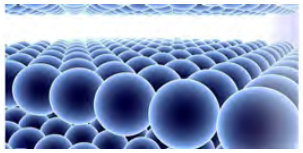

TRAINING

Enhance human resources through training and teaching activities

Specialised trainings of several PhD students and postdoc researchers from MED countries in EU laboratories; hosting experts; **scientific visits of senior** research staff. Participants, especially young researchers, were acquainted with EU norms on waste treatment technologies. Explore options for future research collaboration.

To learn more please visit our website:
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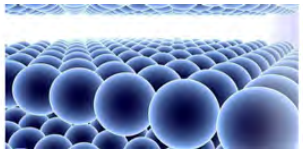
Sustainable networking, permanent dialogue, specific cooperation activities



TRAINING

Enhance human resources through training and teaching activities

FROM	TO	DATES	TYPE	DESCRIPTION
SOU	UAB	02/07/10 to 30/09/10	YOUNG RES.	**Nadia Chaïeb** Training in the field of analytical chemistry analytical techniques such as: HFSLM (Hollow fiber supported liquid membranes), liquid-liquid-liquid micro-extraction, HPLC analysis, Capillary electrophoresis, and molecular Spectrophotometer, including quality assurance protocols
RBI	UAB	02/09/10 TO 30/10/10	YOUNG RES.	**Jadranka Barešić** Training in the field of analytical chemistry, and application of measurement techniques, in tracing of environmental pollutants (trace elements) in soil and sediment samples, and data processing
UCAM	UAB	21/09/10 to 21/12/10	YOUNG RES.	**Moushine Esshaimi** Training on characterization of solid contaminants in soil and measurements in situ – identification of "hot spots" by portable XRF, and studying the influence of humidity of the sample and particle size to XRF measurements, also learning the ICP-MS
RBI	KTH	10/06/10 to 11/10/10	SENIOR RES	**Prof. B. Obelić** Acquaintance with the laboratory and discussion with dr. Abdusalam Uheida about the possible visit of a young researcher from RBI in 2012
RBI	KTH	07/06/10 to 11/06/10	SENIOR RES	**Prof. N. Horvatinčić** Dr.Abdusalam Uheida acquainted her with the application of nanoparticles and nanostructured materials in removal of toxic materials and pesticides
UAB	KTH	15/09/10 to 15/12/10	YOUNG RES.	**Diego Morillo** Training in the field of nanotechnology and its application in water treatment. The candidate has trained on the synthesis and characterization of nanostructured materials. SPION and SION functionalized with different functional groups were successfully synthesized in KTH laboratories. The candidate has training also on different characterization techniques such as HTEM, DLS, zeta potential and state-of-the-art-ICP.
UAB	KTH	15/09/10 to 15/12/10	YOUNG RES.	**Pilar Ortiz** Training in the field of nanotechnology and its application in water treatment/medical applications. The candidate has trained on the synthesis and characterization of nanostructured

4 senior and 10 young researchers exchanges

Improve human potential by organizing individual training short stages in advanced methods for waste treatment technologies. Training for MED partners **on advanced solutions for waste treatment based on nanotechnology and pilot plant functioning**

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SOWAEUMED

Sustainable networking, permanent dialogue, specific cooperation activities

E-LEARNING

Enhance human resources through training and teaching activities

A variety of learning activities and possibility to communicate through different tools like, **chats, lectures, online discussions (Forum), instant messaging, case studies, practical exercises, also offers multimedia sources** and interactive content that support learning progress, like photos, video and audio streaming.

To learn more please visit our website:
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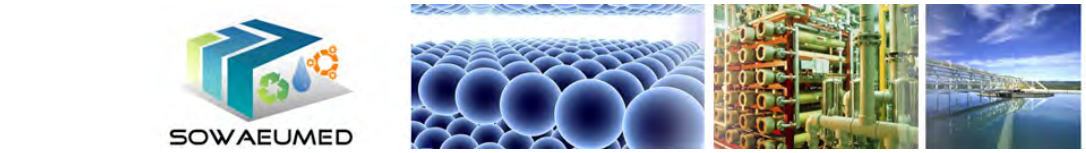
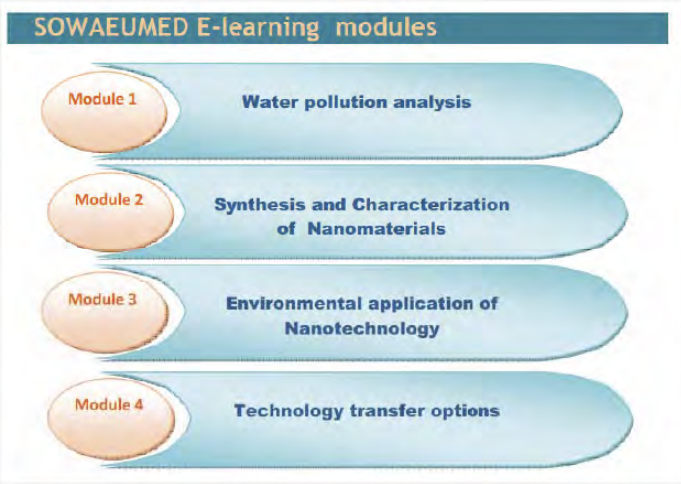


E-LEARNING

46 participants from *Morocco, Tunisia, Egypt, Jordan*



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DISSEMINATION

Research priorities, road maps and collaborative models to *impact* future S&T collaborative policies

- Promotional kit (logo, banner, poster, brochure)
- Periodic NL
- Own website and redistribution through others (ARABINNOVA)
- Cluster events (WCI, MIRA, SWEEP-NET , ANIMA, CITEC, ECO-TECH, CB-WR-MED etc..), assitance to workshops, conferences
- Press releases
- TV and radio interviews
- Continuous NCPs and policymakers contact

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SOWAEUMED CYCLE
This is how it finally works
Capacity Building
1
2
3
Case Studies
WORKSHOP
4
SOWAEUMED
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THANKS FOR WATCHING

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3. MAIN RESULTS

The main results achieved include:

- The corresponding Strategic orientation rounds (SOR) were performed in the established dates around summer 2010 within the SOWAEUMED partners with the goal of enabling each of the regions to express their strategic orientation at European level in order to better grasp regional communalities and differences. This exercise has contributed to the final objective of fostering mutual learning and cooperation between EU-MPC in terms of waste-related research projects. Additionally, such exercise has let to support SOWAEUMED project in underpinning its activities by an explicit strategic vision on the development of the involved region in the field water and wastewater treatment, making efforts to support the partner's willingness to submit further proposals under FP7 and/or other activities of the EU.
    - While a clear attack situation was observed for the MED partners, with a slight clean the ship situation for the SOU partner, in the EU area, the SOR analysis indicate a balanced situation that suggest that despite good opportunities have been identified there is a need to plan a strategy and be caution not to perform blind attacks.
    - The main strengths to enable to deal with the identified threats and benefit from opportunities were: UAB, patenting and publishing. KTH, Internationally recognized excellent R&D and experience in dissemination of R&D, training results by organizing conferences, seminars, workshops. RBI, Highly professional, skilled, motivated and internationally recognized scientists and well established team work within the laboratory. UCAM, reference university at Morocco and Maghreb being nationally and internationally recognized excellent R&D. NAD, Long experience in waste water treatment plants project design and implementation and high professional experience on Project management and work executions of industrial facilities. SOU, Large available surface land as well as young motivated and pre-specialized researchers and several collaboration experiences with European and African countries.
    - The most dangerous identified weaknesses were the following. UAB, insufficient budget for upgrading, maintenance or renewal of highly specialized equipment as well the lack of entrepreneurial potential to do business within the water sector and poor IP management. KTH, Low recruitment and retention levels of staff due to unattractive terms and conditions of employment. RBI, Lack of accelerator mass spectrometer (AMS) in Croatia (dating of milligram-sized samples) and Insufficient budget for upgrading and renewal equipment. UCAM, The reduced national budget for RTD and applied research and lack of equipment maintenance and upgrade. NAD, Lack of research and development department for new technologies and combination of technician personnel involved in current industrial works on the company with other projects. SOU, Difficulty of repair and maintenance of scientific equipment and no researchers working full time.
    - The most promising opportunities identified were: UAB, improve expertise in water and wastewater treatment (Nanotechnology), SMEs assessment, development of R&D project oriented to emerging sectors within water R&D, improving expertise in water and wastewater treatment (Nanotechnology) as well as the collaboration through CDTI (Centro de Desarrollo Tecnologico Industrial) in innovation based projects. KTH, multidisciplinary collaborations and synergisms with other EU research institutions and SMEs within water sector, flexible Research multidisciplinary research and SMEs assessment, development of R&D project oriented to emerging sectors within water R&D expertise. RBI, leadership in WBC (West Balkan Countries) in topics related to use of isotopes 14C and 3H. UCAM, multidisciplinary international collaborations as well the development of RDT projects in the field the priorities sectors like water and

waste. NAD, new co-operation and synergies with foreign institutions and industrial companies in international projects. SOU, co-operation with foreign institutions using international projects

- The main threats to be aware include: UAB, international competitors (China, India, Brasil), economical and training cost due to the continuous technological renovation, maintenance and upgrades as well as the difficulties in implementation of project results at decision maker level. KTH, national competitors and partial stability of young research staff, leading to high fluctuation of personnel and economical and training cost due to the continuous technological renovation, maintenance and upgrades. RBI, unpredictable changes in conditions for publishing in CC journals. UCAM, limited laboratory capacities. NAD, economic cost of equipment needed to develop research and solution implementation and lack of first-hand information on troubles to treat. SOU, reduction units and research laboratories for reasons of budget cuts

- In brief the SORs exercise reveal the need for further financial resources and knowledge resources in the MED countries as the main challenges to overcome in order to avoid the detected threats to become more threatening. At this point, is suggested to involve Regional/National policy makers to contribute with their understanding of local dynamics and their own communication channels in order to bring closer funds such as SF, ERDF and ESF, or in the case of the MPCs, funding instruments such as the ENPI and/or the Horizon 2020 initiative, to the regional actors as well as to the scientists at stake.

- As an answer to the SOR exercise, several fostering activities have been continuously carried out and updated through the different consortium meetings and SOWAEUMED partners participation in additional events (interaction with ERA-WIDE, BILAT, REGIONS or REGPOT projects) have been considered. As a result of them, SOWAEUMED has been able to become a member of the Tunisian cluster of water. The outputs of such meetings let to define topics of interest and the submission of several EU proposals, positively funded, were different members of SOWAEUMED consortium participate. Those projects funded include SUDSOE, STRAVAL, EULANETCERMAT, WATERBIOTECH, TREASURE 2, NORIA. Under evaluation, FP4BATIW, SOCLENAM. Additional submitted proposals unsuccessfully granted MULTIWATER, REACSOIL.

- As a result of the activities carried out by all partners, UCAM has compiled all the information and prepared the corresponding report on impact of social, cultural and economic factors on business innovation and models and mechanisms for EU/MED collaboration. The derived impact of the realized activities is an enhancement on cooperation between public research organizations and industry and a promotion of entrepreneurship of young researchers, training, coordinated public-private action and multilateral flagships projects and reinforcement of the inter-institutional among the operational leading EC players in the area. Further information can be observed in D2.3 Report on social and cultural impact. Such document includes a section where the procedures that the involved partners have followed in order to keep a constant contact with different stakeholders and involve them in the different events organized by the project are summarized. Such activities let the MPC partners to start gaining regional awareness on their activities. The document compiles a series of main lessons learned after the organization of the different events. A final summary with the main conclusions in terms of social, cultural and economic factors was provided within the corresponding deliverable.

- Within the different activities undertaken by SOWAEUMED, those providing research priorities regarding wastewater treatment enclosed in WP2 & WP6, let to conclude some recommendations. As a result of the organized events, promoting clustering in MED region where the main MA&TN stakeholders participated, it has been possible the development of partnership opportunities based on S&T Infrastructure and Innovation Knowledge within this

research area the results. Furthermore, several recommendations has let to consolidate defined future strategic collaborations and new joint activities and networking in the identified thematic area of NMP and ENV, sectors which are growing steady and fast in both Morocco and Tunisia. These recommendations are summarized below.

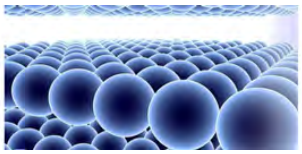
- S1. Setting realistic goals. Open and transparent communication about strategic goals, objectives and the scope of possible measures. This will be an important step to avoid unrealistic expectations and increase accountability of the cooperation. This can be achieved through organizing periodic activities in support of institutional strengthening and participatory wastewater management between MA&TN policy stakeholders and the DG Research (NMP&ENV) in order to determine the research areas/topics identified by the experts that correspond to most of the research priorities from both regions. Facilitate the engagement of Mediterranean Partner Countries in the EU Water Technology Platform (ex: Water Supply and sanitation Technology Platform). Linking Southern Mediterranean Countries' water strategy with the EU Water Framework Directive to improve quality of mutual EU-MPC cooperation and competitiveness in the water sector.
- S2. Linking research, technology enterprising and water users to enhance competitive research in water use efficiency, drought and flood management, non-conventional water use, water conservation, mitigation of salt intrusion in coastal groundwater and impact of desalination brine discharges to coastal environments. Identify the most appropriate MA&TN Institutions/Companies to be visited in the frame of future fact finding mission in order to develop the most relevant research areas/topics identified by the experts into potential call texts to be submitted to the EC as SMEs topics or coordinated calls. Consider research at both small scale community/catchment and water basin level (including transnational basins) addressed to the development of water multi-uses towards zero water discharge; applied socio-economics aimed at assessing how to induce technological, managerial and organizational-social changes and water cultural heritage as a basis for innovation and adaptation to water risks. Allowing the industry access to the knowledge relevant to its activity sector, at national and international level, to be able to detect challenges affecting their activity, such as the regulations evolutions. The industry should also benefit from the scientific infrastructures for their own control or monitoring needs.
- S3. Create operational synergies with political and multi-stakeholder processes on water in the region, like the Mediterranean Component of the EU Water Initiative, assisting to reach out to policy makers, a range of regional and national players as well as other related initiatives, processes and programmes that provide support to policy making. Organize fact-finding missions in the region to identify partners for joint cooperation, presenting relevant MA&TN institutions in wastewater treatment sector and encourage the participation in FP7 or H2020 projects.
- S4. Reinforce the dissemination of the financing opportunities opened by the Seventh Framework Programme for Research and Technological Development of the European Commission in the research areas/topics identified and start introducing those that will appear under the umbrella of future H2020. Organize during the first semester of 2013, open day events with the opportunities derived from H2020 concerning innovation and participation of SMEs, not only in Moroccan cities but also other important Tunisian cities. Important senior officials from CE should be invited to these events
- S5. Taking profit of the fact-finding missions, promote the presentation of the researchers and industries explaining, current advances, future perspectives, competitive advantages and common points of possible interactions with EU partners. Exploit any opportunity to appear during the participation in fact finding missions, workshops, seminars, etc… such as coffee breaks and lunches, for dedicated networking activities, and allow all participants to identify common research interests and if possible propose short time, medium-time and long-

time project collaborations. Boost round table experiences after the networking activities in the organized fact finding missions, workshops and seminars, with the aim of allow all participants to provide some conclusions about the discussions held during lunchtimes and coffee-breaks. Regional networking should be fostered as an effective way of enhancing synergies and allow concentration of efforts, know-how exchange, co-ownership and dialogue.

- S6. Enhance cross-Mediterranean joint learning and training of students and faculty in the area of innovation and entrepreneurship; support university reforms and the revision of curricula. Establish new career paths through excellence in applied research. Establish career and start-up promoting policies for firms and researchers to interact at an early stage. Facilitating the mobility of business and research people to places, companies or research institutions, where good practices of technological transfer or knowledge are used. Encourage participation of MA&TN research institutions in human resources capacitation projects such as FP7-PEOPLE through IOF (Int. Outgoing Fellowships for Career Development) – IIF (Int. Incoming Fellowship)– IRG – IRSES (Int. Staff Exchange Scheme) and foster acquisition of new knowledge, establishment of networks and increase institutional mobility. Capacity building including a wide array of actions such as organizational reforms, institutional strengthening, science-policy interfacing, training and networking, participative approach implementation. Capacity building has to be rationalized to reach researchers as well as public, private, NGOs and water users. Developing regional demand-driven innovation and entrepreneurship programmes that would engage the growing population of youth in the MPCs.
- S7. Promote the convergence of multidisciplinary projects including partners from ICT, NMP&ENV and Energy due to the actual EU prioritization. Support the creation of cooperation and financial partnerships among researchers, SMEs, investors, institutions active on water saving, water use efficiency, drought and flood management, unconventional water use. Strengthening trilateral financial synergies / co-funding (EU-MA&TN) in identified challenges. More research cooperation based on equal participation / co-ownership of EU and MPC researchers. In particular, a permanent ERANET type of action based on variable geometry could be established to ensure continuity of actions and commitments by Morocco, Tunisia and EU to achieve common water challenges. Increased support for multilateral cooperation targeted at increasing quality and quantity of high–potential start-ups. A tighter cooperation among financing institutions and instruments will create a critical mass of excellence and will help to create a leverage effect. Regional approach must be also considered for water management, including build of knowledge share and efficient transfer of mechanism for the use of research results at regional level, common monitoring/observatory mechanisms, technology share, water strategies/policies alignment.
- S8. Concerted collection of relevant innovation and technology data at the firm-level and research institutions in order to enhance the new R&D&I policy design in terms of water research. Identify national scientific and technological strengths water saving, water use efficiency, drought and flood management, unconventional water use and those subtopics of main potential national and international collaboration and possibilities of clustering, not only based on the scientific and technological experience and production but also on the available infrastructure and linking to industry. Promote partnerships to create conditions for competitive research in water use efficiency, use of non-conventional waters, risk management. Integrating research in local and regional clusters of relevant actors, stakeholders and final users. The participation of stakeholders in all aspects of water management is crucial to the successful uptake of research results and implementation of water policies. These partnerships must be able to promote (i) interface interaction between specialties and sectors leading to new approaches, tools and innovation; (ii) the integrated and sustainability aspects; (ii) collaboration between experienced and new teams for coaching and capacity building in cooperation.

- S9. Promote special pre-competitive research efforts to develop technology that can be used for a wide range of costs, management systems, scales and technological advances in the region. Holistic but competitive research and innovation in water quantity management and use efficiency, and management of non-conventional waters. For instance, pilot demonstrations and real case studies to substantiate pre-competitive research in the water sector in the region, with particular regard to develop income generating water saving and multi-use solutions and alternative at user level. Developing tools enabling replication and the scale up (regionalization) of successful pilot / demonstration actions. Increasing the sustainability of water technology and their adaptation to different socio-economic contexts and treated water uses. The dissemination of research results and the benefits for the societies from research mainly depend on two aspects: the quality of the (public) research institutions and the one hand side, and the interaction and communication between research institutions and the industry and political on the other.
- S10. Identify EU, Egyptian and Jordanian counterparts to propose selected potential projects leaded by MA&TN institutions and detect possible interested in joining them together with MA&TN partners. Invite them to assist future and periodic MA&TN Fact Finding Missions. Promote contacts with chambers of commerce such as EU Chambers in order to identify future calls where MA&TN SMEs could participate. Promote competitive research to enhance innovation in relevant water sectors (water use efficiency-productivity, system performance, non-conventional water, water risks, access to water)
- S11. Continue to deepen the above proposals, initiate or continue exchanges with other MA&TN institutions concerned and submit joint proposals where appropriate to achieve the synergies and continue contacts with European counterparts (Spanish National Research Council, Fraunhofer, Max Planck, National Research Council of Italy, Politecnico de Milano, Sapienza Universita di Roma, etc…) in order to achieve all definitions are possible before the arrival of the mission and that this is all successful than expected.

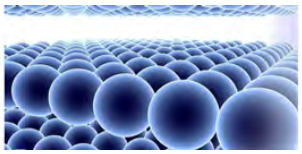
- SOWAEUMED intends to provide a reliable strategy which includes sufficient level of details to allow strategic partners to make informed use of it for their decision, in order to increase the Moroccan and Tunisian competitiveness in the NMP and ENV sector (in both academic and external collaborative terms). In addition, it is important to specify the assumptions underlying the significant data in the strategy and the timeframes (1-2 years) for the achievement of targets throughout the different strategic priorities. The provided strategy, offer actions for the future, and aims to support the decision of public policies regarding cooperation in EU-MED area, as well as to respond to economic pressures, political and environmental issues, market trends and technological trajectories that the Waste water sector will face in the future. The proposed strategy it is based on the analysis of findings, analyses, results and recommendations generated by different events held under the SOWAEUMED and Waste Cluster Initiative auspices. These strategy is based on the following pillars
    - Evidence-based identification of the common technological and socio-economic issues derived from wastewater treatment that the societies around the Mediterranean Basin are facing
    - Join forces to be able to tackle shared problems in real time
    - Enhance cooperation between EU members and enhanced collective capacity to achieve the cooperation objectives in terms of wastewater treatment
    - Establish joint research priorities in a transparent, aligned structure and simplified procedures to access the financial support for wastewater treatment research.
    - Active monitoring and detailed documentation of the performance and output of existing and promising solutions for wastewater treatment.



- Develop routine feedback mechanisms for learning from experience within the R&I in the wastewater treatment sector.

- The recommended actions and measures presented previously want to serve both as inspirations and as practical implementation ideas for the development of partnership opportunities based on S&T Infrastructure and Innovation knowledge between European Commission, the European, Moroccan and Tunisian governments, and for the main national and international stakeholders involved in S&T research in Morocco and Tunisia. Some adoption strategies are proposed that would allow taking the recommendations and considerations put forward by SOWAEUMED into account for future EU, Morocco and Tunisia Cooperation S&T in those identified as priority research areas. Depending on the level of readiness of the different actors as far as the adoption of each recommendation, two complementary and non-exclusive take-up possibilities were provided.

