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# Investing in European success

Euro-Mediterranean Cooperation  
in Research and Innovation

*Research and  
Innovation*

EUROPEAN COMMISSION

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EUROPEAN COMMISSION

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# INTRODUCTION

The European Union (EU) is supporting the historical changes taking place in the Southern Mediterranean region with a focused, innovative and ambitious response. The European Commission sees the Neighbourhood Countries of the European Union as a key priority, and in 2011 presented a new strategy for a changing Neighbourhood, together with the High Representative of the Union for Foreign Affairs and Security Policy.

A key element of the drive for greater prosperity and democracy in the Mediterranean is closer ties between people and businesses. This includes strong momentum to establish a renewed, closer partnership in research and innovation between the EU and its Mediterranean neighbours. A Common Knowledge and Innovation Space (CKIS) is part of the new strategy and will embrace and encourage policy dialogue, national and regional capacity-building, cooperation in research and innovation as well as increased mobility opportunities for students, researchers and academics. These are all vital elements for the Mediterranean's future success.

The EU has been active in the Mediterranean region through the Union for the Mediterranean, formerly known as the Barcelona Process. The Monitoring Committee (MoCo) for Euro-Mediterranean cooperation in research and innovation has played and continues to play a key role in bringing together EU Member States and all Mediterranean countries.

The EU has concluded bilateral Science and Technology (S&T) cooperation agreements with Egypt, Jordan, Morocco, Tunisia and Algeria. Moreover, Albania, Croatia, Israel and Turkey are all associated to the Seventh Framework Programme. The European Commission has

supported scientific collaboration, policy dialogue, networking and twinning activities in the Mediterranean countries through their participation in the Research Framework Programmes. Capacity-building in research and innovation has also been funded by external policy instruments such as MEDA and the European Neighbourhood and Partnership Instrument (ENPI).

Horizon 2020, the future research and innovation programme of the EU, will continue to promote Science and Technology cooperation with Mediterranean countries. The focus will be on tackling common challenges such as climate change and food security. Cooperation will also support EU external policies and seek to bring partner countries closer to the European Research Area (ERA).

This brochure showcases a selection of success stories from various EU-funded S&T projects real results. The brochure was launched at the "Euro-Mediterranean Conference on Research and Innovation: An agenda for a renewed partnership" in Barcelona on 2 and 3 April 2012. The conference set out a path for Euro-Mediterranean Cooperation in Research and Innovation, based on closer cooperation on research and innovation policy. This is a proven recipe for success that will create growth and jobs, and make people's lives better across the Mediterranean region.

## AGORA

# Saving the forests of the Mediterranean

*We all know about tropical rain forests and fir trees from Northern Europe. But when we think about the Mediterranean, our thoughts turn to beaches, not trees. Now thinking about the forests around the Mediterranean is becoming a top priority because this region is one of the hotspots where the effects of global warming will be exceptionally high.*

Forests are especially sensitive to climate change and they are the most important ecological structure in the Mediterranean region. Not only do they play a role as an energy source and in maintaining biodiversity, but they are also indispensable in maintaining soil and water resources, which are the most important natural assets in the region, says Marc Palahi of the European Forest Institute, the coordinator of the project. "Many of the forests in Morocco and Tunisia have degraded in recent years due to climate change and local people cutting down trees."

AGORA, a three-year project funded with close to € 1 million by the European Commission, started at the beginning of 2010 and will end at the end of 2012. Six institutions from Morocco, Turkey, Portugal, Tunisia, Italy and France joined the project. "The main aim of this project was to improve the scientific

knowledge and capabilities in Morocco and Tunisia, with regard to sustainable management of their forests," says Palahi. The project does not focus on the science itself, but on its implementation. "We are not training people in how to manage forests, we are preparing the scientists to be able to instruct decision makers and managers in how to manage a forest," says Palahi.

An important research capability that must be developed is the understanding of how forests can cope with climate change. "We have evidence that the temperature in North Africa has risen on average two degrees Celsius, and rainfall is also decreasing and changing its pattern," says Palahi. One of the questions is whether tree species will be able to adapt to these accelerated changes. "We don't know yet, and we need to understand the genetic component very well," says Palahi.