- Regarding fostering relationships involving policy makers as well as representatives from the scientific community, the private sector and other state actors at MED sub-regional level, such actors have been identified, contacted and new links has been established, opening new possibilities for future projects. Examples of such interactions are the activities carried out under WP2. Two case studies successfully organized.
  - The I Case Study concluded with up to 45 participants from Croatia, Bosnia and Herzegovina, Serbia, Slovenia, Italy, Spain, Morocco and Tunisia. The main topics addressed involve 1) Research of water and sediment in the Plitvice Lakes, (2) Investigations of water and sediment from other karst areas, and (3) Methods of purification of polluted waters. RBI staff demonstrated their research related to water quality with emphasis to parameters responsible for the processes of carbonate precipitation from natural water in the form of tufa barriers and possible contaminants that may affect these processes. Sampling of lake sediments on the boat in order to monitor changes in the lakes and in the surrounding environment in past was also demonstrated. Demonstrations were accompanied by explanation of experts who performed research on protection of the Plitvice Lakes.
  - The II Case Study, SOU assembled a team of researchers specializing in hydraulics and environment. Two masters were launched: A study on the hydraulics of the watershed of Oued Meliane was performed. Flows of water have a great influence on the movement of pollution. The case study was a great dissemination opportunity for the project SOWAEUMED as politicians; industrials, leaders in water and water treatment assisted the event. This was an exhibition that was visited by hundreds of people. The visit was carried out in company with officials of the National Agency of Environment Protection (ANPE) and the Regional Representative of the Ministry of Agriculture. Water samples were taken, and the participants visited the mobile laboratory of the ANPE and enjoy the quality of equipment for water analysis. This visit was followed by taking water samples from two other areas of the river Miliane still by of the ANPE staff. It was a great opportunity for students to see how the environmental authorities were doing their daily work to monitor pollution of the Oued. A visit to the laboratory in El Mourouj ANPE allowed being aware of important equipment available to this institution for water analysis and control of air. The day ended with a visit to the urban wastewater treatment station of Ben Arous rejecting the treated wastewater in the Miliane river. It is a biological station operated with activated sludge. The final day ended two events, workshops and case study by a special seminar on the subject of Wadi Miliane. In addition to students about thirty people were present representing various organizations such as: National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Management Agency (ANGed) ; Ministry of Health, Institute of Science Coastal Protection and Planning Agency (APAL and Technology of the sea interventions were many and varied: they concerned the analysis of the river, the environmental diagnosis, the degradation of



the marine ecosystem. Further information concerning this event can be obtained at D2.1 Case studies & workshops and D6.1 Newsletter, 3-4 issue.

- Three workshops which have been successfully organized.
  - The ECO-INDUSTRIES HADRUMETUM workshop on solid waste and water treatment took place from November 10th to November 12th,2011 in Tej Marhaba Hotel; Sousse (Tunisia). This workshop was organized by FP7 projects SOWAEUMED coordinated in Tunisia by Sousse University. It was a meetings space, interventions and fruitful discussions, both for Tunisian researcher's industrials and foreign participants. The objectives of this workshop were the innovative aspects of water treatment and waste management, introducing new technologies, describing the state of the art and case studies related, discuss key controversial issues, sharing of experiences among different countries. The opening session registered the participation of the principal Tunisian institutions involved in the environment activities like National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Management Agency (ANGed), National Society of operation and water distribution (SONEDE) , The Water Researches and Technologies Center of Borj-Cedria (CERTE), Faculty of Sciences of Monastir (FSM), Sfax Biotechnology Centre (CBS), Coastal Protection and Planning Agency (APAL), National Research Center and Materials Science Ecopark Borj Cedria (CNRSM). Five Tunisian companies (ANPE, ANGed, APAL, ONAS, SONEDE), presented their experiences, expertise and knowledge and discussed various topics such as technical assistance, the engineering and construction of water treatment plants (drinking water, wastewater), technologies and services for the treatment of industrial waste and hazardous waste, control equipment and measurement, etc More than 80 participants (researchers, engineers; specialists…) from 6 countries (Tunisia, Spain, Morocco, Egypt, Croatia, Sweden) attended in Hadrumetum Eco-Industries. The activities of this workshop were included in six themes as follow:
    - Biological wastewater treatment.This session offered the opportunity to take cognizance of progress in research on valorization and treatment of pollutants discharges, through the use of microorganisms these techniques are inexpensive and can be easily developed in Tunisia. The works presented in this session focused on the treatment of waste pharmaceuticals, textiles; cosmetics and wastewater purification.
    - Textile wastewater treatment. Different techniques of textile wastewater treatment have been presented during the workshop. Among these methods are cited: electrocoagulation, electrochemistry and UV irradiation.
    - Innovative technology Several innovations technological were presented during the workshop. These technologies are: Nanomaterials have gained considerable attention for applications in environment due to their small size and large surface area. Nanomaterials exhibit different physical, chemical, and biological properties that may not be predictable from observations on larger-sized material. Electrochemical methods offer an attractive and powerful alternative to traditional methods for treating waste water in situ thanks the involving of highly reactive oxidants. The development of a new reversible stabilization process will allow that the hides can be shaved before chrome tanning. As a consequence, an important ecological advantage will be achieved: the substitution of chrome shavings generated in conventional processes by the new white shavings generated in this new process. These new shavings can be used as raw material for gelatin production being a high added value product. Low cost inorganic products are extremely interesting in the field of the supported membrane because of their mechanical resistance,

chemical inertia, long working life and thermal stability. Research in this study is directed towards the exploitation of Tunisian clay minerals and synthesized zeolite.

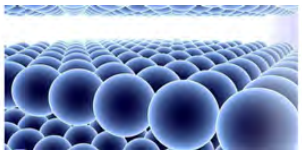
- General session. This session was dedicated to water in North Africa (Tunisia and Egypt), where the situation is becoming increasingly difficult due to a rapid increase in population and dwindling rainfall.
- Adsorption and biosorption techniques. Adsorption is a physico-chemical phenomenon by which molecules present in a liquid or gas become fixed to the surface of a solid at active site. Ten interventions were devoted to the presentation of perspectives and evolution of field of adsorption on activated carbon and biosorption on the surface of low cost natural biomass like Agave Americana, green algae; and other cellulosic fibres.
- Monitoring and control session. In this session, three presentations were focused on control and monitoring techniques of wastewater treatment. The first presentation was focused to the development and use of a methodology using hollow fiber supported liquid membranes for microextraction (named here Hollow Fiber Liquid Phase Micro-extraction, HF-SLM) to selectively separate and concentrate two organic compounds (catechin and rutin) from aqueous donor solutions, prior to its analysis by HPLC. The second presentation has operated the analysis of metal trace in drinking water by ICP Optic and has determined of oil and grease in water with a MID INFRARED spectrophotometer. The last presentation presented National Society of Operations and Distribution of Water SONEDE which has implemented a number of appropriate technical processes, in order to product drinking water with excellent characteristics starting from untreated water. The event was noticed and highly commented in the local press, on the one hand because of the momentum it has communicated and also the quality of researchers and public companies present.

- The second SOWAEUMED workshop supported by the FP7 SOWAEUMED project focused on the reinforcement of research links with leading universities, institutes and industrial companies in the Mediterranean countries in waste and water treatment technologies and promoting an efficient transfer of the generated knowledge to the industry. Sharing and discussing views and experiences on innovative technologies for solid waste and water treatment provided the opportunity to directly address the challenges of sustainable development. More than 100 participants (Scientists, policymakers, water and waste managers, operators, stakeholders representatives and NGOs) from Algeria, Belgium, Croatia, Ethiopia, Egypt, Germany, Morocco, Spain, Senegal, Sweden, Tunisia and Yemen attended the ITS2WAT-2012. This international workshop organized by the National Centre for Studies and Research on Water and Energy (University Cadi Ayyad), was a forum for exchange of best practices and knowledge transfer between Europe and Mediterranean countries with regards to the following topics:
  - Part 1: “Waste and water treatment technologies of social, economic and political interest”, was addressed issues such as: public policies of R&D, according to the economic and social development; impact on the environment and impact on the health of the industry in general, and in particular for the conventional, advanced and nano-based waste treatment industry;
  - Part 2: “Starting-up and managing companies in the field of Nano-based waste treatment technologies” was focused on innovative forms of promoting the creation of start-up companies; evaluation of experiences in both regions, benchmarking of best practices,

- The third SOWAEUMED workshop, WCI “ WCI in Hadrumete “ was held from 22 to 24th November and organized jointly by a Higher School of Sciences and Technology of Hammam Sousse (Sousse University),

the Laboratory of Energy and Materials. Such final meeting was expected to include the participation of other Waste Cluster Initiative members. Despite the different consortiums were invited, the members of WASTEKIT and STINNO were absents. All the partner from SOWAEULED, some partners of TEMP, the Water cluster of Tunisia; the SWEEPNET network; scientists from Med and EU countries and a variety of stakeholders from Tunisia: policymakers, regional economic development actors, waste and water management, sustainability, RTD, innovation entrepreneurship met together. The final meeting represented an excellent opportunity to meet, to present research activities and experiences and to discuss new concepts and technologies. The workshop focused on innovative aspects of Water Treatment and Waste Management, presenting new technologies, describing the state of the art and related case studies, discussing the main controversial subjects, sharing experiences among different countries, valuating social and economic balances and launching new projects, especially for the FP7-2013-INCO work programme within the R2ENPI call. The workshops included about 70 oral presentations in specialized sessions. In addition, several participants exhibit their technologies, products and equipment in the hall next to the conference room. This event was inaugurated jointly by the Director of the Higher School of Sciences and Technology of Hammam (Sousse university), the European commission and the partnerships: National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Managment Agency (ANGed), National Society of operation and water distribution (SONEDE), The Water Researches and Technologies Center of Borj-Cedria (CERTE), Faculty of Sciences of Monastir (FSM), Sfax Biotechnology Centre (CBS), Coastal Protection and Planning Agency (APAL), National Research Center and Materials Science Ecopark Borj Cedria (CNRSM), Chamber of commerce of Sousse (CCIC), National School of Engineer of Tunis (ENIT), CHIMITEX – Sidi Abdelhamid. Three Tunisian companies (ANPE, ANGed and ONAS), presented their experiences, expertise and knowledge and discussed various topics such as technical assistance, the engineering and construction of water treatment plants (drinking water, wastewater), technologies and services for the treatment of industrial waste and hazardous waste, control equipment and measurement, etc.). A successfully brokerage event was organized (Bilateral Contact: Researchers – Industrials). The intention of such event was to invite key stakeholders from Tunisia especially industrials to attract attention to the cluster activities, meet the scientists enhance awareness on opportunities offered and network in view of further projects to be built (seeking synergies). More than 100 industrials and researchers participated to this event, several contacts was realized between the participants.Further information can be obtained at D2.1 Case studies & workshops and D6.1 Newsletter, 4-6 issues.

- Transfer and exchange of know-how between EU-MPC has been accelerated and the potential of the MPC groups will be better exploited, especially through the key contribution of the involved SME. As an example, a continuous enhancement of consortium human resources has been carried out through training and teaching activities, under WP3. Once defined the rules and schedule for such activities, several exchanges have been performed during the project. 11 exchanges of young researchers have been completed, acquiring knowledge concerning advanced methods for waste treatment technologies, remediation and monitorization. In addition, 5 exchanges of senior researchers have been completed. The visits of senior staff let to detect some future opportunities for collaboration including alternative mobility schemes such as PEOPLE-IRSES and ERA-WIDE. The seniors' exchanges let to present 2 bilateral projects between UAB-UCAM and UAB-SOU to the AECID Spanish bilateral call for regional development. Finally, such exchanges let to further identify possibilities for exchange mobilities schemes, which have been identified and distributed between partners. The complete list of exchanges between institutions under the framework of SOWAEUMED is provided below.



- From RBI to KTH, 06/06/10 to 12/06/10, Senior researcher. Nada Horvatinčić and Bogomil Obelić. Acquaintance with the application of nanoparticles and nanostructured materials in removal of toxic materials and pesticides. Discussion about the possible visit of a young researcher from RBI
- From SOU to UAB, 02/07/10 to 30/09/10, Young res., Nadia Chaîeb. Training in the field of analytical chemistry analytical techniques such as: HFSLM (Hollow fiber supported liquid membranes), liquid-liquid-liquid micro-extraction, HPLC analysis, capillary electrophoresis, and molecular Spectrophotometer, including quality assurance protocols
- From RBI to UAB, 02/09/10 to 30/10/10, Young res., Jadranka Barešić. Training in the field of analytical chemistry, and application of measurement techniques, in tracing of environmental pollutants (trace elements) in soil and sediment samples, and data processing
- From UCAM to UAB, 01/10/10 to 31/12/10, Young res. Esshaimi Mohssine. The study of heavy metals contamination of soil by Using a portable X-ray fluorescence spectrometry , and ICP-MS , the influence of soil particle size and humidity on XRF performance
- From SOU to KTH, 29/11/10 to 3/12/10, Senior res. Ezzeddine Srasra. Define a subject of collaboration and internship for a young researcher in the field of nano-materials Synthesis for water treatment
- From UAB to KTH,15/09/10 to 15/12/10, Young res. Diego Morillo. Training in the field of nanotechnology and its application in water treatment. The candidate has trained on the synthesis and characterization of nanostructured materials. SPION and SION functionalized with different functional groups were successfully synthesized in KTH laboratories. The candidate has training also on different characterization techniques such as HTEM, DLS, zeta potential and state-of-the-art- ICP.
- From UAB to KTH, 15/09/10 to 15/12/10, Young res. Pilar Ortiz. Training in the field of nanotechnology and its application in water treatment/medical applications. The candidate has trained on the synthesis and characterization of nanostructured materials. The candidate has training on different characterization techniques such as HTEM, DLS, zeta potential and state-of-the-art- ICP.
- From SOU to NAD, 27/06/11 to 5/07/11, Senior res. Seffen Mongi and. Abdelaziz Baçaoui. Preparation of the design of the pilot plant Barcelona (NADREC). Design was made after several experiments in the Lab of INTEXTER (Pr Cgespi) and many visits to companies close to Barcelona.
- From UCAM to UAB, 01/06/11 to 30/09/11, Young res., Faissal Aziz. Impact assessment of pollution sources on water quality and human health through the characterization of bacterial diversity by a molecular approach.
- From SOU to KTH, 01/05/12 to 31/07/12, Young res. Kaouther Abderrazek. Photocatalytic degradation of indigo carmine using zinc oxide on polymer nanofibers
- From SOU to UCAM, UCAM, 16/07/12 to 15/08/12, Young res., Aida Kesraoui Abdessalem. Studying the performance of a pilot plant activated sludge automated by measuring : COD, BOD5, NO3-, NO2-, TKN, PO43-and PT.
- From UCAM to KTH, 01/03/12 to 30/04/12, Young res. Majdouline Belaqziz. Application of nanotechnology for treatment of contaminated water by heavy metals
- From UCAM toKTH, 01/09/12 to 31/10/12, Young res. Faissal Aziz. Application of natural clay nanocomposite in removal of inorganic contaminants from surface water
- From RBI to KTH, 23/09/12 to 22/11/12, Young res. Maja Ivanić. Fabrication of the nanofiber/nanoparticle composites for water treatment

- Such information was included within the guide on exchange possibilities. Further information can be obtained at D3.1 Reports of young researchers and senior staff and D 3.2. Comprehensive Guide to funding for research exchanges EU/MED.

- An e-learning course for nanotechnology learning and application has been organized, supported in a UCAM virtual platform. Among the 60 participants registered on the platform, only 46 participants were selected from Morocco, Tunisia, Egypt, Jordan. These participants presented the requested profile and have skills to follow the e-course Nanotechnology from Research to Applications in water treatment .The SOWAEUMED E-learning course was successfully followed by the participants from different horizons (researcher, pHD students, professors, managers).
    - Module 1: In a wastewater treatment plant, analyses are necessary for monitoring the effectiveness of the treatment processes. This module is dedicated to water contaminants and to different analytical methods to detect water pollution. This first module is supported by materials coming from University Autonome of Barcelona (UAB – Spain). The specific subjects of the Water pollution analysis module are: Lecture 1: Water pollutants. Lecture2: Water pollution analysis. Lecture3: Specific organic pollutants analysis (I). Lecture4: Specific organic pollutants analysis (II) – Gas and Liquid chromatography (GC- and LC). Lecture5: Specific organic pollutants analysis (II) – Gas and liquid Chromatography coupled to Mass spectrometry (GC-MS and LC – MS). Lecture6: Analysis of Families of compounds
    - Module 2: Define Nanotechnology and Nanomaterials, explain top-down and bottom-up approaches for Nanomaterial fabrication. The recent scientific and technology work in the nano world will be presented to demonstrate the potential of nanoscience and industrial applications of nanotechnology, identify and explore opportunities and uncertainties of nanosciences and nanotechnologies. The second and third modules are supported by materials coming from Royal Institute of Technology (KTH – Sweden). This module is focused on Instruments and methods of characterization and analysis of nanomaterials. The specific subjects of the Water pollution analysis module are: Lecture 1: Introduction to Nanotechnology. Lecture 2: Physical and chemical synthesis methods. Lecture 3: Analytical Atomic Spectroscopy Theory and applications (ICP-AES). Lecture4: Analytical Atomic Spectroscopy Theory and applications (AAS). Lecture5: Thermal Analysis Techniques (TGA – DSC – DTA). Lecture 6: Particle Size Measurements (DLS). Lecture 7: Particle Surface Charge: Zeta potential technique. Lecture 8: Basic of Transmission Electron Microscopy (TEM). Lecture9: Focused Ion Beam Scanning Electron Microscopy (FIB – SEM) Dual Beam System
    - Module 3: The focus of this module is to give a concise overview and update of research results in the field of application of Nanotechnology in wastewater treatment and remediation. The specific subjects of the Water pollution analysis module are: Lecture 1: Environmental application of Nanotechnology. Lecture 2: Application of Nanotechnology in remediation of contaminated Grounwater: A short review. Lecture 3: Use of iron oxide nanomaterials in Wastewater treatment: A review. Lecture 4: Emerging Nanotechnology for site remediation and wastewater treatment. Lecture 5: Pollution prevention and treatment using nanotechnology. Lecture 6: Adsorbents in water treatment technologies
    - Module 4: This fourth module is scheduled at the end of the three modules and is focused on Innovation and Transfer of know ledges and technologies processes.
- The required equipment for both pilot plants one for tannery waste water treatment (UCAM) and other for textile waste industry (SOU) have been identified as a response of the MED requests, becoming trained on the use of such pilot plants the human resources of MED countries during the design of such pilot plants. The required pilot plants have been designed, built and installed at UCAM and SOU.
    - The pilot plant installed at SOU facilities, is intended primarily for waste water discharges from textile industries. It has a demonstrative, educational and scientific character. The unit operates in dynamic mode with an average flow of 1 to 5 L / h. The treated water must respect the Tunisian standard NT 106-002. The

unit is based on the system of membrane bioreactor (MBR). The finishing process is done through two adsorption columns. The 13th November 2011 and in the presence of Euro-Mediterranean Students (three from Europe : Spain , Sweden , Croatia and twelve from Tunisia) tests of cleaning textile water discharges were made on pilot plant based at Higher School of Science and Technology of Hammam Sousse (ESSTHS). Tests conducted with wastewater originating from a dyeing industry of jeans located in the region of Sousse have shown high efficiency of membrane bioreactor. The unit is very flexible, as it could use the membrane bioreactor alone or coupled with activated carbon for finishing or photocatalysis with nanofibers.

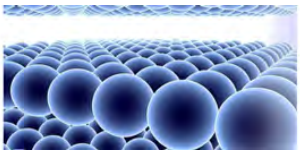
- The pilot plant installed at UCAM facilities is based on a membrane bioreactor system (MBR) coupled with adsorption columns were nanostructured material to be implemented in order to treat wastewater from tannery industry. An immersed membrane bioreactor (IMB) was employed for the cultivation of organisms collected from waste sludge of urban wastewater treatment. The reactor had a total volume of 1000 L. The mixed liquor (10gL−1) was only agitated by aeration, from a compressed air source through a diffuser in the bioreactor's base at a flow rate of 5 L min−1. The aeration rate was sufficient to maintain the dissolved oxygen concentration during cultivation, so growth was assumed not to be limited by oxygen. Membrane in a MF membrane (FP-T0008, 0,2µm, area 1m2 , TMP max 0,15MPa), the permeate rate between 12-18l/h. Several backwashing at different frequency and duration were tested to maintain a constant permeate flux. In order to give more flexibility to the use of the pilot unit, NADREC Company has also designed adsorption columns to be filled with nanofunctionalised fiber for a potential upgrading treatment. The fibers are based on Amidoxime-modified polyacrylonitrile nanofiber grafted to iron oxide nanoparticles and its application for the removal of metal ions from industrial wastewaters. The MBR pilot plant was installed and operated at CNEREE during the Second SOWAEUMED Workshop on innovative technologies for solid waste and water treatment which held in Marrakech from May 23 to 26, 2012. Further information can be observed on D5.1 Equipment as well as on D6.1 Newsletter, 5-6 issues.

- Derived from the SWOT analysis, the senior positions requested by MED partners have been described, defining and establishing the rules for selection. An initial identification of potential candidates started and despite the lack of funding for such positions, SOU started the recruitment of senior technicians for local companies involved in waste and water treatment business, becoming a contact point for future employment of trained specialists. In addition SOU have trained young technicians in waste water treatment, helping them finding employment and thereby strengthen the human capacity of companies in the field of waste water treatment. Further information can be obtained at D 4.2 Reports on the individual activity of contracted scientists.

- As a result of four on going EU-FP7 projects and due to one of the required tasks to be performed under the workpackage 6, the Waste Cluster Initiative was launched at the beginning of the project. Such initiative results as a consequence of addressing the major issues facing the EU and its partner countries and upholding economic growth, social responsibility and sustainable development in the field of waste management. Such initiative tried to involve different European Community funded research projects (WASTEKIT, StINNO, TEMP EU and SOWAEUMED) in an exchange of knowledge and experiences, learning from each other's strengths and weaknesses, defining regional strategies, investing in strengths through integral use of national and regional funding. The WCI as it stands was a 'genuine research-driven cluster' of cooperating regions with a strong emphasis on exchange of best practices and knowledge transfer. Due to the involvement of partners from the Mediterranean Partner Countries (MPCs), the cluster's main target was knowledge transfer from North to South to directly enhance

visibility of the MPCs in the cluster and prepare the grounds for their integration into the European Research Area (ERA).

- Initially, the WCI was composed of 4 projects with 43 partners funded under the Regions of Knowledge & Research Potential programmes. Participating countries are Morocco, Tunisia, Spain, Finland, Netherlands, Portugal, Bulgaria, Croatia, Greece, (Israel), Italy, Sweden and the United Kingdom. In order to contribute to the objectives of the WASTE-cluster, interested participants/clusters/networks, key stakeholders, managing authorities, scientific teams etc. could join anytime.
- Within the WCI, key stakeholders were working together in pursuit of regional economic development and the strengthening of the European Research Area (ERA). Following the logic of identifying similarities and complementarities among the participating projects' activities, the ultimate aim was to explore possible synergies among the projects in terms of concrete actions as well as in terms of funding opportunities with other European and local funding instruments. The Mediterranean Innovation and Research Coordination Action (MIRA project) financed by the FP7 programme "international cooperation" offered possibilities to realize complementary activities with the WASTE-CLUSTER initiative at various levels.
- Opportunities for benchmarking and exchange of best practices regarding strategies, structures and resources associated with technology transfer were seized in order to increase the efficiency of the proposed measures by the WASTE Cluster initiative to further enhance its visibility and impact. Further synergies were explored under the "Capacity-building" component of the Horizon 2020 political initiative. Its purpose was to support the implementation of Horizon 2020 through capacity-building and awareness raising activities. It equally promoted the integration of environmental issues in the policies of other sectors such as transport and energy.
- As a result of the activities performed by the participants in the WCI along the framework of the different projects, there are some outcomes at a macro level need to be assessed in the context of the overall policy and strategic objectives of the Commission with respect to the MPCs scientific, technical and innovation priorities as defined in their cooperation agreement and approved by the Joint Committee for the next years.
- As the activities of the project partners develop subsequent to the initial assessment being undertaken on their SWOT/SOR positioning, the progress being achieved at project level have been monitored and recorded. The project outcomes were used as building blocks to portray the activities and effectiveness of the Cluster as a whole. Due to the already critical mass in number of projects (4) and participants (43), the impact of this clustering activity has been enhanced, contributing to a higher visibility of the individual partners/projects, leading to a better integration of the participants from the MPCs into the ERA and enabling them to prepare more and better proposals to enhance their participation under FP7.
- In fact, SOWAEUMED partners participated in 2 projects proposals in FP7-NMP- 2011-SMALL-5 and NMP.2011.3.4-1 Eco-efficient management of industrial water together with other partners from WCI. In addition, UCAM contributed to the preparation of 2 EU future projects with partners from the WCI. Feedback on possible future collaborations between participating partners, potential R&D partners, industry and policy making bodies has been obtained and put into practice for future proposals.
- After the SWOT and SOR analysis focused on wastewater treatment sector and the EU&MPC cooperation that was realized during the Waste Cluster Initiative (WCI) events, it was possible to define the main SOWAEUMED axes of intervention. This SWOT exercise was realized considering the waste sector as a heterogeneous one, encompassing the various types of waste, the different treatment strategies such as disposal, recycling, valorization of waste streams, as well as the different parties involved, the different objective such as sustainability or performance or the environment goals. The focus was in line with those

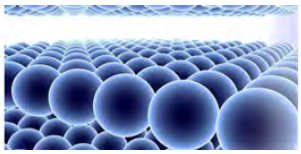


of regional economic development and strengthening the European research area, as well as the development of common actions responding to European funding opportunities.

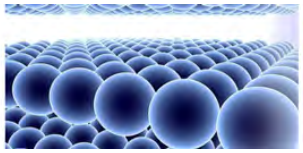
- The identified SOWAEUMED axes of intervention were in line with some of the different elements for a medium/long-term agenda, which in fact, are relevant to some HORIZON2020 goals such as excellent science, industrial leadership and societal challenges. These axes are summarized below.
  - Increase societal awareness and capacity building to support the implementation of adaptation measures to address a particular water risk under climate change.
  - Developing sustainable innovative technologies and concepts in water saving, water use efficiency, water productivity, use of non-conventional waters, water harvesting and conservation as options to mitigate risk and impact by climate change.
  - Institutional strengthening and participatory water management
  - Improving water sanitation to reduce water related diseases
  - Water pricing, cost recovery mechanisms and efficient water charge policies
  - Management of agricultural waters under scarcity conditions: sustainable land-use changes, alternative agricultural practices, water use efficiency and system performance, water productivity (water-plant-soil), use of unconventional waters (including wastewater reuse and related nutrients valorisation)
  - Technologies in water saving, water use efficiency, water productivity, use of non-conventional waters (including gray waters and treated wastewater reuse and related health issues), water harvesting and conservation, distribution system.

4. DISSEMINATION

- A communication plan has been designed as well the corresponding plan for dissemination and use that collects all the information being generated by the project. Such PDU has been distributed to the partners. Such PDU involve the branding, the material for information support (website, newsletter, brochure, presentations, etc), describe the target audiences, indicates the messages to disseminate, events to assist, etc. More than 35 events, included conferences, workshops, public talks, appearance on several websites not only at EU but also MPC level, interviews with journalist and press releases have become a dissemination output of SOWAEUMED. Further information is provided on deliverable D6.1 PDU.
- The main actions carried out are summarized as follows:
    - Participation in mass media and promotional activities, through periodic publication of press releases, organized press conferences, TV clips, radio messages and public lectures at both national and regional level. Such actions have been carried out encouraging the coverage of the organized events by public media involving the participation of local authorities, policy makers, SMEs, R&D institutions, users associations, chambers of commerce. The evaluation of such activities let to assess the impact of the project at both national and regional level.
    - Dissemination to a non-specialised audience. It was considered a key component of the project dissemination activities, and this is why during every project meeting specific sessions were devoted to this issue. This activity was composed of the following tasks; i) "Translation" of the project outcomes from scientific and specialist language to common language,; ii) Dissemination of the project outcomes to general audience, meaning that the articles above will be disseminated among the major newspaper and web magazines in EU and MPC. This "general public promotion campaign" was carried out in collaboration with networks that were mobilised during the project (some of which are normally referring also to non-specialised audiences), in order to make sure that all the possible channels were used for this activity.
    - Scientific achievements were disseminated to public and policy stakeholders by the HEIs. Through papers presented at conferences and published in technical magazines. Particular and fundamental science involved in the development of new water technologies was published in high quality, peer reviewed journals targeting scientific community.
    - Invitation to potential users of developed wastewater technologies, to discuss specific issues and to test the user friendliness of the developed technologies. All SOWAEUMED partners were involved in regional, national, or international activities, being possible the use of their developed and extensive networks to disseminate SOWAEUMED results to potential end users (Governmental, NGOs, and scientists).
    - Networking and cluster cooperation activities with existing actions and projects. The project worked to position itself among the many running mechanisms that aim to support scientific cooperation between Europe and MPC. For this reason, from the very beginning of the project a work on the database with the research projects and researchers currently funded at both EU and MPC level in the field of water treatment and management was done and contacts with identified projects was performed when appropriate. These actions, and others that the project performed during its lifecycle, represent natural multipliers of the SOWAEUMED results, messages and outcomes.
    - Collaboration with NCPs networks. To reach the highest possible number of researchers through the European networks of NCPs through the INCONTACT Platform. This means that when an important result or communication by SOWAEUMED was produced, these networks were activated to not only disseminate the news in their own national environments, but to do so in their national language and targeting the right national stakeholders.



- Employ the project events to increase the partnerships as well as community building. To guarantee a continuous "presence" of the project awareness rising and dissemination activities in the region, the organized workshops, annual project meetings, round events and participation in brokerage events were carried out. During each event a specific knowledge dissemination session took place to make sure that all the participating stakeholders were aware of the project aims, status and results, as well as a promotional component (promotion of H2020, involvement of new partners) and a community building one (validation of the issues, presentation of the water clusters community enlargement). These events covered different topics focused on improving mutual awareness of technological demands and scientific capabilities of MPC region in terms of water treatment technologies and to initiate partnerships between SOWAEUMED partners and external entities of private and public sector. As a result of the organized events an increase of SOWAEUMED network has occurred, being focused on more efficient water treatment technologies and possible formation of research-driven cluster with similar projects in the MPC region.



SOWAEUMD Newsletter

N° 1. May 2010

SOWAEUMED newsletter goals

The SOWAEUMED Newsletter has been designed and aims at promoting the project's results to interested users. It has multi-fold objectives

- Inform on recent and future SOWAEUMED activities and events,
- Summarize ongoing activities,
- Provide links to detailed material on specific subjects,
- Foster liaison with other related projects as well the WASTE CLUSTER initiative
- Disseminate and advertise the project" s results,
- Announce significant events (e.g. conferences) in the field of wastewater treatment

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SOWAEUMED (Network in solid waste and water treatment between Europe and Mediterranean countries) is a project co-funded by the European Commission in its 7th framework Programme under the Grant Agreement no 245843 running from 1st Dec. 2009 to 31st November, 2012.

The water scarcity problem

"Science and technology as well as human resources training can contribute to solve the severe water troublesome concerning the region"

African countries of the Mediterranean river basin located in a climatic zone with high intra-and interannual variations in precipitation are those ranked among the most threatened by the consequences of global warming. While the situation there has improved over the past 30 years, a deficient management of scarce water resources, threatened by pollution of increasing concern from various sources, contributes to aggravating the situation. The main four major problems affecting the water, its quality and treatment involve:

1. Proper research on the issues of climate change, water shortages and the development of new technologies for desalination, reuse of waste, water flows and transfers of water between areas
2. Gaps in regulations in the sectors of water and its treatment
3. Establish good practices in decentralization of the management of water and recycling, involving the private sector
4. Peoples' right to access to water in terms of quantity and quality

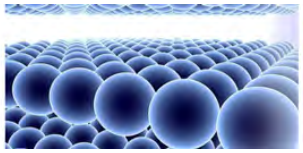
Regarding the considered pollution sources, those commonly involved are, uncontrolled dumping of domestic and industrial waste without any previous treatment affecting the aquatic environments quality, massive employment of pesticides and fertilizers affecting groundwater, high concentration of activities in confined spaces that generate pollution exceeding the power of self-purification of waters, accidental landfills often located on the banks of rivers, and rivers, already weakened by successive drying and water companies activities.

As an example, environmental studies carried out in Morocco,[1] manifest that the discharge of domestic and industrial wastewater into the environment without prior treatment, affects the potability of water in some basins. Of the 500 million cubic meters of wastewater discharged annually by households in urban areas, more than one quarter is simply released into the water or spread on the ground. The same trend is observed in the case of sanitation solid. Thus the 10,800 tonnes of household waste produced each day in urban areas; only 2% of waste collected are either recycled or put into landfill. The rest is discharged into the wild, contributing significantly to pollution of water resources. Moreover the increasing tourism pressure against hydric resources becomes a future key aspect to be solved. In fact The Observatory of Tourism in Morocco in its latest report, 2009, indicates that tourism in the country has registered 7.3 million foreign tourists in 2007, which means 10% compared to last year. Tourism is a key sector of the Moroccan economy and constitutes major foreign exchange earners for the Kingdom. In overall the situation reflects for the implementation of conventional and emerging wastewater treatment technologies in order to face the existing problem.

Furthermore, a deficient management of scarce water resources as well as waste management contributes to generate instable situations through the south Mediterranean region and increase social and economical problematic. Science and technology as well as human resources training can contribute to solve the severe water troublesome concerning the region (an extremely scarce good, so much in terms of quantity and quality) as well as the urban and rural waste treatment. However, RTD has to be complemented by upgrading the existing environmental legislation in order to solve the problem.

In short, MED countries current challenges focus on the protection of water resources through legislation and appropriate studies, the dangers associated with pollution caused by fly-tipping on the surface and its impact on groundwater, the implementation of effective technologies for treating wastewater, training and education on environmental pollution, the proper management of water resources and gain awareness of local people about the dangers of contaminated water on human and animal health.

Byl Gustavo Perez
UAB



Introduction to SOWAEUMED

By Gustavo Perez
UAB

Project goals

The SOWAEUMED project is a 3 years Coordination Action whose main goal is to establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU Member States (MS), Associated States (AS) and the Mediterranean Region States (MED), concerning the development and implementation of solid waste and water treatment technologies. The objective of this Coordination Action is to **put together and generate a stable sustainable bi-regional and integrated scientific platform of international excellence to collaborate in the development and implementation of new solid waste and waste water treatment technologies research in specific topics of interest between Member States, Associated Countries and Mediterranean Region Countries which will contribute to a threefold objective:**

- Create the optimal conditions in order to favor the establishment of a **sustainable networking, permanent dialogue, specific cooperation activities** and a communication flow, including dissemination activities of the priorities towards Mediterranean Partners R&D research entities and policy makers such as funding agencies, learned bodies and national science policy bodies to boost their scientific and technological research potential to allow a similar foot basis cooperation.
- Promote **interregional and intraregional cooperation key actions** concerning with the **identification of eventual difficulties, needs and long term priorities** to further strengthening the established relationships and looking for legal, administrative and financial solutions to these problems, based on a better knowledge of the scientific and technological systems on both sides, as well as a closer dialogue between EU and MED policy makers.
- Stimulate and support the **participation of MED region research stakeholders in future joint proposals at national and international level** such as FP7, with a first emphasis on the People Programme in order to enhance their human resources through training and teaching activities.

The consortium is coordinated by UAB, Autonomous University of Barcelona, and is composed of 5 partners, which have a multidisciplinary background and experience in supporting international cooperation in Science and Technology.

The consortium is a balanced group of expert institutions (3 from Europe and 2 from the MED region) with the following partners: KTH, RBI, NAD, UCAM and SOU.

"To establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU and MED region"

SOWAEUMED & WCI

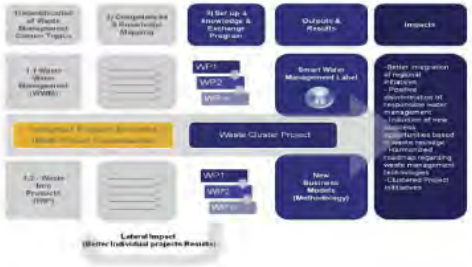
By Gustavo Perez
UAB

Synergies with the Waste Cluster Initiative

Within the WASTE-CLUSTER, the SOWAEUMED partners are working together in pursuit of regional economic development and the strengthening of the European Research Area (ERA). Following the logic of identifying similarities and complementarities among the participating projects' activities, the ultimate aim is to explore possible synergies among the projects in terms of concrete actions as well as in terms of funding opportunities with other European and local funding instruments. The Mediterranean Innovation and Research Coordination Action (MIRA project) financed by the FP7 programme "international cooperation" offers possibilities to realize complementary activities with the WASTE-CLUSTER initiative at various levels.

Opportunities for benchmarking and exchange of best practices regarding strategies, structures and resources associated with technology transfer could be seized in order to increase the efficiency of the proposed measures by the WASTE Cluster initiative to further enhance its visibility and impact. Further synergies could be explored under the "Capacity-building" component of the Horizon 2020 political initiative that will launch a regional support programme sponsored by the European Neighborhood Policy Instrument (ENPI) towards the end of 2009, early 2010. Its purpose is to support the implementation of Horizon 2020 through capacity-building and awareness raising activities. It will equally promote the integration of environmental issues in the policies of other sectors such as transport and energy.

"A genuine research-driven cluster of cooperating regions with a strong emphasis on exchange of best practices and knowledge transfer"



Impact

The outcomes from the WASTE-Cluster at a macro level need to be assessed in the context of the overall policy and strategic objectives of the Commission with respect to the MPCs scientific, technical and innovation priorities as defined in their cooperation agreement and approved by the Joint Committee for the next years.

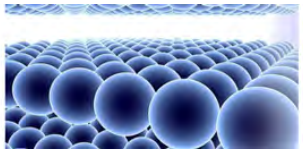
As the activities of the project partners develop subsequent to the initial assessment being undertaken on their SWOT/SOR positioning, the progress being achieved at project level will have to be monitored and recorded. The project outcomes then can be used as building blocks to portray the activities and effectiveness of the Cluster as a whole. Currently, these activities can not be funded due to a severe lack of support through the individual projects – efforts are ongoing to attract other funding sources to realise the objectives of the cluster and to establish 'synergies' in action with other on-going projects with a similar thematic and ambition.

Due to the already critical mass in number of projects (4) and participants (43), the impact of this clustering activity is awaited to be further enhanced, contributing to a higher visibility of the individual partners/projects, leading to a better integration of the participants from the MPCs into the ERA and enabling them to prepare more and better proposals to enhance their participation under FP7.

Who participates?

The WASTE-cluster is currently composed of 4 projects with 43 partners funded under the Regions of Knowledge & Research Potential programmes. Participating countries are Morocco, Tunisia, Spain, Finland, Netherlands, Portugal, Bulgaria, Croatia, Greece, (Israel), Italy, Sweden and the United Kingdom. In order to contribute to the objectives of the WASTE-cluster, interested participants/clusters/networks, key stakeholders, managing authorities, scientific teams etc. can join anytime.

SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

Message from a partner

By Manuel Valiente
UAB

Dear SOWAUMED partners,

This is the first SOWAEUMED newsletter, and as Coordinator of the Project and co-editor of this newsletter, I would like to take advantage of this first issue to write a few words for all the partners of SOWAUMED.

After the Kick-off meeting held in Barcelona, we are going to co-organize the First WASTE CLUSTER INITIATIVE meeting next January in Marrakech (Morocco), under the direction of Prof. Laila Mandi.

We are confident that this first edition of the WCI will be a great success, and will become an example for next events performed under the auspicicles of WCI. We are sure that this event will lead us to achieve one of the fundamental goals of our network, which is to motivate and stimulate relationships between EU and MED region within the frame of the conventional water and waste treatment technologies.

We believe that our partner from UCAM has done a good choice with the selected lectures and invited stakeholders, as they will treat issues of maximum interest in the field of water and waste treatment. We therefore expect a high number of registrations proceeding not only from the other projects involved in the WCI but also from private companies in both regions EU and MED.

It is necessary to highlight the importance of the brokerage event that will be held during the I WCI event, which should be used as an advanced tool dedicated for setting up new partnerships and for launching new collaborative project proposals. It is a way to strengthen the cooperation between EU region and research units and to give to European organizations a simple, direct and accessible way to find partners around MED region.

The preparation of each event takes several months, but the event itself needs two days, including plenary sessions, parallel workshops on specific areas, facilities for bilateral discussions. The brokerage event is an appropriate place for the participants to present themselves, to show each other's their expertise and their collaborative project ideas.

We hope that number of collaborations and common proposals involving SOWAEUMED partners will increase day by day and we will go on supporting the maximum mobility within the partners to assure it.

With kind regards,

Manuel Valiente
UAB

"The brokerage event is an appropriate place for the participants to present themselves, to show each other's their expertise and their collaborative project"

More information about both events will be published on our website. http://grupsderecerca.uab.cat/sowaeumed/

Next events

- I Waste Cluster Meeting. Marrakech. Morocco. **13-15/01/2010**
- Expert Consultation Workshop on Financing and Water in North Africa and the wider Mediterranean. Madrid. Spain. **24/02/2010**
- Union for the Mediterranean: The 3rd Meeting Water Expert Group. Madrid. Spain. **25/02/2010**
- International Water Exhibition: SMAGUA 2010. Zaragoza. Spain. **02-05/03/10.**
- The Water Forum for the EMA Region: "Environmental Protection and Water Management: Sustainable Cooperation and Know-How-Transfer in the EMA Region" Hamburg. Germany. **11-12/03/2010.**
- WIRE. Week of Innovative Regions in Europe. Granada. Spain. **15-17/03/2010.**
- Research, development and innovation, keys for a sustainable development in the Mediterranean. Tunis. Tunisia. **15/03/2010.**
- 4th MELIA Workshop: "Benchmarking Exercise & Recommendations on the Application of the Water Framework Directive" Amman. Jordan. **21-25/03/2010.**
- Integrated Water Resources Management and Challenges of the Sustainable Development. Agadir. Morocco. **24-26/03/2010**
- Cooperation for Waste Issues - The 7th International Conference on Solid waste, Sewage and Air emissions management. Kharkiv, Ukraine. **07-08/04/2010**
- The IV Euro-Mediterranean Ministerial Conference on Water. Barcelona. Spain. **13/04/2010.**
- 2nd Forum of Mediterranean Local and Regional Authorities meets ahead of UfM Summit. Barcelona. Spain. **02-03/05/2010.**
- Water Safety Plan Training in Morocco. Rabat. Morocco. **03-07/05/2010.**
- Workshop on innovative technologies on wastewater treatment and reuse. Marrakech. Morocco. **04-08/05/2010.**
- "Sharing the Costs for Sustainable Water Management" European Conference. Berlin. Germany. **10-11/05/2010.**
- The 5th International Conference on the Water Resources in the Mediterranean Basin, WATMED 5. Lille. France. **26-28/05/2010.**
- Micro pollutant and urban waste water treatment plants. Paris. France. **27/05/2010.**

Stay in touch & collaborate

The SOWAEUMED objective of promoting research excellence from the MED region towards Europe can be reached only through a direct mobilization of MED stakeholders. For this reason we kindly ask you to send us any news or events related to our interest, also the links or "research experiences" that you wish to see published in the SOWAEUMED website.

For any of this actions, please contact: Gustavo Pérez to the follow: Gustavo.perez@uab.cat

SOWAEUMED
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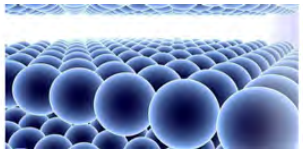

SOWAEUMD Newsletter

N° 2. December 2010

SOWAEUMED newsletter goals

The SOWAEUMED Newsletter has been designed and aims at promoting the project's results to interested users. It has multi-fold objectives

- Inform on recent and future SOWAEUMED activities and events,
- Summarize ongoing activities,
- Provide links to detailed material on specific subjects,
- Foster liaison with other related projects as well the WASTE CLUSTER Initiative
- Disseminate and advertise the project' s results,
- Announce significant events (e.g. conferences) in the field of wastewater treatment

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SOWAEUMED (Network in solid waste and water treatment between Europe and Mediterranean countries) is a project co-funded by the European Commission in its 7th Framework Programme under the Grant Agreement no 245843 running from 1st Dec. 2009 to 31st November. 2012.