## Participants

Finland (Coordinator), France, Italy, Morocco, Portugal, Tunisia, Turkey

[www.efi.int/portal](http://www.efi.int/portal)

FP7	Proj. N°	245482	Total costs:	€ 1 200 000	EU contribution:	€ 900 000	Duration:	from: Jan. 2010	to: Dec. 2012
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A second need is the development of new "tools" specific to the Mediterranean environment. Unlike northern forests, which are mainly exploited for their timber, forests in the Mediterranean are much more multifunctional. "We have a lot of different products, from cork to mushrooms to aromatic plants. Forests also play an important role in the control of land erosion and water resources, and therefore we need a new approach to forest management," says Palahi.

Germany is the role model for forest management, but their techniques are not readily applicable to the Mediterranean. "The challenge is to change this paradigm of forest management and really address the nature and specificities of the forests in our region."

But the need for expertise developed in Europe will remain very important. Therefore, a key role of AGORA is the stimulation of "twinning" between the best scientific organizations in Europe with institutions in Morocco and Tunisia. And here the project has been very successful. "Agora has emerged as a dynamic platform allowing communication

among scientists from all these countries," says Palahi.

AGORA has been so successful in setting up a scientific infrastructure that the European Commission approved a follow-up programme, called FORESTERRA (Enhancing forest research in the Mediterranean through improved coordination and integration). Started at the beginning of 2012 it involves the other Mediterranean countries.

Palahi stresses the importance of such a programme: "North Africa is now facing climate problems that we will have in Spain, France and Italy in the coming 20-30 years."

The project proved its worth in Morocco and Tunisia, and for these countries it was also an eye-opener, according to Palahi. "We found the good young scientists and for the first time 22-23 year olds are going abroad to do research. For them it's an amazing opportunity."

## BLUEFIN TUNA

# An eye in the sky to track tuna

*The bluefin tuna is one of the world's great voyagers. It must continuously swim in order to ventilate, generating enough heat to maintain its vital organs and elevate its body temperature above that of the water. Travelling 100km a day at speeds of up to 70km/hour, it is capable of crossing oceans in epic wanderings, but always returning to where it was born for spawning.*

But such extraordinary migratory feats have made bluefin tuna habits more elusive for scientists and conservationists at a time when this magnificent fish is under threat from overfishing. Now, however, research has found a way to use satellite remote sensing data to track bluefin in real time, offering hope that a clearer picture of their migratory patterns might lead to better protection of their endangered stocks.

The new model developed by scientists from the European Commission's Joint Research Centre (JRC) – alongside partners from the French Research Institute for Exploitation of the Sea (Ifremer) – allows the potential presence of bluefins to be tracked through daily updated maps. For the first time, it provides an overall view of their preferred feeding and spawning habitats in the Mediterranean Sea, as well as changes over time.

This is crucial for a stock that has seen its numbers collapse over the past half century. The findings, which can also be adapted to other

threatened species, could also help combat the notorious misreporting by fishermen who often insist that stocks are healthier than they really are, while catching more than they officially claim. The publicly available satellite imagery could thus prove a valuable tool for monitoring fishing practices and ensuring that the EU lives up to its principles when it comes to building sustainable fisheries.

The model's innovative approach uses satellite data on the concentration of chlorophyll on the sea surface to identify potential feeding areas, as well as temperature to determine spawning sites. Jean-Noel Druon, who leads the research at the JRC, says the results highlight how bluefin feeding and spawning is concentrated in distinct recurrent locations. "It was a real scientific challenge to derive the bluefin tuna's potential habitat because it migrates over thousands of kilometres, notably from the North Atlantic for feeding to the Mediterranean Sea for spawning," he says.