The water scarcity problem

By L. Mandi
UCAM

"Finding solutions to various water related problems presents a complex challenge in our century."

According to a UN 2006 report, if global water consumption continues, by 2025 more than 3 billions of the world's 7.9 billion people will be living in areas where water is scare.

The Mediterranean is one of the Regions to be affected most by the climate change in the world, facing water problems such as scarcity, pollution, conservation, sanitation and management of resources. Water is a scarce commodity in most Mediterranean countries and its availability is declining to a crisis level. A unique feature of this area is that water is one of the limiting factors for sustainable development, increased quality of life, and peace.

Mediterranean countries share the following features and characteristics:

- Warm, sunny and mostly rainless climatic conditions during a relatively long summer and a rather long rainy season during autumn/winter and early spring.
- A general shortage of water, at least in certain regions of the respective countries.
- A threat of pollution to groundwater and surface water due to the lack of dilution, dispersion and flushing out- a consequence of the general shortage of water.
- Advantages in intensive agriculture (due to relatively warm and sunny climatic conditions) aimed at exporting of agricultural products to colder climate countries.
- Droughts, ranging from frequent to occasional, depending on the region. Multiyear droughts have been experienced in the Middle East and Southern Europe in the past two decades.
- Rapid population growth and significant consumptive demands, especially as a result of shifts from rural to urban areas.
- Trans-frontiers water dependencies, and challenging questions of overlapping political and administrative boundaries affecting shared water bodies.
- Tourism is one of the most important economical branches, and hard currency earner (in certain countries the entire economy virtually relies on tourism). Indeed, the number of tourists and visitors to Mediterranean countries is close to 200 million per year. Intensive high-level tourism requires a high standard of sanitation, safe drinking water, safe food (vegetables, fruits and seafood) and unpolluted bathing beaches.
- Relative susceptibility to sanitation-oriented disease outbreaks and even epidemics due to the warm climate, relatively high proportion of disease carriers and in certain areas the persistence of endemic diseases.
- Relative shortage of funds for both capital investments and operating costs in the public municipal sector.

Natural and renewable water resources are unequally distributed between Mediterranean countries with the rich North and the poor to extremely poor South and East. The hydrographic basins are broken up and also several basins are crossed by national borders, making the resource common to several countries. Furthermore, some considerable water volumes stored in large deep aquifers are non-renewable resources and their use is consequently not sustainable.
Water is a scarce commodity in most Mediterranean countries and its availability is declining to a crisis level. According to the World Bank (1996), Middle East and North Africa (MENA countries) is the driest region in the world with only 1% of the world's fresh water resources. The regional average annual per capita renewable water dropped significantly over the last 40 years from 3,300 m3 in 1960 to 1,250 m3 in 1995 and is projected to drop to 650 m3 in 2025. An increasing proportion of surface and groundwater resources in the region is polluted mainly due to inappropriate disposal of municipal wastewater, infiltration from onsite sanitation facilities, and excessive use of fertilizers and pesticides in agriculture. Due to severe shortages in agricultural water, reuse of wastewater has become unavoidable in many countries such as Jordan, Tunisia, Syria and Morocco.

Due to the water scarcity, water supplies are intermittent, unreliable and insufficient, and water consumption rates are still comparatively very low.

The management of water resources has the basic scope of balancing water availability (quantitatively and qualitatively) and water demand in space and time, at a reasonable cost and with acceptable environmental impacts. The mismatch of water availability and water need has a strong impact in on all aspects of water use mainly in Mediterranean region. Such impacts are: a) The necessity to build dams to store water in the wet season; (b) the need to transfer water from one basin to another; (c) the over exploitation of groundwater and increasing risk of sea water intrusion in coastal areas; and (d) finally, very strong effects on water quality and on water treatment requirements.

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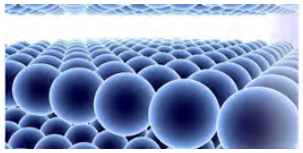
The challenge of water use and allocation is already a major political concern and will most likely amplify in the coming years. Integrated Water Resource Management (IWRM) is coming high on the policy agenda and affects people in their daily life. As the water resource is becoming scarce and/or is deteriorating, it becomes clear that plentiful water of good quality can no longer be free to all who desire to use it and a more in depth understanding of use of water resources and its consequences is needed.

Finding solutions to various water related problems presents a complex challenge in our century.

Prof. Laila MANDI

University Cadi Ayyad



SOWAEUMED case studies

By S. Obelic & S. Mangi
RBI & SOU

Case study 1

The first Case Study will be held in Croatia, Plitvice Lakes National Park at the end of May 2011, as the most suitable term for this study. The event will be organized by RBI (B.Obelic, N.Horvatincic). Members of the Laboratory

The whole karstic environment of Plitvice Lakes, including water, soil and air, is very sensitive to any kind of pollution. It is characterized by intensive calcium carbonate precipitation from the lake waters forming tufa barriers and fine-grained lake sediment. Although the National Park is protected area included into the UNESCO World Heritage list, and is scarcely populated, some contamination by local settlements, tourism activities and traffic is possible. Moreover, the lakes are located in mostly deciduous forest, and huge amount of leaves are transported into the lakes every year.

Any change in the lake ecosystem and its watershed caused by anthropogenic activity or even by natural processes could disturb the equilibrium between geochemical and biological processes responsible for tufa formation.

Demonstration will include isotopic and geochemical analyses of water and recent sediments in the Plitvice Lakes area to present the conditions for calcite/tufa precipitation, as well as to follow the changes in the Plitvice ecosystem reflected in the lake sediments in the last 200 years.

Case study 2

Will be held in Meliane river, Tunisia in month 18 organized by SOU (S. Mangi) and KTH (M. Muhammed).

The Meliane river dewaters the basin with its extent of 2,280 km2 and its length is 160 km. Its flow is about 50 million m3/year, with its capacity of solid substances at the level of 20,400 tons/year. Two waterworks (the El Kébir dam and the Bir M'chergua dam) built in the basin decreased substantially the amount of the floating debris as well as waters. The waters are polluted with draining of 50 % waste waters, especially at the lower watercourse stretch.

Demonstration of good practices implemented along the project, to populated areas in MED region affected by an intensive tourism activity and waste pollution, especially small villages.

Demonstration of applied emerging waste treatment nanotechnologies. Demonstration of knowledge transference efficiency through training and implemented nanotechnologies such as nanomesh, nanofiltration, nanofibrous filters, nano ceramics, clays and adsorbents or nanocatalysts.

The Workshop and Case study 2 that are both planned for M18 of the project, SOU proposes to held them together in the period 7 – 13 November 2011, in the same time as the 11th International Show of the Creativity and the Technological Innovation, which will be organized by the Sousse University (10 – 15 November 2011).

SOU partner disseminated the event as well the project activities during the last SWEEPNET project meeting as well as the CITEC 2010 congress.

"Case Study 1. Plivitce Lakes, Croatia. May 2011"

"Case Study 2 Meliane River, Tunisia. November 2011"

SOWAEUMED & WCI

By Gustavo Perez
UAB

"SOWAEUMED partners have collaborated with other WCI members by preparing project proposals, dissemination activities and contacting with other cluster initiatives"

New opportunities

During this period different activities of SOWAEUMED partners concerning the WCI have been performed such as collaboration for future proposal preparation, dissemination of the WCI activities, contact with other cluster initiatives. Search for interested partners in getting involved in the WCI.

In this sense some SOWAEUMED partners have started collaboration with other members of the Waste Cluste Initiative. As a result of the established contacts during the I WCI event held in Marrakech, different proposals have been submitted to the following calls:

- FP7-NMP-2011-LARGE-5 concerning Multi Sector On Line System for Smart Water Management
- FP7-NMP-2011-SMALL-5 dealing with the development of new adsorbent materials for a more efficient water treatment.
- FP7-ENV-NMP-2011 regarding sustainable application of nanomaterials for the conservation of fragile historic building fabric

Furthermore, as a result of an active participation of some partners of the WCI during the past ECOTECH 2010 meeting, held in Kalmar last November, and through the mingle meeting held during 25/11/10, new collaborations for future project proposals were settled. Such event manifest the need for the establishment of links and synergies between the Baltic Strategy and the future MED strategy based on an efficient use of the available funding a fact which was highlighted. ECOTECH 2010 included a brokerage event were the participants join in four alternatives ideas which were proposed concerning the following areas:

- Synergies between Olive Oil and Wood Industry
- Water and waste management in the Food Industry
- Waste into Products and Energy utilization
- Landfill mining and landfilling

In this case, some SOWAEUMED partners were involved in the preparation of a proposal in relation to the waste treatment of olive oil industry in the MED region.

Further opportunities have been detected during the last Food Cluster Initiative meeting, held in Ghent, last December. In such event, SOWAEUMED coordinator participates in order to disseminate the activity of the SOWAEUMED project defining the main aims and activities performed, as well the role of the partner's project. During the event the demands of different partners from the FCI concerning the valorization of their waste were identified. The potential transfer of the technologies involved in SOWAEUMED project, open the possibility of new project proposals concerning the citric industry waste valorization. In this sense, several potential partners from Spain, Montenegro and Turkey, were contacted in order to prepare a draft for a future proposal.

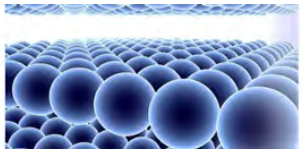
The event also provides information on alternative funding to enlarge networks and a better integration into further research networks and projects derived from cluster initiatives, such as EUREKA and COST funding alternatives. The organised workshops let to identify bottle-necks when collaborating actors from the triple helix model in a cluster initiative and how to solve them, as well as the definition of valuable indicators to evaluate the performance of clusters and a toolkit for practical handbook to better communicate smart ideas and enlarge the participants skills in marketing.

A WCI website will be available in the near future where the profiles of the participating partners and projects will be available for interested stakeholders, defining the aims of the clusters, and finally opening the possibility to join the cluster initiative to the interested actors of the triple helix model involved in the waste business, such as the Estonian Waste Cluster, the University of Padua or the Catalonian Waste Cluster.

Future events

Kalmar meeting also let to define the next WCI event to be held during March 2011 in Tunisia.

SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

Message from a partner

By Marco Arredondo
NAD

Dear readers,

First of all I would like to take advantage of writing these words to thank Manuel Valiente as a Coordinator of SOWAUEMED Project and all the partners having this opportunity of working together and develop this project.

We all set off this project one year ago and after this time we realise how much important our work is.

For us it is a great opportunity to be on a project like this. One of the most important things SOWAEUMED does is gathering a group of well-known research centres in order to apply technologies of the state-of-the-art in solving common problems in waste and waste water treatment in many countries.

Nowadays there are many industries causing important damage to environment in many countries and this project can not only develop and implement solutions but share knowledge and solutions between countries in terms of solving waste and waste water troubles.

SOWAEUMED bring all of us the capability of doing something against pollution and global warming in a real way by working in real industrial processes already working and having real cases of study to test and implement new and advanced solutions.

At the same time all these actions try to recover experience and information to train new researchers and implement a cooperation platform among scientists and industrial experts to disseminate the information with the objective of making easier to use it and spread knowledge as far as possible.

Nevertheless there are other important actions, as Dr. Valiente mentioned before, related with this project to bear in mind because of their importance. SOWAEUMED is a project under the WASTE CLUSTER where other EU projects are still working. It provides all of partners being in contact with other components of these projects sharing actions, interests and promoting synergies between them. All of this with the aim of searching new proposals to set off new projects in the future continuing EU action on waste and other important issues related to environment protection.

Eventually, including companies and industrial experts on these projects another goal is aimed to be reached. It is giving sustainability to research projects in economic terms looking industrial investments on technology implementation on the market of the solutions found and with this the implementation of all our work in a real world solving real troubles.

Being part of this project rewards our work with a feeling of doing something good for not only find solutions but spread and share them as well in a sustainable way for the future.

With best regards,
Marco Arredondo
NADREC, S.A.

"Being part of this project rewards our work with a feeling of doing something good for not only find solutions but spread and share them"

More information about both events will be published on our website. http://grupsderecerca.uab.cat/sowaeumed/

Next events

- Climate & River Basin Management Symposium 201. Oulu. Finland. **17-20/01/2011.**
- Workshop on Science and Data Gaps in EU Water-Related Projects. Geneva. Switzerland. **12-15/01/2011.**
- International Training Program on Seawater Desalination. Larnaca. Cyprus. 01-**04/02/2011.**
- The 4th International Symposium on Water Resources and Sustainable Development. Algiers. Algeria. **22-23/02/2011.**
- The International Fair for Efficient Water Management: EFIAQUA - The Situation in Mediterranean countries and the Strategy for Water in the Mediterranean. Valencia. Spain. **16-18/02/2011.**
- WasteECo-2011 The International Exhibition and Conference "Cooperation for Waste Issues". Kharkov. Ukraine. **23-25/02/2011.**
- 15th International Water Technology Conference Alexandria. Egypt. **30/03/2011 – 02/04/2011.**
- SCENES Final Conference - "Future Waters for Europe" Budapest. Hungary. **22-25/03/2011.**
- Water and Environment 2011: CIWEM's Annual Conference. London. UK. **06-07/04/2011.**
- Development of Desalination Technology for Social Responsibility. Portofino. Italy. **16-18/05/2011.**
- Water Security for Policy Makers and Practitioners: short course 2011. UEA Norwich Campus. UK. **23-27/05/2011.**

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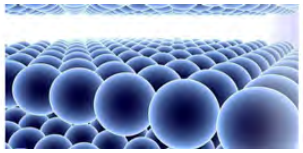
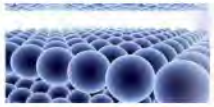


SOWAEUMD Newsletter

N° 3. May 2011



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The Tunisian textile industry case

By S. Mongi
SOU

"Current problems in Tunisia on water scarcity, it is essential to find ways to reuse water discharges from this sector and new technical to minimize water consumption."

The textile industry comprises two main types of activities:

- The mechanical activity (spinning, weaving ...).
- The textile finishing or finishing. This activity includes the operations of bleaching, dyeing, printing and finishing.

When we talk about pollution in the textile sector, the finishing is first in line. On the one hand it's an industry that consumes large quantities of water in various stages of processing the material and secondly it is characterized by diversity:

- Treated fibres (natural, synthetic, artificial)
- Processes dyes (off, scarf, Jiggers, autoclave, roller printing, frames ...).
- Chemicals used.

Contrary to the washout area, the water quality in the field of textile finishing is very important, especially in dyeing operations. Indeed, their structures, dyes can bind to the salt content in water and lose efficiency. This will inevitably lead to higher consumption in the industrial dyes and simultaneously generate a higher pollution. Thus, we can see from the surveys conducted among professionals in this sector that the majority of them use water from SONEDE (National Society of water Distribution)

Knowing the price of m3 of water (1,500 DT) and the current problems in Tunisia on water scarcity, it is essential to find ways to reuse water discharges from this sector and new technical to minimize water consumption.

The daily consumption of these 30 companies is 7502 m3 / d. From these data, we note that the waste companies ((No. 1 and No. 14) represent 53.3% of the total water consumption. Apart from these two companies, which are most important in Tunisia, all other industries have dyes in water consumption between 50 and 400 m3 / d.

A major problem of textile finishing sector is the diversity of chemicals used in the different stages of treatment of the fiber. In addition, chemicals and dyes used in this area can serve as raw materials for other industries such as the preparation of paints, tanneries, food ... etc...

PURIFICATION TECHNIQUES FOR TEXTILE WASTE WATER IN TUNISIA

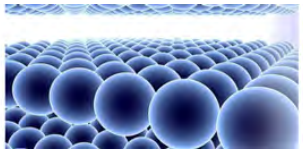
- 60% of manufacturers are equipped with treatment water station.
- 30% are planned (the study is completed and filed with the ANPE (Environment National Protection Agency)
- 10% are not equipped with a station and have not made any study.

For industrial station equipment or project the method of effluent treatment is the type physico-chemical and is virtually the same for everyone. The treatment regimen includes the following:

- Screening and de-sanding.
- Homogenization and Oxidation: 84% of manufacturers are equipped with a pool of homogenization.
- pH regulation: 78% of industrial adjust the pH of the effluent.
- Coagulation: 45% of adding coagulants industrial effluents. These products allow you to cancel the repulsive forces of colloidal particles. The most often used coagulants are aluminium sulphate.
- Flocculation: The coagulation step is usually followed by flocculation operation. This is done by adding the effluent of flocculants agglomerate colloids unloaded and hence constitute particles that settle out more easily. We note 67% of adding flocculants to their effluent. This shows that 12% of industrial flocculants added to the effluent bypassing the step of coagulation.
- Decanting. This will separate the treated water sludge. 78% of industry has a decanter.
- Biological treatment: 11% of manufacturers have incorporated a biological process with physico-chemical treatment of water discharges.
- Finishing process: To completely eliminate the colour and the residual COD, adsorption by activated carbon is the best but expensive method.

Prof. Seffen Mongi

University of Sousse, Tunisia





SOWAEUMED e-learning

By Prof. Laila Mandi
Cadi Ayyad University-Morocco

CONCEPT

Nanotechnology and Nanosciences concerns the development and production of materials, objects or machines at nanoscale. It's a key technology that helps to improve a large number of applications in the environmental field, like water desalinisation or wastewater filters.

Because of the unique properties and potential of nanoparticles applications in the fields of energy, health and agriculture, many scientists may perceive nanotechnology as a 'gold solution' to solve a number of problems in developing countries. We note that many countries in the world invest significant amount of budget in Nanotechnology studies and researches. The current online course is designed to respond to such challenges by developing skills in Nanotechnology for research groups in educative institutions and for industrials and socio-economic actors.

This e-learning course for nanotechnology learning and application take a part of the SOWAEUMED project. This e-learning proposal for Nanotechnology learning will focus its effort to improve and transfer knowledge and know-how about nanonotechnologies and nanosciences to the participants using different technological tools, learning methodologies and contents developed by SOWAEUMED partner, which are supported in a UCAM virtual platform.

OBJECTIVES

This online course on Nanotechnology applied to Water, Energy and Health will enable participants to:

- Develop a common understanding of basic concepts of nanoscience and nanotechnology applied to water, Energy and health;
- Become familiar with instruments and methods for nanotechnology;
- Enhance the university researchers, industrial and socio-economic actors skills in the fields of nanoscience and nanotechnology, this e-learning course are specially designed to their needs.

METHODOLOGY

The SOWAEUMED e-learning proposal for Nanotechnology learning offers a variety of learning activities and possibility to communicate through different tools like, chats, lectures, online discussions (Forum), instant messaging, case studies, practical exercises, also offers multimedia sources and interactive content that support learning progress, like photos, video and audio streaming. Also allow the design, build and scripting of 3D objects, where the participants can use nanotechnology virtual laboratories and nanostructures in virtual way. Lab area will provide a space that gives a wide variety of laboratory activities, experiments and interaction in various areas of Nanotechnology. Initially we are understanding of the building some interactive experiences for knowledge and understanding of the nanostructures. With the tools offered in this space, we are looking that the learner can participate through dialogs, interactive structures and other elements that makes easier to the user have a closer experience with nanotechnology. A 3D tools increases user interactivity with the nanostructures and greater interest in the way of presenting the content.

The courses will be a balance between theoretical and practical inputs, giving participants the opportunity to apply in practice what they learned in theory. Exchanges and learning among participants and their trainers will be supported. Training courses are designed to be highly interactive and dynamic.

The courses will be facilitated by Nanotechnology and Nanosciences researchers and experts from the UCAM, the KTH and UAB. The trainers will support participants in a systemic way and respond to their questions and requests on a regular basis via e-mail or discussion forums. For well progress of the training courses, participants must have a good Internet connection and email access.

SOWAEUMED & WCI Case study I Plivitce Lakes

By Bogomil Obelic
RBI- Croatia

Case Study I

Laboratory for Measurements of Low-level Radioactivity (^{14}C and ^{3}H Laboratory) of the Rudjer Boskovic Institute in Zagreb, Croatia, organized a Case Study dedicated to professionals and students from the countries-partners and neighbouring countries at the Plitvice Lakes National Park in Croatia from 29 May to 1 June 2011.

Unlike the problems of pollution and the removal of solid and liquid wastes from urban or industrial areas, which is the main focus of the Waste Cluster Initiative, the first Case Study has been performed on the protected karst area of Plitvice Lakes National Park in Croatia (29 May – 1 June, 2011). Although the National Park is protected area included into the UNESCO World Heritage list, the pollution affected by intensive tourist activity is possible. Any change in the lake ecosystem and its watershed caused by anthropogenic activity or even by natural processes could disturb the equilibrium between geochemical and biological processes responsible for tufa formation. Very low amounts of contaminants can irreversibly affect the ecological balance, so the presence of these contaminants should be constantly monitored.

Besides the participants in the project SOWAEUMED, the workshop was attended also by scientists and students from the Croatian institutes and universities(including some RBI co-workers), as well as from Bosnia and Herzegovina, Serbia, Slovenia and Italy, either as speakers or listeners to lectures, all together 45 participant. Program of lectures was divided into three sections: (1) Research of water and sediment in the Plitvice Lakes, (2) Investigations of water and sediment from other Karst areas, and (3) Methods of purification of polluted waters. Lectures were held in the morning during the three days, and the field trips to the lakes were organized every afternoon. During the field trips the RBI staff demonstrated their research related to water quality with emphasis to parameters responsible for the processes of carbonate precipitation from natural water in the form of tufa barriers and possible contaminants that may affect these processes. For this purpose different geochemical and isotopic analyses have been used. Sampling of lake sediments on the boat in order to monitor changes in the lakes and in the surrounding environment in past was also demonstrated. Demonstrations were accompanied by explanation of experts who performed research on protection of the Plitvice Lakes.

The meeting of the Steering Committee of the Project was also organized in order to discuss the results achieved during the first 18 months of the Project, and the goals to be achieved during its second half.


In situ measurements at Lake Prošće


Preparation for sediment sampling at Lake Kozjak


Participants of the Case Study I below the Great Waterfall

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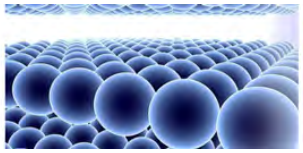

SEVENTH FRAMEWORK PROGRAMME

Message from a partner

By Abdusalam Uheida
KTH-Sweden

Dear readers,

As we are approaching our 2nd year in this project I would like to express my sincere gratitude to our coordinator Manuel Valiente and project manager, Gustavo Pérez for their commitment and ongoing efforts in ensuring this project bridge the research community and governmental sectors to better serve and protect the environment. Also, I would like to thank all the partners for their collaboration and service to each other and their respective colleagues.

The importance of this project is designed to build and sustain an ongoing network between the EU and Mediterranean countries in order to address and develop solutions to environmentally related issues.

To sustain life, clean freshwater is needed by humans for personal hygiene, irrigation, industry, and recreation. Due to current world crisis the amount of available freshwater is decreasing. In addition, much of the available freshwater is being contaminated with harmful elements such as heavy metals, fertilizer, and gasoline, which are then carried to the streams, rivers, and eventually into the groundwater, lakes, and oceans of the world. The importance of clean water, coupled with its scarcity due to over-use, climate, and pollution, has resulted in increased concerns about water quality and quantity. These concerns are what have inspired me to do the work I am currently doing at KTH Functional Materials Laboratory in Sweden.
A segment of our research activities is directed in the area of Nano-Environment by focusing on the use of nanoparticles in environmental clean-up including water purification and treatment of waste water. Nanoparticles can be very suitable for water treatment due to their high reactivity and a very high surface to volume ratio; they can be up to 1000 times more efficient than conventional ion exchange resins for the removal of dissolved species form water streams. Nanoparticles can be used either in the form of pristine or surface modified for specific interaction. Electrospun nanofibers and nanocomposite is another area of interest. The research is focusing on the fabrication of functionalized polymeric nanofibers (nanocomposite fibers) by the incorporation of nanoparticles into organic polymer. The research aims at the use of nanoparticles and nanocomposite materials in applications such as selective adsorption, removal of toxic compounds, and catalysis.

Applications of nanomaterials in environmental protection have created conditions to improve environment protection and control of pollution. Using applications of nanomaterials such as green chemistry, photo-catalytic degradation of organic pollutants, remediation of polluted soils or water, pollutant sensing and detection to solve environmental issues will become an inexorable trend in the future.

With my best regards
Abdusalam Uheida
Functional Materials, KTH

Collaborating in this project provides me a unique opportunity to utilize my knowledge and share with other partners by addressing realistic solutions capable of meeting the present Global environmental challenges.

More information about both events will be published on our website. http://grupsderecerca.uab.cat/sowaeumed/

Next events

- Surface Water Management: The Developing Picture and Key Lessons, London, United Kingdom. **14/06/2011**
- International Conference on Sustainable Management of sewage sludge and biowaste, Valencia, Spain. **16/06/2011 - 17/06/2011**
- IASWS 2011: 12th International Symposium on the Interactions between Sediments and Water, Dartington, Devon, England, **19/06/2011 - 23/06/2011**
- The International Training of Trainers on Wetland Management, 2011, Wageningen, Centre for Development Innovation, Netherlands, **20/06/2011 - 08/07/2011**
- VI International Symposium: Water Engineering and Management in a Changing Environment, Catania, Italy, **29/06/2011 - 02/07/2011**
- UNESCO-IHE Regular Short Course: Watersned and River Basin Management, Delft, The Netherlands. **04/07/2011 - 22/07/2011,**
- 2011 World Water Week, Stockholm, Sweden, **21/08/2011 - 27/08/2011**
- International forum for water: "Water, source of life or conflicts in the Near and Middle East", Pavillon Dauphin, Paris, France. **29/09/2011**
- WaterMed 2011, Milano, Italy. **05/10/2011 - 07/10/2011**
- JIA 2011. 2nd Spanish Water Engineering Symposium, Barcelona, Spain. **05/10/2011 - 06/10/2011**
- International Conference on Integrated Water Resources Management of Water in a Changing World: Lessons Learnt and Innovative Perspectives, Dresden, Germany, **12/10/2011 - 13/10/2011**
- CIWEM International Event 2011: Water Management in Europe, Lille, France. **12/10/2011 - 13/10/2011**
- Regional Preparatory Meeting in the Arab Region, ESCWA and partners, Cairo Egypt. **18/10/2011 - 20/10/2011**
- The first International Conference on Water and Environment-WATEIC-2011- , Marrakech, Morocco. **26/10/2011 - 29/10/2011**
- 7th Algeria Electricity & Water Expo 2011, Algiers, Algeria, **14/11/2011 - 16/11/2011**
- The 3rd International Symposium "RE-WATER", Brunswick/Germany, **21/11/2011 - 22/11/2011**
- WATEC Israel 2011, Tel Aviv Exhibition Center, Tel Aviv, Israel, **15/11/2011 - 17/11/2011**

Stay in touch & collaborate

The SOWAEUMED objective of promoting research excellence from the MED region towards Europe can be reached only through a direct mobilization of MED stakeholders. For this reason we kindly ask you to send us any news or events related to our interest, also the links or "research experiences" that you wish to see published in the SOWAEUMED website.

For any of this actions, please contact: Gustavo Pérez to the follow: Gustavo.perez@uab.cat

SOWAEUMED
COORDINATION & SUPPORT ACTION

Contact details

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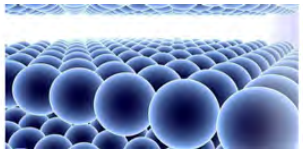

SOWAEUMD Newsletter

N° 4. January 2012

SOWAEUMED newsletter goals

The SOWAEUMED Newsletter has been designed and aims at promoting the project's results to interested users. It has multi-fold objectives

- Inform on recent and future SOWAEUMED activities and events,
- Summarize ongoing activities,
- Provide links to detailed material on specific subjects,
- Foster liaison with other related projects as well the WASTE CLUSTER Initiative
- Disseminate and advertise the project' s results,
- Announce significant events (e.g. conferences) in the field of wastewater treatment

This issue is devoted to the II Case study held in Tunisia

Table of contents

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SOWAEUMED (Network in solid waste and water treatment between Europe and Mediterranean countries) is a project co-funded by the European Commission in its 7th Framework Programme under the Grant Agreement no 245843 running from 1st Dec. 2009 to 31st November, 2012.

International Workshop. Hadrumetum Eco-Industries

By A.Kesraoui; B.Ben Tiba ; M.Seffen SOU

"Innovative aspects of water treatment and waste management, introducing new technologies"

The ECO-INDUSTRIES HADRUMETUM workshop on solid waste and water treatment took place from November 10th to November 12th in Tej Marhaba Hotel; Sousse (Tunisia). This workshop was organized by FP7 projects SOWAEUMED coordinated in Tunisia by Sousse University. It was a meetings space, interventions and fruitful discussions, both for Tunisian researcher's industrials and foreign participants.

The objectives of this workshop were the innovative aspects of water treatment and waste management, introducing new technologies, describing the state of the art and case studies related, discuss key controversial issues, sharing of experiences among different countries.

This event was inaugurated jointly by The Seretary state of the Ministry of Agricultural and Environment Pr Salem Hamdi, Pr Najeh Farhat Director of School of sciences and Technology of Hammam Sousse (Sousse University), Pr Seffen Mongi Local Coordinator of the SOWAEUMED project and the main coordinator of SOWAEUMED project Pr Manuel Valiente. This openning session enregistred the participation of the principal Tunisian institutions involved in the enviroment activities like National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Management Agency (ANGed), National Society of operation and water distribution (SONEDE) ; The Water Researches and Technologies Center of Borj-Cedria (CERTE), Faculty of Sciences of Monastir (FSM), Sfax Biotechnology Centre (CBS), Coastal Protection and Planning Agency (APAL), National Research Center and Materials Science Ecopark Borj Cedria (CNRSM).

Five Tunisian companies (ANPE, ANGed, APAL, ONAS, SONEDE), presented their experiences, expertise and knowledge and discussed various topics such as technical assistance, the engineering and construction of water treatment plants (drinking water, wastewater), technologies and services for the treatment of industrial waste and hazardous waste, control equipment and measurement, etc ...

More than 80 participants (researchers, engineers; specialists...) from 6 countries (Tunisia, Spain, Morocco, Egypt, Croatia, Sweden) attended in Hadrumetum Eco-Industries. We can share the activities of this workshop in six themes as follow:

Biological wastewater treatment

This session offered the opportunity to take cognizance of progress in research on valorization and treatment of pollutants discharges, through the use of microorganisms these techniques are inexpensive and can be easily developed in Tunisia. The works presented in this session focused on the treatment of waste pharmaceuticals, textiles; cosmetics and wastewater purification.

Textile wastewater treatment

Different techniques of textile wastewater treatment have been presented during the workshop. Among these methods are cited: electrocoagulation, electrochemistry and UV irradiation.

Innovative technology

Several innovations technological were presented during the workshop. These technologies are:

Nanomaterials have gained considerable attention for applications in environment due to their small size and large surface area. Nanomaterials exhibit different physical, chemical, and biological properties that may not be predictable from observations on larger-sized material.

Electrochemical methods offer an attractive and powerful alternative to traditional methods for treating waste water in situ thanks the involving of highly reactive oxidants.

The development of a new reversible stabilization process will allow that the hides can be shaved before chrome tanning. As a consequence, an important ecological advantage will be achieved: the substitution of chrome shavings generated in conventional processes by the new white shavings generated in this new process. These new shavings can be used as raw material for gelatin production being a high added value product.

Low cost inorganic products are extremely interesting in the field of the supported membrane because of their mechanical resistance, chemical inertia, long working life and thermal stability. Research in this study is directed towards the exploitation of Tunisian clay minerals and synthesized zeolite.

General session

This session was dedicated to water in North Africa (Tunisia and Egypt), where the situation is becoming increasingly difficult due to a rapid increase in population and dwindling rainfall.

Adsorption and biosorption techniques

Adsorption is a physico-chemical phenomenon by which molecules present in a liquid or gas become fixed to the surface of a solid at active site.

Ten interventions were devoted to the presentation of perspectives and evolution of field of adsorption on activated carbon and biosorption on the surface of low cost natural biomass like Agave Americana, green algae; and other cellulosic fibres.

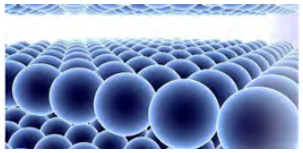
Monitoring and control session

In this session, three presentations were focused on control and monitoring techniques of wastewater treatment.

The first presentation was focused to the development and use of a methodology using hollow fiber supported liquid membranes for microextraction (named here Hollow Fiber Liquid Phase Micro-extraction, HF-SLM) to selectively separate and concentrate two organic compounds (catechin and rutin) from aqueous donor solutions, prior to its analysis by HPLC.

The second presentation has operated the analysis of metal trace in drinking water by ICP Optic and has determined of oil and grease in water with a MID INFRARED spectrophotometer. The last presentation presented National Society of Operations and Distribution of Water SONEDE which has implemented a number of appropriate technical processes, in order to product drinking water with excellent characteristics starting from untreated water.

The event was noticed and highly commented in the local press, on the one hand because of the momentum it has communicated and also the quality of researchers and public companies present.



SOWAEUMED

SEVENTH FRAMEWORK PROGRAMME

The Workshop «HADRUMETUM ECO-INDUSTRIES» was followed by the case study II which started Sunday 13th November in the High School of Science and technology of Hammam Sousse. Note that the case Study I was held in Croatia at the Plitvice Lakes National Park from 29 May to 1 June 2011 and organized with great success by the Low-level Radioactivity (14C and 3H Laboratory) of the Rudjer Boskovic Institute in Zagreb. The organization of these case studies is part of the SOWAEUMED project tasks.

Case Study Objectives:

Demonstration of good practices implemented along the project, to populated areas in MED region affected by an intensive tourism and urbanism activity and waste pollution, especially small villages.

The case of Miliane River was chosen as a site to study and protect:

The Miliane wadi or wadi Miliane is a river running out in the North-East of Tunisia; on a distance of 160 kilometers, which makes of it the second longer river perennial of the country after Medjerda

- It takes its source in Djebel Bargou, culminating to 1 280 meters, and throws in the gulf of Tunis between the towns of Radès and of Ezzahra It has a catchment area of 2 283 km² in a relatively sprinkled medium (400 to 450 millimetres of annual precipitations) and is joined by the Kébir wadi (upstream) and the Wadi El Hamma (downstream).

- Its flow is irregular, being able to reach 200 m³ a second at the time of raw, but it belongs to the rare rivers of Tunisia with flow maintained during the summer, as recalled by the Arab etymological direction, Miliane meaning "full".

- It is characterized by a strong alluvial load, evaluated with 25 grams per liter what corresponds to 1,5 million tons of carted sediments each year. This made it possible to fertilize the plain of Mornag.

To protect this river it is important to control the liquid and solid waste that is dumped.
These discharges must comply with Tunisian standards NT106-002.

But we must also provide companies and wastewater urban stations treatment by new technologies which should be reliable and inexpensive.

That's what case study II showed in this case study by transfer Technology between Euro-Mediterranean countries. In the presence of Euro-Mediterranean Students tests of cleaning textile water discharges will be made on pilot plant based at Higher School of Science and Technology of Hammam Sousse. As well as water analysis of Oued Miliane will be conducted on selected sites of the river.

Pilot Plant Unit (13th November)

NADREC company with help of INTEXTER (Barcelona) and collaboration of Sousse University and Cadi Ayyad University (Marrakech) designed a pilot plant using a membrane system coupled with adsorption using traditional supports such as activated carbon and other more original as biomass, modified clays and nanomaterials .

In the presence of Euro-Mediterranean Students (three from Europe: Spain , Sweden, Croatia and twelve from Tunisia) tests of cleaning textile water discharges were made on pilot plant based at Higher School of Science and Technology of Hammam Sousse (ESSTHS). Tests conducted with wastewater originating from a dyeing industry of jeans located in the region of Sousse have shown high efficiency of membrane bioreactor.

SOWAEUMED
II Case study. 13-15/11/11. Hammamet

By A.Kesraoui ; B.Ben Tiba ; M.Seffen
Sousse University

The operation of the pilot plant has been well explained to participants by Marco Arredondo (Nadrec) and Mohammed Lourimi (Scientific and Industrial Equipment). Students also were able to observe the water analysis before and after treatment like (COD ,Conductivity ,pH ,dissolved oxygen). They have seen the efficiency of this mode of treatment, because the water coming out of the membrane is very clear, the quality complies fully with current standards.

The quality of the treated water obtained with the membrane bioreactor is slightly higher than the obtained by applying the classical activated sludge system followed by a tertiary process of coagulation flocculation. Additional advantages of the membrane bioreactor are that it takes much less space than the conventional alternative and sludge production is much lower. The quality of treated water with system is sufficient to allow partial recycling of the treated water in the textile industry.

SOWAEUMED
II Case study. 13-15/11/11. Hammamet

By A.Kesraoui ; B.Ben Tiba ; M.Seffen
Sousse University

Pilot plant demonstration

Pilot plant based at Higher School of Science and Technology of Hammam Sousse (ESSTHS)

Laboratory in El Mourouj ANPE, water analysis

Visit to Oued Miliane River (14th November)

The visit to the Wadi Miliane started in Hammamet. The first step was the Zaghouan water temple that symbolized the power for the empire of Romans because it allowed them to bring drinking water from the high mountains of Zaghouan (800 m) until Carthage. It was built between 117 and 138 years AJC at the time of the Roman Emperor "Hadryanos." The "Wendal" have failed and then they have been rehabilitated by the Muslim king Almostanser Billah El Hafsi on the end of 13th century. It was connected with the park of Ras Tabia, the gardens of Ariana and the Zitouna Mosquet (Tunis).

The program continued with the visit of the dam of Bir Mcherga; it's the main one on the Miliane one. Dam Bir Mcherga is on the Miliane river, it opened in 1971. It's located at about 47 km southwest of Tunis and 35 km from the Gulf of Tunis, where the river flows. It takes the name of the town of Bir Mcherga nearby. The dam has a height of 43 meters and a crest length of 1300 meters, it can hold up to 130 million cubic meters of water in a reservoir with an area of 705 hectares.
It is dedicated to controlling the flow of the river Miliane to protect the plains south of the city of Tunis against floods. The visit was carried out in company with officials of the National Agency of Environment Protection (ANPE) and the Regional Representative of the Ministry of Agriculture. Water samples were taken, and the participants visited the mobile laboratory of the ANPE and enjoy the quality of equipment for water analysis.

Zaghouan : Water temple

Bir Mcherga Dam. Sampling of water

The stage after was a visiting of the ruins of the Roman city of Tuburbomajus which is very close to the banks of the river Miliane. It is located roughly 60 km southwest of Carthage on a major African thoroughfare. This thoroughfare connects Carthage to the Sahara. Other towns along the way included Sbiba. Romans started to build Thuburbo Majus in 27 BC.

Visit of the Roman Tuburbomajus Town

This visit was followed by taking water samples from two other areas of the river Miliane still by of the ANPE staff. It was a great opportunity for students to see how the environmental authorities were doing their daily work to monitor pollution of the Oued. A visit to the laboratory in El Mourouj ANPE allowed being aware of important equipment available to this institution for water analysis and control of air. The day ended with a visit to the urban wastewater treatment station of Ben Arous rejecting the treated wastewater in the Miliane river. It is a biological station operated with activated sludge;

Oued Miliane river water sampling

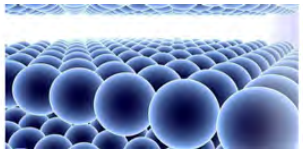
Workshop of the 15th November (Mouradi Beach; Hammamet)

The final day ended two events, workshops and case study by a special seminar on the subject of wadi Miliane. In addition to students about thirty people were present representing various organizations such as: National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Management Agency (ANGed) ; Ministry of Health, Institute of Science Coastal Protection and Planning Agency (APAL and Technology of the sea interventions were many and varied: they concerned the analysis of the river, the environmental diagnosis, the degradation of the marine ecosystem.

Urban wastewater treatment station of Ben Arous

Some points of Wadi Miliane studied by ANPE. Release of wastewater treatment station, exit to the sea

SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

Message from a partner

By Aida Kesraoui
ESSTHS – Tunisia

Dear readers,

I would like to thank everyone who helped make of our workshop and the case study II a great success: organizers, speakers, partners and participants. Memorable days, of what to do, full of motivation and enthusiasm for the continuation of our projects.

Besides the pleasure to know the participants of different country (Tunisia, Spain, Morocco, Egypt, Croatia, and Sweden) and other guests, there was an appropriate balance between technical and scientific interventions.

I thank also NADREC and ESI Company, INTEXTER (Barcelona), Sousse University and Caddi Ayyad (Marrakech) for their contribution to the realization of a pilot plant. In fact, this pilot uses a membrane system coupled with adsorption using traditional supports such as activated carbon and other more original as biomass, modified clays and nanomaterials.

Wastewater textiles consist of a mixture of many different chemicals: compounds easily biodegradable, hardly biodegradable (recalcitrant) and non-biodegradable. Our pilot plant is able to treat this wastewater in the textile sector with their different compounds.

In other hand, the pesticides are considered to have persistency and toxicological effects on the environment. As a matter of fact, the pollution of surface waters and groundwater by pesticides has increased sharply in the last years, and presently it constitutes a major pollutant problem due to an extensive use of these substances. In order to decrease their negative impacts on the environment, the pilot plan can be used to remove the pesticides from wastewaters. This pilot may be efficient as it is formed by membrane system and adsorption on activated carbon that are particularly attractive due to its out-standing performance and easy handling. This work will allow me to continue my research works on the pesticides treatment.

In fact, during my works phD, The "advanced oxidation processes" (AOPs) process were used for the pesticide degradation in aqueous medium. The methodology of experimental research has been used to study the influence of some parameters (initial concentration, current intensity and processing time) on the rate of degradation and to determine the optimum conditions for mineralization.

I cannot forget the visit of Miliane River who combined the useful to the agreeable. Also, the visit of Zaghouan water temple and the ruins of the Roman city of Tuburbomajus allowed us to appreciate the cultural richness, the daily life and the real face of this region. On the other hand, the visit of the dam of Bir Mcherga, the laboratory in El Mourouj ANPE and the urban wastewater treatment station, was an opportunity to see how:

- taking water samples from areas of the Miliane river,
- to analyze water and control air in each region of Tunisia,
- to treat wastewater by a biological station operated with activated sludge.

Finally, I hope that the Euro-Mediterranean Students have benefited a sharing of knowledge and experience. I wish them a good continuation in their researches.

With my best regards
Dr. Aida Kesraoui

It's a great pleasure and honor for me to collaborate in the project SOWAEUMED it give me the opportunity to know a very interesting researchers from different countries and improve my knowledge in waste water treatment. I hope that the equipment of our Laboratory in Higher School of Sciences and Technology by the pilot plant will allowed us to be involved in other Euro-Mediterranean projects.

More information about both events will be published on our website.
http://www.sowaeumed.eu

Next events

- 2nd meeting of the SPI-Water FP7 cluster Brussels. Belgium. **23/01/2012**
- The 5th International Perspective on Water Resources & the Environment (IPWE 2012). Marrakech. Morocco. **05-07/01/2012**
- Training Course : "O&M of Water Pumping Stations". Amman. Jordan. **22-26/01/2012.**
- Water Node International Research & Operation in the EU: The Water Challenge. Brussels. Belgium. **25-27/01/2012.**
- International Symposium on Water and Wetlands in the Mediterranean. Agadir. Morocco. **06-08/02/2012.**
- WaterWorld Middle East Conference- "Changing Water Solutions in Challenging Times". Qatar. **06-08/02/2012.**
- 2nd International Conference and Exhibition on Sustainable Water Supply and Sanitation (SWSSC2012). Cairo. Egypt. **27-29/02/2012.**
- 6th World Water Forum 2012. France. **12-17/03/2012.**
- WasteECo-2012 Cooperation for Waste Issues: International Exhibition and Conference. Ukraine. **28-30/03/2012.**
- Water & Environment 2012 CIWEM'S ANNUAL CONFERENCE. London. United Kingdom. **20-21/03/2012.**
- 3rd IWA Specialized Conference on Water and Wastewater Technologies in Ancient Civilizations. Istanbul. Turkey. **22-24/04/2012.**
- Conference and Exhibition on "Desalination and the Environment": Clear water & energy. Barcelona. Spain. **23-26/04/2012.**
- 3rd European Water Conference. Brussels. Belgium. **24-25/05/2012.**
- SWEEP-Net - 2nd Regional Forum on Integrated Solid Waste management. Marrakech. Morocco. **15-17/05/2012.**

Stay in touch & collaborate

The SOWAEUMED objective of promoting research excellence from the MED region towards Europe can be reached only through a direct mobilization of MED stakeholders. For this reason we kindly ask you to send us any news or events related to our interest, also the links or "research experiences" that you wish to see published in the SOWAEUMED website.