## Participants

Italy (Coordinator), France

<http://ipsc.jrc.ec.europa.eu/news.php?id=41>

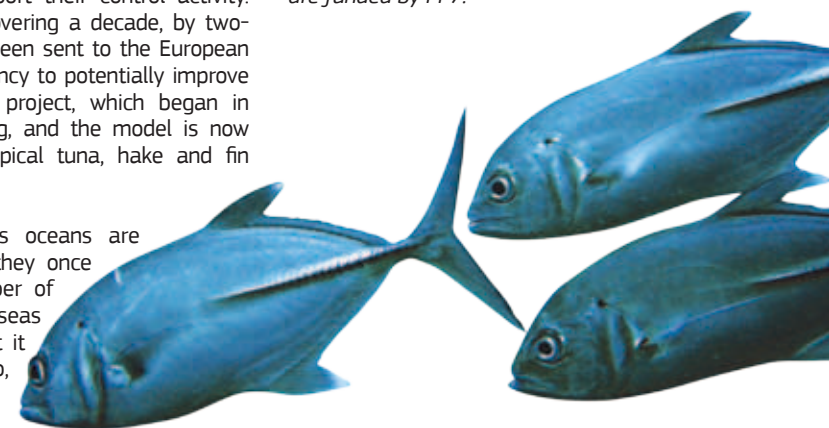
Although spawning grounds generally follow an East-West progression from the eastern Mediterranean in May to the Balearic Islands area in June/July, Druon was still surprised by the high variability. "Some recurrent areas for spawning were unfavourable in a given year and some other areas presented particularly good conditions for reproduction for a specific year, like the one around Sardinia in July 2006", he says.

The research is already being used: real time maps were sent in 2011 during the bluefin tuna fishing season to control authorities of two EU member states in the Mediterranean area, who used it to support their control activity. And habitat maps covering a decade, by two-week periods, have been sent to the European Fisheries Control Agency to potentially improve monitoring. But the project, which began in 2008, is still ongoing, and the model is now being applied to tropical tuna, hake and fin whale.

Although the world's oceans are a shadow of what they once were, and the number of fish swimming the seas is a fraction of what it was a century ago,

research like this tuna tracking could help reverse the tide and contribute to a more effective fisheries management, thus helping Europe tackle some of its environmental and food security challenges. "We hope the insight on migration patterns and habitat change that this project brings could not only improve fisheries management but also lead to a rebuilding of stocks," says Druon.

*The European Commission's in-house science service, the Joint Research Centre, carries out direct research funded by the European Commission's Framework Programmes. Research activities showcased in this publication are funded by FP7.*



C8

# Aerosols: pollutants from afar

*You may be surprised at what can affect our climate. You always hear about the burning of fossil fuels. But what if you lived in Cyprus? Would you expect atmospheric conditions there to be affected by the sands of the Sahara, wood burning in the Ukraine and the monsoons in India? The culprit in Cyprus is dust, natural dust from sand storms or man-made dust from the tiny sulphur compounds produced by burning wood.*

These types of very fine dust particles in the atmosphere are called aerosols. And they are playing an increasingly important role in the climate of the Eastern Mediterranean.

To understand the interaction of aerosols with climate change in this region, Professor Jos Lelieveld, the director of the Max Planck Institute of Atmospheric Chemistry, obtained a grant of € 2.2 million from the European Research Council for the C8 project (Consistent computation of the chemistry-cloud continuum and climate change in Cyprus). The 60-month project started in January 2009 and is hosted by The Cyprus Institute in Nicosia. It was part of the European "Ideas" programme -innovative projects on the "edge" of current research, explains Panos Hadjinicolaou, a researcher at The Cyprus Institute and a participant in the project. "We are studying

the effects of atmospheric chemistry and aerosols in the climate of our region and their feedbacks," says Hadjinicolaou.

For this research, the Eastern Mediterranean provided an interesting backdrop because it has temperatures rising faster than in other areas, making it a hotspot for climate change. Cyprus, for its little local industrial pollution, experiences also high levels of ozone and particulate matter pollution. However, most of the aerosols are blown in from outside the region, coming from the sandstorms in the Sahara and the burning of wood in Eastern Europe. Another effect is the increased levels of transported ozone-forming substances in combination with the cloud-free and intense sunlight conditions, which result in higher concentrations of ground-level ozone, making the Mediterranean also an ozone hotspot.

## Participants

Cyprus (Beneficiary)

<http://erc.europa.eu>

FP7	Proj. N° : 226144	Total costs: € 2 200 000	EU contribution: € 2 200 000	Duration: from: Jan. 2009 to: Dec. 2013
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Researchers discovered a connection between the northerly winds and the rainfall in South Asia, during the Indian Monsoon. "There is a spectacular synchronisation between these two phenomena: the onset of the monsoons in India in the summer, and the appearance of the strong northerly winds in the Eastern Mediterranean that it may control the episodes of high-ozone pollution near the ground," says Hadjinicolaou.