For any of this actions, please contact: Gustavo Pérez to the follow: Gustavo.perez@uab.cat

SOWAEUMED
COORDINATION & SUPPORT ACTION

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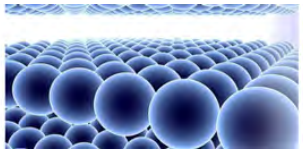
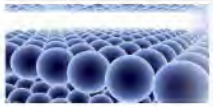


SOWAEUMD Newsletter

N° 5. June 2012



SOWAEUMED newsletter goals

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- Inform on recent and future SOWAEUMED activities and events,
- Summarize ongoing activities,
- Provide links to detailed material on specific subjects,
- Foster liaison with other related projects as well the WASTE CLUSTER Initiative
- Disseminate and advertise the project' s results,
- Announce significant events (e.g. conferences) in the field of wastewater treatment

This issue is devoted to the II SOWAEUMED Workshop held in Morocco

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SECOND SOWAEUMED WORKSHOP

ITS2WAT-2012
23-26 May 2012, Marrakech

"Innovative Technologies for Solid Waste and Water Treatment
"Exchange of best practices and knowledge transfer between Europe and Mediterranean countries"

A deficient management of scarce water resources as well as waste management contributes to generate instable situations through the south Mediterranean region and increase social and economic problems. In addition, production in the industrial and agricultural sectors contributes to pollution of the air and water and the generation of solid and hazardous wastes.

Science and technology as well as human resources training can contribute to solve the severe water troublesome concerning the region as well as the urban and rural waste treatment. However, RTD has to be completed by upgrading the existing environmental legislation in order to solve the problem.

The Second SOWAEUMED Workshop on Innovative Technologies for Solid Waste and Water Treatment, ITS2WAT-2012 aimed to reinforce research links with leading universities, institutes and industrial companies in the Mediterranean countries in waste and water treatment technologies and promoting an efficient transfer of the generated knowledge to the industry. Sharing and discussing views and experiences on innovative technologies for solid waste and water treatment will provide the opportunity to directly address the challenges of sustainable development.

The IT52WAT-2012 organized by the National Centre for Studies and Research on Water and Energy (University Cadi Ayyad) with the collaboration of SOWAEUMED consortium, was a forum for exchange of best practices and knowledge transfer between Europe and Mediterranean countries with regards to the following topics:

Part 1: "Waste and water treatment technologies of social, economic and political interest", addressed issues such as: public policies of R&D. More than 80 participants discussed about the economic and social development; impact on the environment and impact on the health of the industry in general and in particular for the conventional, advanced and nano-based waste treatment industry;

Part 2: "Starting-up and managing companies in the field of Nano-based waste treatment technologies" was focused on innovative forms of promoting the creation of startup companies; evaluation of experiences in both regions, benchmarking of best practices.

The workshop was inaugurated jointly by Pr Janah Saadi, Vice President of the University Cadi Ayyad; Pr Manuel Valiente, Coordinator of SOWAEUMED Project (University Autonoma of Barcelona) and Pr Laila MANDI, Director of the National Centre for Studies and Research on Water and Energy (University Cadi Ayyad) and Chair of ITSWAT-2012.

Opening ceremony of ITS2WAT-2012

More than 120 persons have participated in the workshop. The event was attended by scientists as well as policymakers, water and waste managers, operators, stakeholder's representatives and NGOs together with students from Algeria, Belgium, Croatia, Ethiopia, Egypt, Germany, Morocco, Spain, Senegal, Sweden, Tunisia and Yemen.

The program of the Workshop was started by two opening conferences:

1) Eco Innovation, Eco Conception: An efficient way to sustainable development and environment protection, done by the keynote speaker Pr Mohamed Tahiri, UNCHAIN- University Hassan II, Morocco Mohamed TAHIRI

2) Potential of Nanoparticles for environmental applications, done by the keynote speaker Pr. Mamoun Muhammed, KTH, Sweden who is also member of SOWAEUMED consortium.

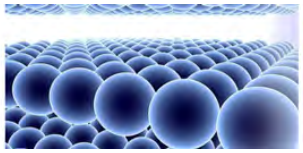
The program included:

Session I, was dedicated to solid waste treatment technologies. The oral presentations in this session were focused on the impacts of solid waste (pharmaceutical, medical, heavy metals, organic pollutants, mining wastes, etc.) on the environment and their management and treatment through the presentation of some experiences both in European and Mediterranean Countries.

Session II was dedicated to water treatment technologies. Several innovative technologies were presented during this session, mainly application of nanoparticles in waste water treatment, membrane bioreactor (MBR) technology, application of natural biosorbents, biotechnologies, disinfection of contaminated water by using a solar CPC photo-reactor. Some presentations were focused on best wastewater reuse practices.

Poster session: In addition to the oral presentations, 35 posters were presented during the 3 day workshop dealing with the innovative technologies for solid waste and water treatment. More than 50% of the posters were from PhD students research works.

Participants to the ITS2WAT-2012 Workshop



SOWAEUMED
II Workshop Marrakech 24-25/05/12.

Visit of the National Centre for Studies and Research on Water and Energy (CNEREE) and the WWTP of Marrakech

By Pro. Laila MANDI

Visit of the National Centre for Studies and Research on Water and Energy (CNEREE)

www.ucam.ac.ma/cneree

The CNEREE was established by the ministry of Higher Education and Research at the university Cadi Ayyad in 2008. The Center supports Cadi Ayyad University's mission through applied research projects designed to address local water, energy and environmental necessities. The objectives of the CNEREE as regards research/development are articulated around the programs and priorities established by the Moroccan State concerning water resources integrated management and renewable energies.

The CNEREE hold two laboratories:

Laboratory of Water sciences and Environment which main research topics involve: Functioning of aquatic ecosystems, remote sensing and environmental modeling, Impact of pollution and climate change on water resources, biodiversity and health, optimizing the use of water systems and water conservation, wastewater treatment technologies, recycling and recovery of water and waste, desalination of sea water and saline waters.

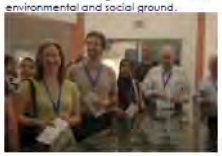
Laboratory of Renewable energy and Energy efficiency which main research topics are: Solar thermal energy, photovoltaic solar energy, desalination using renewable energy, energy efficiency in industrial processes, biomass.

Through collaborative work with its partners and sponsors, the CNEREE assist in the development of solutions to a variety of contemporary water, energy and environmental problems.

Visit of WWTP of Marrakech City

The workshop included a visit to the Marrakech wastewater treatment plant, where every day, 110.000m³ of wastewater is collected, from which 90.000m³ can be reused. Within the treatment process, methane is used to generate electricity. The facility generates a daily amount of 30MWh electricity, which fulfils 50% of the total electricity need of the wastewater treatment plant. After treatment, the water is distributed through five pumping stations and 80km of pipelines that connects all golf courses.

This plant is an example of a guarantee of efficient water use as well as electricity generation. Another strong point of the Marrakesh approach is the stakeholder coalition for the Project, where RADEEMA (The Marrakech Electricity and Water Board), government and golf courses, all made a significant financial contribution. The treatment and re-use of Marrakech's wastewater is a milestone in sustainable development, which brings significant benefits for the region on economic, environmental and social ground.



MBR-Treatment technology and effluent recycling

By Pr. Abdelaziz Baçaoui
Pr. Laila Mandi
Cadi Ayyad University -Morocco

The textile and leather industry consume large amounts of water and produce a high load of pollutants of various types. In Morocco, this industry represents 31% of the entire national industry and has a specific ratio of water consumption of about 123 m3/t, which corresponds to 10 million m³ of volume of water discharged, according to the Ministry of Energy, Mines, Water and Environment (2009).

These discharges classified as sources of pollution most dangerous (COD very high, about 80 times higher than that of an urban effluent, high in suspended solids ...) do not suffer in most cases no treatment and often when treatment is done, it does not reach the level of quality required by the discharge standards in natural environment and even less when asked to recycle a portion of the treated water.

For water reuse in industrial processes, tertiary treatment is often applied. According to Prof. M. Crespi (INTEXTER, Universidad Politécnica de Catalunya), since 2000, the MBR technology when coupled with reverse osmosis (RO) far exceeds other treatments such as MF / UF Followed by RO, and Conventional Treatment Followed by RO.

According to this expert the current situation of using MBR technology by industry is as a result Leachate (37%), Maltings (2%), Food & Beverage (7%), Navy (12%), Pharm (12 %), Chem (12%), Auto (1%), Other (17%)

Moreover, opportunities for reuse of treated water with MBR in textile mills have already been confirmed in several countries such as in Spain and Germany reaching up to 60%.

Advantages of the MBR are:

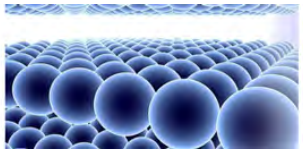
- ✓ treated water quality,
- ✓ flexibility of operation,
- ✓ size of facilities,
- ✓ high rate of degradation,
- ✓ decreased production of sludge,
- ✓ disinfection and odor control

According to its mission of developing appropriate technologies, the National Centre for Studies and Research on Water and Energy (CNEREE-UCAM) is now equipped, as part of the SOWAEUMED project, with an advanced technique of membrane filtration (microfiltration) to treat industrial effluents. This technique, which has already been proven on an industrial scale in many Western countries since 2000, will be favored by lower cost of membranes and increased interest for water reuse in Morocco.

In the Frame of SOWAEUMED Project, NADREC company with the help of INTEXTER and AXG (Barcelona) and the collaboration of the National Centre for Studies and Research on Water and Energy of Cadi Ayyad University (Marrakech) designed a pilot plant using a membrane bioreactor system (MBR) coupled with adsorption columns were nanostructured material will be implemented in order to treat wastewater from tannery and textile industry.

Installation of the MBR pilot plant by NADREC Company (Spain)

SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

Steering committee meeting

Due to the tight schedule of the workshop agenda the consortium meeting was held in two separate sessions and the most critical issues were discussed, being previously advanced by email to all the partners. The project manager Gustavo Perez pointed out the fact of a final meeting to be focused on policy issues rather than dissemination of achieved results due to the nature of the project. G. Perez stressed the importance of taking immediate actions in order to finish with the delay of some key tasks and the corresponding deliverables. He includes the list of deviations and corrective actions that should be performed.

Workshop round table

The round table as a part of SOWAEUMED workshop, has the main objective of discussing "Starting-up and managing companies in the field of Nano-based waste treatment technologies" focusing on innovative forms of promoting the creation of startup companies; evaluation of experiences in both regions; benchmarking of best practices.

The debate was animated by Pr. Mamoun Muhammed from the Royal Institute of Technology (KTH- Sweden) and Pr Manuel Valiente (University Autonoma of Barcelona).

Pr. Manuel VALIENTE (UAB, Spain)

The participants of the round table were students, the representative of socio-economic sector and industrials. The animators of the round table introduce the debate by that nowadays industrials have to treat their wastewater. Nanotechnology can offer to companies' possibilities to improve their process to be more selective with high efficiency and also with low cost giving them the opportunity to valorize and recycle their waste into environmentally beneficial products.

Pr. Mamoun MUHAMMED (KTH, Sweden)

Pr. Mamoun explained the different research strategies especially in the field of nanotechnology and how we can move from an innovative idea coming from laboratory to a new or improved product that can be commercialized reaching a new or improved market and particularly use this research to drive the economic development.

Researchers from university have the challenging issue to develop new processes, smart and low cost solutions for wastewater treatment taking into account the need of the market.

For that research community from universities have to invest in laboratory equipment infrastructure in parallel to human investment by training and recruiting skilled young researchers.

Nanotechnology can help companies to move to another way to dealing their waste, offering them the opportunity to get an added value from their waste and have a sustainable business by preserving the environment.

To initiate a startup in the field of Nanotechnology, patenting can be a crucial tool to protect new ideas, transfer and commercialize the results of research directly to companies.

The representative of Coca Cola Company in Marrakech raise the problem of the high cost of energy for treatment of their waste by aerobic process with no possibility to reuse and recycle the treated water. The discussion also concerned the luck on communication between industrials and researchers from university. Create an ecosystem witch allow industry and academia to work together and share ideas can help companies to solve their local problem and improve their process. To connect student and young researcher with industrial world can be a good way to start a sustainable and active collaboration and promote innovative companies.

Steering Committee meeting and Workshop Round Table

By Pr. Laila MANDI
Pr. Naaila OUZZANI
Dr. Majdouline BELAQZIZ
Dr. Gustavo Perez

Round Table participants from industry and socio-economic sectors.

Message from a partner

By Majdouline Belaqziz
UCAM – Morocco

Dear readers,

Division of Functional Material, Royal Institute of Technology (KTH)

First of all I would like to thank Pr. Laila MANDI for giving me the opportunity to participate in SOWAEUMED project from the beginning to improve my management, organizational, communication and scientific research skills.

Through SOWAEUMED project and like a young post-Doc researcher I was pleased to conduct a training research at the Royal Institute of Technology, Division of Functional Materials, headed by Pr. Mamoun MUHAMMED and I take this occasion to thank him for his invitation to his department, for his kindness and support during my stay in Sweden.

I conduct my research training under the supervision of Dr. Abdusalam UHEIDA a senior researcher in the Functional Materials Department who is focused in the research field of nanotechnology applications to environment. The main objective of my research with Dr. A. UHEIDA is to fabricate novel magnetic nanocomposites, to characterize their performance and their sorption properties for removing chromium and arsenic from aqueous solution.

Toxic heavy metal pollution is one of the most significant environmental problems due to their hazards to human being and ecological systems. In this sense, there is an urgent demand to develop new methods for solving this problem. The conventional treatment methods used for removing metal ions from aqueous solution include physical, chemical and biological technologies. Nanomaterials have recently attracted extensive interest for their unique properties in various fields as compared to their bulk counter parts.

Electrospinning is a very simple and versatile process by which high functional and high performance polymer nanofibers (with diameter lower than 100 nm and lengths up to kilometers) can be produced using an electrostatically driven jet of polymer solution. The electrospun nanofiber can be considered as a suitable support for stabilization of metal oxide nanoparticles fibers due to their high specific surface area and well developed pore structure making them an excellent nanosorbent for use in filtration and membrane applications. Like mentioned above my training research at KTH have been focused on fabrication and characterization of multifunctional nanofiber nanoparticles composites for application to industrial wastewater treatment. The nanofibers are produced from polyacrilonitrile solution using the electrospinning technique. The electrospun fibers were chemically modified, to produce aminated nafibers with no losses in their flexibility, which can be suitable for metal adsorption due to their high adsorption affinity for metal ions. Metal oxide nanoparticles were synthesized by different methods and functionalized by a diversity of capping ligands. The functionalized metal oxide nanoparticles are grafted to the aminated nanofiber by using the chosen crosslinkers. Finally the absorption of Cr (IV) and As (V) on the surface of the prepared nanofibers was examined and tested in continuous and batch mode conditions. The results shows an increase of the amount of adsorption of Cr(IV) and Ar (V) on aminated nanofibers after their functionalization by metal oxide nanoparticles. The FT-IR and TGA analysis confirmed the surface functionalization of the produced nanomaterials. The surface morphology of the functionalized nanofibers was characterized using scanning electron microscope (SEM) and the concentration of Cr (IV) and Ar(V) in the solution was measured by ICP.

Advances in nanocomposites coating research can revolutionize the word of structural materials by improving their optical, magnetic, electronic, catalytic, mechanical and chemical properties. Moreover, there are still many parameters that can be considered to control and optimize the performances of nanostructured composite coating.

My scientific experience at KTH in this new field of research allowed me to learn new techniques, tools, methods, technology and Know-How that I can transfer to my University and also open new ways of collaboration.

I want to express my sincere acknowledgements to all students, junior and senior researchers form the Division of functional Materials team, for their encouragement and scientific support contributing to my work by the discussion that I had with them.

Finally I would like to express my deepest gratitude, for constant, encouragement, understanding and care that I received from Dr. Abdusalam UHEIDA during my research training at KTH.

With my best regards
Dr. Majdouline Belaqziz
Cadi Ayyad University – Morocco

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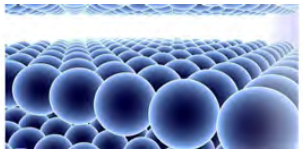

Next events

- ENPI CBC Med Programme: Programme Mid-Term Conference. Rome Italy. **17-18/7/2012**
- Ion Exchange Membrane Processes: Their principle and practical applications. Rome, Italy. **9-11/7/2012**
- 3rd International Interdisciplinary conference on Predictions for Hydrology, Ecology and Water Resources Management: Water Resources and Changing Global Environment (HydroPredict2012). Viena. Austria. **24-27/9/2012**
- CFA: Regional Expert Workshop on Water losses management in water supply systems. Antalya. Turkey. **25-29/9/2012**
- International Conference on MEMBRANES IN DRINKING AND INDUSTRIAL WATER PRODUCTION. Leeuwarden. Netherlands. **10-12/9/2012.**
- XXXIII Conference of Hydraulics and Hydraulic Engineering. Brescia. Italy. **10-15/9/2012**
- Euro-INBO 2012 conference. Istanbul. Turkey. **17-19/10/2012**
- 7th IAHR International Groundwater Symposium 2012. Kuwait, Kuwait. **19-21/11/2012**

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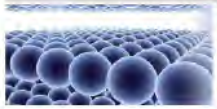
Nº 6. November 2012



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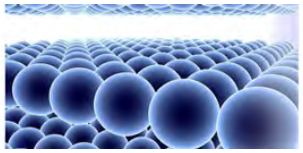
SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

SOWAEUMED Final Workshop
WCI IN HADRUMETE
"WASTE CLUSTER INITIATIVE "
22 – 24th of November 2012, Port El Kantaoui (Tunisia)
Prof. Seffen Mongi

"Innovative Technologies in Waste Water Treatment "

Water treatment & Waste management strategies and technologies are currently undergoing rapid development. Actually, the discharge standards of solid and liquid waste are becoming increasingly stringent therefore; we must seek for new low cost and effective treatment methods.

We must also seek to recover the waste and reuse treated water of the Mediterranean regions particularly in the South where the water shortage is highly remarkable so as to ensure growth, which has become increasingly crucial.

The Higher School of Sciences and Technology of Hammam Sousse (Sousse University), the Laboratory of Energy and Materials with the support of the Euro-Mediterranean FP7 SOWAEUMED project (Network in Solid Waste and Water treatment Between Europe and Mediterranean Countries) organize the last Workshop of the project. It should be noted that the WCI was launched in Marrakech in January 2010. The Waste-Cluster is currently composed of 4 projects (Sowaeumed; Wastekit, Stinno and Temp), with 43 partners funded under the Regions of Knowledge & Research Potential programs. The participating countries are Tunisia, Morocco, Spain, Finland, Netherlands, Portugal, Bulgaria, Croatia, Greece, Italy, Sweden and the United Kingdom. The ambition of the WCI was to involve different European Community funded research projects in an exchange of knowledge and experiences, learning from each other's strengths and weaknesses, defining regional strategies, investing in strengths through integral use of national and regional funding.

This meeting has also the particularity to group in the same time the members of the Water Cluster of Tunisia which involve the Euro-Mediterranean projects: Capwa; Wassermed; CB-WR-ME; Ciara; Incommet; Climb and the regional solid waste exchange of information and expertise network in Mashreq and Maghreb countries SWEEPNET.

The participation of the members of WCI , the Water cluster of Tunisia ; the SWEEPNET network ; scientists from Med and EU countries and a variety of stakeholders from Tunisia: policymakers, regional economic development actors, waste and water management, sustainability, RTD, innovation entrepreneurship was an excellent opportunity for each to meet, to present research activities and experiences and to discuss new concepts and technologies. The workshop focus on innovative aspects of Water Treatment and Waste Management, presenting new technologies, describing the state of the art and related case studies, discussing the main controversial subjects, sharing experiences among different countries, valuating social and economical balances and launching a new projects.

The workshops included about 70 oral presentations in specialized sessions. In addition, several participants exhibit their technologies, products and equipment in the hall next to the conference room.

This event was inaugurated jointly by the Director of the Higher School of Sciences and Technology of Hammam (Sousse university), the European commission and the partnerships: National Agency of Environment Protection (ANPE), Tunisian International Centre for Environmental Technologies (CITET), National Sanitation Utility (ONAS), National Waste Managment Agency (ANGed), National Society of operation and water distribution (SONEDE), The Water Researches and Technologies Center of Borj-Cedria (CERTE), Faculty of Sciences of Monastir (FSM), Sfax Biotechnology Centre (CBS), Coastal Protection and Planning Agency (APAL), National Research Center and Materials Science Ecopark Borj Cedria (CNRSM), Chamber of commerce of Sousse (CCIC), National School of Engineer of Tunis (ENIT), CHIMITEX – Sidi Abdelhamid.

Three Tunisian companies (ANPE, ANGed and ONAS), presented their experiences, expertise and knowledge and discussed various topics such as technical assistance, the engineering and construction of water treatment plants (drinking water, wastewater), technologies and services for the treatment of industrial waste and hazardous waste, control equipment and measurement, etc.).

The representative of ETC presented The EU's Seventh Framework Programme for research and development (FP7) that includes collaborative projects and networks of excellence. In fact, during their initial negotiation with the Commission, these projects may reserve a portion of their budgets for specific tasks to be carried out by a new beneficiary, who will join the consortium at a later date. These new beneficiaries will be selected from proposals submitted in response to a "competitive call".

The representative of the ANPRI indicated that the creation of the ANPRI addresses the need for an institutional interface able to boost the partnership and transfer. It is an official address for innovators. The agency wants to be a center of expertise and services related to interfacing, transfer and protection systems for the benefit of research and production. It must contribute to the dissemination of the culture and practices of creativity and innovation at all levels and particularly at the school and the company.

SOWAEUMED Final Workshop
WCI IN HADRUMETE
"Workshop and ECI sessions"
22 – 24th of November 2012, Port El Kantaoui (Tunisia)
Prof. Seffen Mongi

The program included:

Session I was dedicated to Textile wastewater treatment.
Textile industry is one of the most chemically intensive industries on the earth and the major polluter of potable water. It generates huge quantities of wastewater including complex chemical substances and dyes as a part of unused materials.
The oral presentations were focused on the developing innovative technologies that can diminish the environmental damage.

Session II was dedicated to waste cluster initiative and network.
The presentations were focused on the Presentation of the Waste Cluster Initiative and their objectives & synergies established. The oral presentations were focused for Presentation of the Waste Cluster Initiative and their objectives synergies established, the presentation of SOWAEUMED project, main realizations and the Exchanges in this Project, the presentation of TEMP project and main realization and finally the presentation of the Regional Solid Waste Exchange of Information and Expertise Network.

Session III was dedicated to water cluster in Tunisia
Several Euro-Mediterranean projects in Tunisia were presented during this session such as: CLIMB project, CBS projects, CB-WR-MED project, IRESA project, INCOMMET project, CAPWA and WASSERMED Projects.
General discussion took place in the end of this day about the possibility to participate to new call for Euro-Mediterranean project and the efficiency of working as a cluster.

Session IV was dedicated to innovative technologies in Urban Waste Water:
This session began with three interesting conferences: the first one was presented by a **Professor Ahmed Kettab (Algeria)** about the use of non conventional water resources in north Africa; the second by **Professor Laila Mandi (Morocco)** concerning the Wastewater management in Morocco and the third presented by **Professor Helmy Zaitaly (Egypt)** treated the benefits and risks associated with urine use in agriculture and the micropollutants problems. The other presentations concerned the microbiological treatment and the anaerobic digestion.

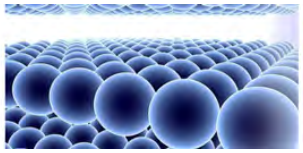
Session V
Many innovative technologies were submitted in this session, principally application of use of electrochemical process for treatment of anthraquinone textile synthetic effluent, the study of heavy metals contamination of soil by Using a portable X-ray fluorescence spectrometry , ICP-MS , AAS and the influence of soil particle size and humidity on XRF performance, use of exhausted olive cake ash (EOCA) as low cost adsorbent for the removal of toxic metal, ions from aqueous solutions, etc.

Session VI was dedicated to brokerage event.
A successfully brokerage event was organized (Bilateral Contact: Researchers – Industrials).

The intention was to invite key stakeholders from Tunisia especially industrials to attract attention to the cluster activities, meet the scientists enhance awareness on opportunities offered and network in view of further projects to be built (seeking synergies).
More than 100 industrials and researchers participated to this event, several contacts were realized between the participants.

Session VII and VIII
Those were focused on Nanosciences and were began by two very interesting conferences presented by **Pr. Mohamed Mammouri and Dr. Abdessalam Uheida** concerning the potential of nanoparticles for environmental applications and waste water treatment .
The other presentations concerned synthesis of nanocomposites and their use in water treatment; the study of heavy metals contamination of soil by using a portable X-ray fluorescence spectrometry the use of surfactant-bentonite in environment applications ; the local wastewater management in two primary school and the analysis techniques of water

Poster session: Besides the oral presentations, 33 posters were presented throughout the workshop dealing with innovative technologies of wastewater treatment and solid waste.



SOWAEUMED Main lessons learned

SOWAEUMED Team

The real need of bringing R&I closer together and aligning existing programmes and initiatives at the level of the EU, the Euro-Mediterranean relations, and of Mediterranean countries, unleashing the innovative potential in the MED region and make direct use of R&I for socio-economic development in the region in the medium and long term.

Support a bi-regional programme of research, innovation and higher education, with full co-design, co-evaluation, co-management, co-appropriation and co-funding. Construct medium- to long-term Research Agendas focused on a few challenges of common interest;

Enhance cooperation between public research organizations and industry and promote entrepreneurship of young researchers, training, coordinated public-private action and multilateral flagships projects and reinforce the inter-institutional among the operational leading EC players in the area. A major constraint to innovation in the Mediterranean countries is the capability to foster the transfer of technological capacities and a miss-match between the content of (higher) education and the skills need by the industry. The medium and long-run return on investments in these areas, from an EU perspective as well as from the MED perspective, are substantially higher than in more traditional areas of Euro-Med cooperation

Foster networking initiatives and clustering of different on-going actions in the MPC dealing with wastewater treatment and develop a strategic perspective, directly involving stakeholders, which is the key to future success. This in return requires informed decision-making based on detailed knowledge and understanding of the real needs at local and national level. Close interaction and exchange of knowledge and ideas across and around the Mediterranean needs to be increased significantly in quality. Time and resource consuming duplication of research and innovative effort can be reduced and redirected towards productive validation/falsification and modification of generated knowledge. Transparent and dynamic, open networks are difficult to manage, but the reward for and potential benefit of concerted action for the societies is very high. The aim is to actively join forces to overcome common problems, not cooperation for the sake of cooperation.

Make use of the existing results of science, technology and products to address societal and economic challenges, create an innovation-driven culture and identify where industry's interests lie. Transform such results into seeds for a sustainable continuation of the relationships by converting the involved MPC partners into reference actors in the region with capacities to attract the private sector investment. Promote leading researchers as drivers of knowledge-based economic development in the region to increase job creation through innovation and entrepreneurship.

Facilitate the uptake of knowledge by industry and shorten the gap between research and market. From SMEs point of view, EU projects are a very useful tool to arrive abroad and share knowledge not only on solutions but also on existing problems to solve in neighbour countries, allowing them to realize more than they expected how much SMEs can provide in terms of environment care, spread their borders to other countries giving them the possibility to invest and earn at same time of helping to develop environmental solutions to reduce pollution.

Depending on the scope, size and complexity of (process, product and policy) innovations, research can either be necessary in research-intensive, high technology areas. Or, as is the case for most innovation at the firm level, it often needs much less radical measures to be taken – and is also less expensive and explicit. Incremental innovation and (technology) adaption at the broad basis, i.e. strengthen and upgrade the capacities of actors in the public, private, research and education sectors to use, apply and modify technologies, products and techniques that have been already been developed needs to be strengthened.

Maintaining fluent communication during this kind of projects in order to reach as much as possible success on every task. Cohesion is basic, and communication lack means loses of both time and possibilities to take advantage of project's opportunities.

An important issue is how problems and challenges of the wastewater industry, usually SMEs in the MPC, or even, the acquisition of emerging new knowledge by these companies can be addressed by the research system. This is a fundamental question because, typically, the intellectual interest of the Higher Education and the Research organizations should be directed toward identified global challenges to be studied by the scientific community. The point here is how common interest between the industrial sector and the scientific community can be created.

Only a close cooperation and mutual awareness of complementary and substitutive actions at the national, regional and international level will increase the impact of the cooperation and the effective allocation of resources. Thereby a priority task is to identify best practice amongst the partners in the selected research fields defining the strategies to transfer this know-how to other interested laboratories. Later, it is key action to speed up the acquisition of first-hand knowledge of the state-of-the-art in specific areas of solid waste and wastewater treatment technologies research that will let to establish the basis for joint research and a research agenda based on the pre-selected scientific topics of interest.

Future success of Euro-Med cooperation within wastewater treatment research field learned

SOWAEUMED Team

Future success of Euro-Med cooperation within wastewater treatment research field, including contributions from the environment and nanotechnology point of view, needs a strategic perspective and concerted action, directly involving the stakeholders. This in return requires informed decision making based on detailed knowledge and understanding of the real needs at the local and national level. In this sense, there are three key objectives for Euro-Mediterranean Cooperation in research and innovation focused on wastewater treatment in line with Horizon 2020 main pillars of excellent science, industrial leadership and societal challenges (see below).

Within this context, and in order to structure the proposed recommendations/suggestions and to provide a synopsis of the way they are related to each other, an action plan has been designed. This action plant represents the strategy, which encompasses the identified priorities, the required actions to be undertaken, the involved stakeholders and the derived impacts at short/medium and long term. Such impacts provide some possible indicators and means of verifications able to show its impact on the level of EU, Morocco and Tunisia cooperation, and with some external factors that might influence (and sometimes jeopardize) the effect of the actions themselves.

SOWAEUMED intends to provide a reliable strategy which includes sufficient level of details to allow strategic partners to make informed use of it for their decision, in order to increase the Moroccan and Tunisian competitiveness in the NMP and ENV sector (in both academic and external collaborative terms). In addition, it is important to specify the assumptions underlying the significant data in the strategy and the timeframes (1-2 years) for the achievement of targets throughout the different strategic priorities. This strategy, provide actions for the future, and aims to support the decision of public policies regarding cooperation in EU-MED area, as well as to respond to economic pressures, political and environmental issues, market trends and technological trajectories that the Waste water sector will face in the future. The proposed strategy it is based on the analysis of findings, analyses, results and recommendations generated by different events held under the SOWAEUMED and Waste Cluster Initiative auspices, as well as on the following pillars (see side flow).

Bringing research and innovation closer

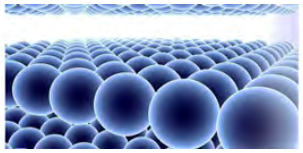
- Aligning existing programmes and initiatives at the level of the European Union, at the level of Euro-Mediterranean relations, and at the level of the Mediterranean countries

Unleash the innovative potential in the MED region

- Make direct use of waste water R&I for socio-economic development in MED region in the medium and long term. Innovation is widely and correctly considered as the key driver of sustainable economic development

Fit research and cooperation to strengthen innovation and marketable knowledge

- In terms of wastewater treatment, research is the art to question, analyze and reflect the status-quo and to push the knowledge frontier. As such, research is an important ingredient and determinant of the innovation process. Innovation always needs research



Message from a partner

By Gustavo Pérez

UAB, Spain

Dear readers

This project has become the opportunity of increasing the mutual learning between EU&MPC. From the beginning it was a challenge and I would like to take the chance to acknowledge each and every one of our partners for their commitment to develop, implement and especially disseminate the project, despite several difficulties have hinder the consortium during the last 3 years.

We would like to start with SOU partner, always providing solutions to face the detected problems and overcoming the greatest of them, the Tunisian revolution. It has been a pleasure to observe their transformation since the beginning of the project, from an initial inexperience of the European projects management, scientific and reporting until their final role as a relevant regional figure in terms of EU projects participation, implementation, justification and specially, events organization.

We would like to thanks UCAM partner by their demonstration to all EU partners, not only to those from SOWAEUMED project but also Waste Cluster Initiative, for their capacity to organize challenging events at the starting of the project despite no time to react. It was enjoyable to observe their capabilities to involve relevant policy stakeholders and their commitment to promote entrepreneurship within the promising young researchers. In fact, their activities reflect the seeds that SOWAEUMED leave in MPC.

After some years of experience, managing EU projects, I could say that any EU project manager, would die wanting to have on his team a partner as RBI. Thank you for your diligence in responding to any request, especially in times of financial and scientific reporting, even surprising with information despite not being requested.

Many years of relationship with KTH, are not enough to not stop to amaze me with his scientific contributions, as well as its ability to train young researchers. Without your efforts, one of the most important challenges of the project would not have been possible. However, there is still one pending issue. I will be waiting for your invitation to visit your facilities ;)

The last acknowledge I will devote to the great unknown at the start of the project, NADREC company. I honestly did not know how a company could get to perform in such kind of projects, unrelated to the investigation, and on a region in which they had no experience. Their actions, commitment, engineering vision have served to move the project and press to comply with the agreements, overcoming dead situations.

Finally, I would also like to thank all the partners, for putting up with me over the last three years, even though many times, I have become heavy and hard, and for your patience despite occasional private or public reprimand (Especially Prof M. Valiente).

For me, it will be a pleasure to have you on board for future projects.

All my best regards
Gustavo Perez
UAB, Spain

"I would like to take the chance to acknowledge each and every one of our partners for their commitment to develop, implement and especially disseminate the project."

More information about both events will be published on our website.

Next events

- STREAM and STEP-WISE Final Conference: Facilitating Water Information Exchange between Science, Policy and Industry. Brussels, Belgium. **03-04/12/2012**
- ESA-EMWIS Workshop: "Exploitation of Earth Observation for water management in the Mediterranean" Rome, Italy. **03 - 05/12/2012**
- CIWEM & WSKEP Water & Innovation Conference: Innovation for Water Practitioners. SOAS, London. **13/12/2012**
- Water and Innovation - Learning from Innovators: Addressing the Challenges by Learning the Lessons. London, United Kingdom. **13/12/2012**
- Training Course: Operations & Maintenance of Water Treatment Plants Level - General Procedures. Amman, Jordan. **23 - 27/12/2012**
- Towards sustainable safe drinking water supply in developing countries: The challenges of geogenic contaminants and mitigation measures (GeoGen2013), Addis Ababa, Ethiopia, **5-7/02/ 2013**
- ICWRE 2013, International Conference for Water Resources and Environment. Marrakech, Morocco.**12-14/12/ 2013**

Stay in touch & collaborate

The SOWAEUMED objective of promoting research excellence from the MED region towards Europe can be reached only through a direct mobilization of MED stakeholders. For this reason we kindly ask you to send us any news or events related to our interest, also the links or "research experiences" that you wish to see published in the SOWAEUMED website.

For any of this actions, please contact: Gustavo Pérez to the follow: Gustavo.perez@uab.cat

SOWAEUMED
COORDINATION & SUPPORT ACTION

Contact details

SOWAEUMED Project nº 245843
"Network in solid waste and water treatment between Europe and Mediterranean countries"
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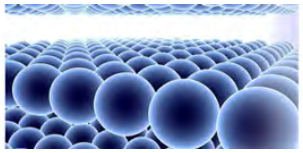

WASTECLUSTER

Research and innovation are crucial in addressing the major issues facing the EU and its partner countries and upholding economic growth, social responsibility and sustainable development. Recently, the WASTE-CLUSTER initiative was launched with the ambition of involving different European Community funded research projects in an exchange of knowledge and experiences, learning from each other's strengths and weaknesses, defining regional strategies, investing in strengths through integral use of national and regional funding. The WASTE-CLUSTER as it stands currently is a 'genuine research-driven cluster' of cooperating regions with a strong emphasis on exchange of best practices and knowledge transfer. Due to the involvement of partners from the Mediterranean Partner Countries (MPCs), the cluster's main target is knowledge transfer from North to South to directly enhance visibility of the MPCs in the cluster and prepare the grounds for their integration into the European Research Area (ERA).

The WASTE-cluster is currently composed of 4 projects with 43 partners funded under the Regions of Knowledge & Research Potential programmes. Participating countries are Morocco, Tunisia, Spain, Finland, Netherlands, Portugal, Bulgaria, Croatia, Greece, (Israel), Italy, Sweden and the United Kingdom. In order to contribute to the objectives of the WASTE-cluster, interested participants/clusters/networks, key stakeholders, managing authorities, scientific teams etc. can join anytime.

The outcomes from the WASTE-Cluster at a macro level need to be assessed in the context of the overall policy and strategic objectives of the Commission with respect to the MPCs scientific, technical and innovation priorities as defined in their cooperation agreement and approved by the Joint Committee for the next years.

As the activities of the project partners develop subsequent to the initial assessment being undertaken on their SWOT/SOR positioning, the progress being achieved at project level will have to be monitored and recorded.

The project outcomes then can be used as building blocks to portray the activities and effectiveness of the Cluster as a whole. Currently, these activities can not be funded due to a severe lack of support through the individual projects – efforts are ongoing to attract other funding sources to realise the objectives of the cluster and to establish 'synergies' in action with other on-going projects with a similar thematic and ambition.

CONSORTIUM

Universidad Autónoma de Barcelona (UAB, ES)

Royal Institute of Technology (KTH, SE)

Ruder Boskovic Institute (RBI, HR)

Centre National d'Etudes et de Recherches sur l'Eau et l'Energie (UCAM, MO)

NADREC S.A. (NAD, ES)

Sousse University (SOU, TN)

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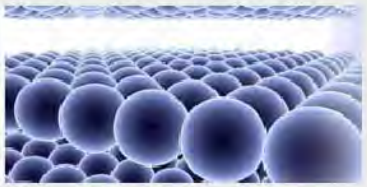
SOWAEUMED

COORDINATION & SUPPORT ACTION

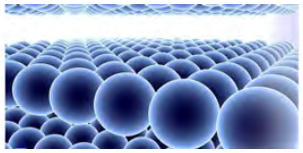
SOWAEUMED

NETWORK IN SOLID WASTE AND WATER TREATMENT BETWEEN EUROPE AND MEDITERRANEAN COUNTRIES



The SOWAEUMED project is a 3 years Coordination Action whose main goal is to establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU Member States (MS, Associated States (AS) and the Mediterranean Region (MED), concerning the development of solid waste and water treatment technologies.

SOWAEUMED



SEVENTH FRAMEWORK PROGRAMME

THE PROBLEM

African countries of the Mediterranean river basin located in a climatic zone with high intra-and interannual variations in precipitation are those ranked among the most threatened by the consequences of global warming. While the situation there has improved over the past 30 years, a deficient management of scarce water resources, threatened by pollution of increasing concern from various sources, contributes to aggravating the situation. The main four major problems affecting the water, its quality and treatment involve:

1. Proper research on the issues of climate change, water shortages and the development of new technologies for desalination, reuse of waste, water flows and transfers of water between areas
2. Gaps in regulations in the sectors of water and its treatment
3. Establish good practices in decentralization of the management of water and recycling, involving the private sector
4. Peoples' right to access to water in terms of quantity and quality

Regarding the considered pollution sources, those commonly involved are, uncontrolled dumping of domestic and industrial waste without any previous treatment affecting the aquatic environments quality, massive employment of pesticides and fertilizers affecting groundwater, high concentration of activities in confined spaces that generate pollution exceeding the power of self-purification of waters, accidental landfills often located on the banks of rivers, and rivers, already weakened by successive drying and water companies activities.

As an example, environmental studies carried out in Morocco, manifest that the discharge of domestic and industrial wastewater into the environment without prior treatment, affects the potability of water in some basins. Of the 500 million cubic meters of wastewater discharged annually by households in urban areas, more than one quarter is simply released into the water or spread on the ground. The same trend is observed in the case of sanitation solid. Thus the 10,800 tonnes of household waste produced each day in urban areas; only 2% of waste collected are either recycled or put into landfill. The rest is discharged into the wild, contributing significantly to pollution of water resources. Moreover the increasing tourism pressure against hydric resources becomes a future key aspect to be solved. In fact The Observatory of Tourism in Morocco in its latest report, 2009, indicates that tourism in the country has registered 7.3 million foreign tourists in 2007, which means 10% compared to last year. Tourism is a key sector of the Moroccan economy and constitutes major foreign exchange earners for the Kingdom. In overall the situation reflects for the implementation of conventional and emerging wastewater treatment technologies in order to face the existing problem.

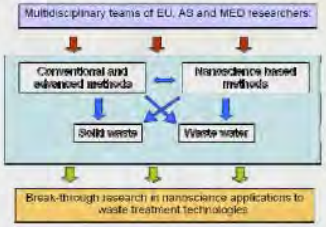
OBJECTIVES

Establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU Member States (MS), Associated States (AS) and the Mediterranean Region States (MED), concerning the development and implementation of solid waste and water treatment technologies.

Create a **sustainable networking, permanent dialogue, specific cooperation activities and a communication flow, with special emphasis to dissemination activities** of the priorities towards MED Partners R&D research entities and policy makers to boost their scientific and technological research potential

Promote **interregional and intraregional cooperation key actions** concerning with the **identification of eventual difficulties, needs and long term priorities** to further strengthening the established relationships as well as **a closer dialogue between EU and MED policy makers**.

Stimulate and support the **participation of MED region research stakeholders in future joint proposals at national and international** level, **to enhance their human resources through training and teaching activities**.



EXPECTED IMPACTS

Creating solid research relationships: Reinforcing common research priorities and interests providing mutual benefit situations avoiding the hindrance of possible implementing problems due to coordination research at significant distances.

Improve the established relationships through attracting new key partners: Reinforce the number of experienced partners proceeding from MED countries, both public research institutions and private industrial companies, in order to propose future joint environmental projects.

An efficient dissemination and communication of SOWAEUMED priorities, activities and plans to key actors including researchers, inventors, funding agencies, innovators, industry investors and policy makers, mainly concerning future calls for EU-MED research projects

Identifying Opportunities for Joint Research Projects with basic or applied/business orientation: Creation of a broad information database including research topics and related state of the art, human and infrastructure potential resources, alternative funding mechanisms at national and international level.

FOCUSED SECTORS

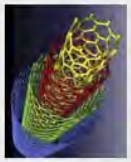
Conventional and advanced treatments
(NADREC, UAB, KTH, SOU, RBI, UCAM)

- Filtration (ceramic, biosand, activated carbon, granular media, fibber & fabric)
- Irradiation (UV)
- Coagulation – Flocculation (synthetic polymer, aluminium & iron salt, natural polymer)
- Chemical and flocculants disinfection (sodium hypochlorite, bleaching powder)
- Reverse osmosis (portable, large-scale)
- Distillation (solar stills, homemade units, commercial units)
- Adsorbent filter media (ion exchange resins, activated alumina, ferric oxide)
- Zeolites



Nanotechnology based treatments
(KTH, UAB)

- Nanomesh (filters, waterstick)
- Nanofiltration (membranes, devices)
- Nanofibrous filters
- Nano ceramics, clays and adsorbents (cell-pore, nanopore, polymers)
- Nanocatalysts (nano titanium dioxide, non zero valence ion)



CONNECTING RESEARCH CENTERS FROM ALL OVER EUROPE (REGPOT)

GRANT AGREEMENT Nº 245843. SOWAEUMED

NETWORK IN SOLID WASTE AND WATER TREATMENT BETWEEN EUROPE AND MEDITERRANEAN COUNTRIES

START: 01/12/2009 END:30/11/2012

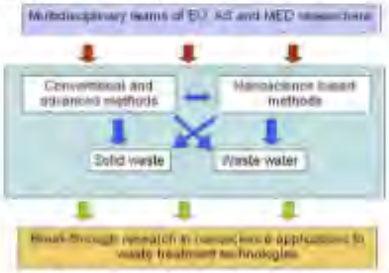
ENTITY DETAILS

UNIVERSITAT AUTÒNOMA DE BARCELONA. CATALONIA. SPAIN.

2508.11 Water Quality / 2303.31 Water Chemistry / 3308.11 Control of Water Pollution / 3308.06 Water Regeneration / 3308.10 Wastewater Technology

OBJECTIVES

- Establish a sustainable cooperation platform for forming strategic partnerships between scientists, scientific managers, policy makers, technology transfer and industrial experts between EU Member States (MS), Associated States (AS) and the Mediterranean Region States (MED), concerning the development and implementation of solid waste and water treatment technologies.



- Create a sustainable networking, permanent dialogue, specific cooperation activities and a communication flow, with special emphasis to dissemination activities of the priorities towards MED Partners R&D research entities and policy makers to boost their scientific and technological research potential.
- Promote interregional and intraregional cooperation key actions concerning with the identification of eventual difficulties, needs and long term priorities to further strengthening the established relationships as well as a closer dialogue between EU and MED policy makers.
- Stimulate and support the participation of MED region research stakeholders in future joint proposals at national and international level, to enhance their human resources through training and teaching activities.

COLLABORATIVE ENTITIES

SWOT LINKED TO ACTION PLAN

STRENGTHS	OPPORTUNITIES
Internationally recognized excellent R&D with frequent collaborations with recognized R&D centers Modern and adequate infrastructure for analysis of pollutants	Consortiums and synergisms with other EU research institutions and SMEs within water sector Improve expertise in water and wastewater treatment
WEAKNESS	**THREATS**
Fluctuation of young employees Obsolete scientific equipment	Low industrial investments Absence of a stable policy regarding research funding

EXPECTED IMPACT

Creating solid research relationships: Reinforcing common research priorities and interests providing mutual benefit situations avoiding the hindrance of possible implementing problems due to coordination research at significant distances.

Improve the established relationships through attracting new key partners: Reinforce the number of experienced partners proceeding from MED countries, both public research institutions and private industrial companies, in order to propose future joint environmental projects.

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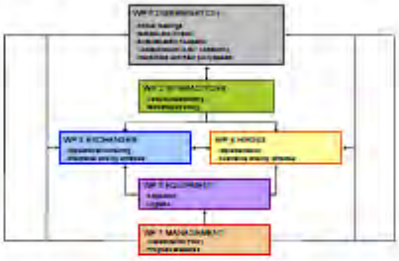

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- NADREC S.A. (NAD, ES)
- Sousse University (SOU, TN)

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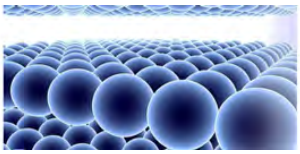
http://grupsderecerca.uab.cat/sowaeumed/

This center is combining different European/National/Regional Funds as part of its strategy to be more competitive at European and International level.

5. EXPLOITATION

Concerning the exploitation of results, in order to identify available financial sources interested on the final outputs of SOWAEUMED, the potential perspectives of transferences to the industrial sector and society and finally, clarify the strategy route of the results exploitation, advancing different aspects of the exploitation difficult to aboard once finalized the CSA, several actions have been carried out, such as:.

- Bilateral Collaboration: Research beyond the timescale of this project. Co-supervision of PhD students, exchanges by post docs and permanent researchers will underpin these developments
- Regional Collaboration: New local/regional collaborations between the partners including also industry have emerged as a result of the meetings and exchanges from this project.
- Continuous cluster cooperation contributing to adopt the Mediterranean Water Strategy and related Action Plan which will provide the financial and instrument framework for the future, partnerships to create conditions for competitive research in water use efficiency, use of non-conventional waters, risk management and regional join funding for trans-basin cooperation and regional water innovation programme.
- Promote the employment of water treatment technologies pilot plant demonstrations and real case studies with MPC participation to substantiate pre-competitive research in the water sector in the region, with particular regard to develop innovative business models (BMs) focused on generating water saving and multi-use solutions.
- Implementation of a platform of synergies around EU and MPC projects, integrating water component for a capitalization, a concentration of the efforts and a maximization of the impacts and the resources (overcoming fragmentation and duplication, facilitation of TT).
- Improved skills of researchers in EU and MPC that have stimulated more young people to embark on a research or entrepreneur career. Such career development opportunities for early stage researchers, including regular evaluation and more autonomy, are expected to improve their employability and chances of promotion. Additionally, identifying the existing potential of early stage researchers, have provided alternative future exchanges though PEOPLE calls for those involved partners.
- Accelerated progress in key areas of some established and already ongoing water treatment S&T cooperation agreements with MPC countries, including the improvement of the links between academia and water treatment industry (establishment of contacts with regional chambers of commerce i.e. EUROCHAMBERS (BE-BXL), PIMEC (ES)) that will lead to spread trans-national recruitment, portability of funding, employment, working conditions, training and skills of the researchers, as well as employability and ability to turn research into results. Such progress has reinforced and enlarged the EU and MPC competitiveness including the creation of strategic partnerships thus attracting the best third country scientists to work with EU and MPC.
- Promotion of the optimal use of intellectual property and innovation support services for a better business model generation, risk assessment and access to capital of the developed water treatment technologies created in public research organizations, focusing on an efficient management and increase of knowledge transfer to industry and regional stakeholders. This has contributed to transform MPC into a more attractive area for researchers and establish a balanced “brain circulation” within MPC countries rather than a “brain drain”.
- Improved Europe and MPC's research performance as well as providing more opportunities for researchers, which therefore have become beneficial both within Europe and with the rest of the world. An



excellent example have been the possibility for SOWAEUMED researchers to get access to major research infrastructures such as synchrotron facilities, which allowed them to keep on leading edge of knowledge creation, related to the SOWAEUMED thematic areas.

6. IMPACT

SOWAEUMED impact is focused on the development and improvement of scientific partnerships and upgrade of S&T MED capabilities, key factors that have helped on the translation of policy objectives of international co-operation with MED countries. Actions engaged by SOWAEUMED CSA have established a solid base for future joint collaboration, allowing an increased awareness of the joint state of the art and needs between EU and MED countries in the selected research field. These actions have facilitated solving the detected opportunities rather than carry out the research projects individually. The established relationships have helped to identify key needs and opportunities, and start the corresponding actions to create suitable consortiums. SOWAEUMED have reflected a main impact on different areas such as:

A) Creating solid research relationships: Reinforcing common research priorities and interests providing mutual benefit situations avoiding the hindrance of possible implementing problems due to coordination research at significant distances, by means of:

Fostering relationships between researchers at all levels (PhD, Post Doc, senior researchers, professors and senior managers) through the exchange and training activities that have helped on sharing research results and ideas and an efficient technology transfer between partners.

Through the established collaborations and links to partners beyond the consortium by the contribution of advisory board gaining an increased worldwide awareness of the research activities.

Promoting the SOWAEUMED website, and data enclosed within, as a tool to create new associations for future joint proposals, including partners beyond the consortium.

B) Improve the established relationships through attracting new key partners: Reinforce the number of experienced partners proceeding from MED countries, both public research institutions and private industrial companies, in order to propose future joint environmental projects in the EU-MED area. The identification of further partners have been based on:

Consultation of data bases generated by each projects partners and by their network of contacts;

Potential incoming experienced researches to be recruited proceeding from MED countries and working at EU, and European scientists working in MED countries;

Connecting to other programmes or coordination and support actions financed by the international cooperation actions of the Specific Program Capacities of the FP7 (ISSOWAMA, RESTCA-TERCE- NIPMSS, AQUATERRE, MELIA, MEDAWATER, etc...) and thematic NCP's network or initiatives such as the Waste Cluster Initiative.

Scientific and technological communities at EU and MED regions which were beneficiated from the impact derived of an increased awareness of MED S&T excellence, motivating the EU RTD stakeholders to generate new NOEs with their MED colleagues. The information generated by the project has served National Chambers of Industry, Business Associations or the Euro-Chamber of Industry to establish strategies promoting economic cooperation between EU27 and MED.

C) An efficient dissemination and communication of SOWAEUMED priorities, activities and plans: to key actors including researchers, inventors, funding agencies, innovators, industry investors and policy makers, mainly concerning future calls for EU-MED research projects, by means of.:

Set up new and consolidate existing relationships between the EU-MED partners concerning both scientific institutions and private industrial companies.

Enlarge the number of potential high quality research institutions or private companies, beyond those of the consortium in MED region as candidates for future joint proposals.

Promote the inclusion of the themes and research priorities concerning waste treatment technologies in the work programmes of the national and international funding agencies.

Greater perception by the scientific community at both the scientific staff and diplomatic offices, trade bureaus, business associations, chambers of commerce of the possibilities for EU-MED joint research, as well PhD and post-doctoral positions in future.

D) Identifying Opportunities for Joint Research Projects with basic or applied/business orientation: Creation of a broad information database including research topics and related state of the art, human and infrastructure potential resources, alternative funding mechanisms at national and international level, efficient technology transfer ways,. The required information has feedback by the generated reports and presentations through the activities carried out at case studies, workshops, or during the exchanges and trainings.

Identified opportunities and needs within EU and MED region and the research topic.

Real potential and weaknesses of partners involved in future consortiums, considering the known human and infrastructure resources, and the opportunities of FP7, increasing MED participation in FP7, especially in the PEOPLE programme.

Furthermore, SOWAEUMED impact can be understood as a result of the developed Action Plan to drive economic development through research, training-mobility and technological development activities in the selected topic or economic sector. This Action Plan comprises regionally specific activities to be developed under each of the identified strategic priorities. For each of them, the involved stakeholders, the actions planned, the corresponding means of verification and the impacts at short/medium/long term, are provided below.

- Strategic priorities: Research quality S2, S7, S8. I) Actions planned: Identify top MA&TN research institutions. Priorization of research topics. Convergence of multidisciplinary projects. Knowledge transfer between EU-MA&TN institutions. II) Involved stakeholders: Scientific communities at EU and MA&TN. III) Means of verification: Access to new technology and information, exposure to international quality standards, contribution to the development of international opinion leaders, encouraging commitment to R&D, generation of infrastructure, resources and employment, image of the country favors visionary and cutting edge technology, attracts foreign investment. Ensuring water management for all ecosystem functions and food security. Political willingness is needed to ensure a multi-sector and multi-scale approach. IV) Impacts at short/medium/long term. Progress in research quality in NMP&ENV fields covered by FP7 and H2020 & bilateral options.

- Strategic priorities: Enhancement of human capital. S6, S7, S10, S11. I) Actions planned: Organize workshops in MA&TN. Organization a large number of visits (scientific and technical) to MA&TN institutions. Providing research training in NMP&ENV and projects formulation. Integration of researchers and PhD students in NMP&ENV research projects carry out in top EU laboratories. Use of FP7-PEOPLE opportunities. II) Involved stakeholders: Scientific communities at EU and MA&TN .Policy makers responsible of EU and MA&TN. III) Means of verification: Promoting integration, increase research excellence and achieve critical mass, overcoming possible brain drain and lack of human potential, providing new points of view to solve problems and new ways for multi-professional projects. Statistics from the EU mobility schemes. IV) Impacts at short/medium/long term. Strengthening the cooperation with leading EU&MA&TN institutions. Involving the EU and MA&TN NMP&ENV research institutions into

common research. Increasing the participation in H2020 and bilateral calls related to NMP&ENV. Visits of NMP&ENV experienced researchers in both directions. Upgrading the skills of technicians from MA&TN in H2020 management.

- Strategic priorities: Support of innovation and fostering cooperation with industry. S2, S8, S9. I) Actions planned: Organization of specific seminars for research staff and meetings research-industry concerning NMP&ENV. Knowledge transfer from EU Offices for projects formulation and IPR, giving examples dealing with NMP&ENV. Building a regional co-ownership on water resources management, from challenges identification to financial and implementation synergies. II) Involved stakeholders: Major donors active in the region. Scientific communities at EU and MA&TN. Policy makers responsible of EU and MA&TN. Trade Unions, end users associations, Chambers of Commerce or Industry. III) Means of verification: Number of consultations and effective participation of MA&TN stakeholders Information gathering among main MA&TN-EU research networks Synergy of the research offer with the requirements of innovation market and industry well developed cooperation Academia-Industry Developing capacities in wastewater management through adequate good governance, stakeholders / societal engagement. IV) Impacts at short/medium/long term. Intensifying the dialog between academia& industry. Development the knowledge of research staff on the priorities of innovation policy. Development of an offer for the cooperation NMP&ENV industry in the frame of H2020 and bilateral actions.

- Strategic priorities: Support of the regional/national economic and social development. S3, S9. I) Actions planned: Organization in MA&TN of periodic seminars addressed to local and regional authorities concerning the importance of NMP&ENV. Initiating H2020 projects or Nets involving others national stakeholders supporting NMP&ENV research. II) Involved stakeholders: Scientific communities at EU and MA&TN. Policy makers responsible of EU and MA&TN. Trade Unions, end users associations, Chambers of Commerce or Industry. III) Means of verification: Level of visibility of MA&TN research programs and actors outside the region. Launch of Regional Research Program and support mechanism in place. IV) Impacts at short/medium/long term. Increased number of international projects related to NMP&ENV performed in MA&TN. Maintaining and development of the cooperation with local NMP&ENV industries. Straining the binomial Academia-Industry. Reinforce the agreements in S&T between EU and MA&TN in NMP&ENV sectors defined as priority. Regional join funding for trans-basin cooperation and regional water innovation program

- Strategic priorities: Dissemination and promotion activities. S4, S5. I) Actions planned: Promotional publications. Cooperation with mass media. WEB site and e-Platform. Organization of Open-days in EU partnering. Take profit of round tables, coffee breaks, lunches. II) Involved stakeholders: Scientific communities at EU and MA&TN. Policy makers responsible of EU and MA&TN. Civil society. III) Means of verification: Activity reports by the actor that shall take the lead concerning the quantity and quality of identified examples, level of dissemination, attendance, practical results. IV) Impacts at short/medium/long term. Promotion in the society of the achievements of the different EU projects involving MA&TN participation concerning NMP&ENV research. Popularization of NMP&ENV and related Technology Transfer among the different stakeholders. Strengthening societal and water users empowerment, improving dialogue as well as mutual trust among institutions, researchers and society

- Strategic priorities: Reinforce regional & international cooperation. S1, S3, S10, S11. I) Actions planned: Twining visits, fact finding missions and exchanges. Participation in some important conferences and congress in MED and EU (2013-2016) encouraging the preparation of NMP&ENV clusters. Developing common NMP&ENV research projects or NETs with EU and/or LA partners. Submission of future actions under H2020 in association with MED research centers concerning NMP&ENV. II) Involved stakeholders: Scientific communities at EU and MA&TN. Policy makers responsible of EU and MA&TN. III) Means of verification: Last FP7 and new H2020 calls specific for EU-MA&TN cooperation. Political attention towards MA&TN in comparison with other LA states. IV) Impacts at short/medium/long term. Strengthening the cooperation with other important MED countries (EG, JO). Involving high level research centers of MED into NMP&ENV research in association with some EU MA&TN. Development of future networks or NMP&ENV projects with more MED universities. Increasing the participation in future H2020 (according with the suggestions of Oslo RTD Council 2010). Adopting the Mediterranean Water Strategy and Action Plan which will provide the financial and instrument framework for the future.

Future success of Euro-Med cooperation within wastewater treatment research field, including contributions from the environment and nanotechnology point of view, needs a strategic perspective and concerted action, directly involving the stakeholders. This in return requires informed decision making based on detailed knowledge and understanding of the real needs at the local and national level. In this sense, there are three key objectives for Euro-Mediterranean Cooperation in research and innovation focused on wastewater treatment in line with Horizon 2020 main pillars of excellent science, industrial leadership and societal challenges.

Bringing research and innovation closer	Unleash the innovative potential in the MED region	Fit research and cooperation to strengthen innovation and marketable knowledge
•Aligning existing programmes and initiatives at the level of the European Union, at the level of Euro-Mediterranean relations, and at the level of the Mediterranean countries	•Make direct use of waste water R&I for socio-economic development in MED region in the medium and long term. Innovation is widely and correctly considered as the key driver of sustainable economic development	•In terms of wastewater treatment, research is the art to question, analyze and reflect the status-quo and to push the knowledge frontier. As such, research is an important ingredient and determinant of the innovation process. Innovation always needs research

Within this context, and in order to structure the proposed recommendations/suggestions and to provide a synopsis of the way they are related to each other, an action plan has been designed. This action plant represents the strategy, which encompasses the identified priorities, the required actions to be undertaken, the involved stakeholders and the derived impacts at short/medium and long term. Such impacts provide some possible indicators and means of verifications able to show its impact on the level of EU, Morocco and Tunisia cooperation, and with some external factors that might influence (and sometimes jeopardize) the effect of the actions themselves.

SOWAEUMED intends to provide a reliable strategy which includes sufficient level of details to allow strategic partners to make informed use of it for their decision, in order to increase the Moroccan and Tunisian competitiveness in the NMP and ENV sector (in both academic and external collaborative terms). In addition, it is important to specify the assumptions underlying the significant data in the strategy and the timeframes (1-2 years) for the achievement of targets throughout the different strategic priorities. This strategy, provide actions for the future, and aims to support the decision of public policies regarding cooperation in EU-MED area, as well as to respond to economic pressures, political and environmental issues, market trends and technological trajectories that the Waste water sector will face in the future. The proposed strategy it is based on the analysis of findings, analyses, results and recommendations generated by different events held under the SOWAEUMED and Waste Cluster Initiative auspices, as well as on the following pillars:

Evidence-based identification of the common technological and socio-economic issues derived from wastewater treatment that the societies around the Mediterranean Basin are facing

Join forces to be able to tackle shared problems in real time

Enhance cooperation between EU members and enhanced collective capacity to achieve the cooperation objectives in terms of waswater treatment

Establish joint research priorities in a transparent, aligned structure and simplified procedures to access the financial support for waswater treatment research.

Active monitoring and detailed documentation of the performance and output of existing and promissing solutions for waswater treatment.

Develop routine feedback mechanisms for learning from experience within the R&I in the waswater treatment sector.

7. MAIN LEARNED LESSONS

The real need of bringing R&I closer together and aligning existing programmes and initiatives at the level of the EU, the Euro-Mediterranean relations, and of Mediterranean countries, unleashing the innovative potential in the MED region and make direct use of R&I for socio-economic development in the region in the medium and long term.
Support a bi-regional programme of research, innovation and higher education, with full co-design, co-evaluation, co-management, co-appropriation and co-funding. Construct medium- to long-term Research Agendas focused on a few challenges of common interest;
Enhance cooperation between public research organizations and industry and promote entrepreneurship of young researchers, training, coordinated public-private action and multilateral flagships projects and reinforce the inter-institutional among the operational leading EC players in the area. A major constraint to innovation in the Mediterranean countries is the capability to foster the transfer of technological capacities and a miss-match between the content of (higher) education and the skills need by the industry. The medium and long-run return on investments in these areas, from an EU perspective as well as from the MED perspective, are substantially higher than in more traditional areas of Euro-Med cooperation
Foster networking initiatives and clustering of different on-going actions in the MPC dealing with wastewater treatment and develop a strategic perspective, directly involving stakeholders, which is the key to future success. This in return requires informed decision-making based on detailed knowledge and understanding of the real needs at local and national level. Close interaction and exchange of knowledge and ideas across and around the Mediterranean needs to be increased significantly in quality. Time and resource consuming duplication of research and innovative effort can be reduced and redirected towards productive validation/falsification and modification of generated knowledge. Transparent and dynamic, open networks are difficult to manage, but the reward for and potential benefit of concerted action for the societies is very high. The aim is to actively join forces to overcome common problems, not cooperation for the sake of cooperation.
Make use of the existing results of science, technology and products to address societal and economic challenges, create an innovation-driven culture and identify where industry's interests lie. Transform such results into seeds for a sustainable continuation of the relationships by converting the involved MPC partners into reference actors in the region with capacities to attract the private sector investment. Promote leading researchers as drivers of Knowledge-based economic development in the region to increase job creation through innovation and entrepreneurship.
Facilitate the uptake of knowledge by industry and shorten the gap between research and market. From SMEs point of view, EU projects are a very useful tool to arrive abroad and share knowledge not only on solutions but also on existing problems to solve in neighbour countries, allowing them to realize more than they expected how much SMEs can provide in terms of environment care, spread their borders to other countries giving them the possibility to invest and earn at same time of helping to develop environmental solutions to reduce pollution.
Depending on the scope, size and complexity of (process, product and policy) innovations, research can either be necessary in research-intensive, high technology areas. Or, as is the case for most innovation at the firm level, it often needs much less radical measures to be taken – and is also less expensive and explicit. Incremental innovation and (technology) adaption at the broad basis, i.e. strengthen and upgrade the capacities of actors in the public, private, research and education sectors to use, apply and modify technologies, products and techniques that have been already been developed needs to be strengthened.

Maintaining fluent communication during this kind of projects in order to reach as much as possible success on every task. Cohesion is basic, and communication lack means loses of both time and possibilities to take advantage of project's opportunities.
An important issue is how problems and challenges of the wastewater industry, usually SMEs in the MPC, or even, the acquisition of emerging new knowledge by these companies can be addressed by the research system. This is a fundamental question because, typically, the intellectual interest of the Higher Education and the Research organizations should be directed toward identified global challenges to be studied by the scientific community. The point here is how common interest between the industrial sector and the scientific community can be created.
Only a close cooperation and mutual awareness of complementary and substitutive actions at the national, regional and international level will increase the impact of the cooperation and the effective allocation of resources. Thereby a priority task is to identify best practice amongst the partners in the selected research fields defining the strategies to transfer this know-how to other interested laboratories. Later, it is key action to speed up the acquisition of first-hand knowledge of the state-of-the-art in specific areas of solid waste and wastewater treatment technologies research that will let to establish the basis for joint research and a research agenda based on the pre-selected scientific topics of interest.