To study these effects, the team uses results from meteorological data and terrestrial and satellite observations of aerosols and chemicals in the atmosphere. To understand these phenomena, they use computer-based climate models, such as those developed for the IPCC (Intergovernmental Panel on Climate Change). The C8 team is also downscaling the projections of these models to make them

usable for the assessment of climate on a regional scale.

These models also include the effects of the interaction of aerosols with clouds. First results indicate that in regions influenced by desert dust, the ability of particles to take-up water and serve as cloud condensation nuclei can increase due to the mixing with air pollution. "Our ultimate goal, is to implement these processes in a high-resolution, long-term model simulation and see how cloud formation and rain are affected by aerosols in the region in a changing climate," says Hadjinicolaou.

This research will develop methods and spur similar research in other Mediterranean regions, including European efforts to include research in North Africa and the Middle East in its Euro-Med project.



CB-WR-MED

# Conserving our most valuable resource

*The Mediterranean Basin is one of the regions in the world most vulnerable to climate change, as well as one of the most impacted by human water demand. Reduced river flows, lowered lake and ground water levels, and the drying up of wetlands are commonplace. Hotter, drier summers are predicted in the region with a progressive increase in the frequency and severity of droughts. The Mediterranean region therefore needs to implement a sustainable approach for managing its water resources, which is focused on conserving water and using it more efficiently. And this is where the ERA-Wide project: "Capacity Building for Direct Water Reuse in the Mediterranean Area (CB-WR-MED)" adds value.*

The main objective of CB-WR-MED is to increase the networking and scientific capacities of the Water Research and Technologies Centre (CERTE). Started in November 2010, the project also aims at establishing CERTE as an international centre of excellence by giving researchers the chance to fill the gaps in capacity building and develop a strategic development plan for the Centre.

CB-WR-MED's specific aims regarding sustainable water management (SWM) and water protection include: strengthening CERTE's capacities in innovative treatment and sanitation concepts, technology, knowledge and skills; as well as advanced water treatment and re-use.

"CB-WR-MED will greatly add to the knowledge on integrating wastewater to the community's water resources and is a vital component of sustainable water management (SWM). It will build expertise in wastewater treatment, enabling the multi-use of water and direct recycling while at the same time reducing water system pollution", says CB-WR-MED Project Coordinator, Dr. Eng. Latifa Bousselmi.

The project also wants to increase Tunisian and European science and technology cooperation in the environmental field and build capacity to address specific problems that Tunisia faces or that are global in nature. Crucially, it will improve the country's response to various socio-economic needs related to water management.

## Participants

Tunisia (Coordinator), Italy, France, Spain, United Kingdom

www.certe.mrt.tn									
FP7	Proj. N°	266609	Total costs:	€ 600 000	EU contribution:	€ 500 000	Duration:	from: Nov. 2010	to: Apr. 2013

CB-WR-MED intends to establish a permanent national "water cluster alliance" which will be based on all the Tunisian partners involved in European water-related projects collaborating effectively, thus ensuring continuity once the project ends. This water cluster alliance, comprising research centres, universities and technical centres, aims to provide a platform of opportunities for scientific exchanges at national and international level, and to offer support to decision makers.

The CB-WR-MED consortium brings together one Tunisian and four EU based organisations representing a well-defined mix of competencies and expertise. Alongside CERTE in Tunisia, the partners include Politecnico di Torino, (POLITO) in Italy; Centre National de Recherches Scientifiques (CNRS-LRGP) in France; Centre Tecnològic (CTM) in Spain; and Europe For Business Ltd. (EFB) in the United Kingdom. All parties involved share the common goals of improving and creating innovative technologies for water management.

With this impressive array of partners, all possessing complementary skills, coupled with a budget of over € 500,000, CB-WR-MED hopes to increase its capacity building and

develop a research plan that will contain all the technological and strategic tools necessary for the sustainable development of the Mediterranean Basin.



DEVCO-RDI

# Banishing the “black cloud”: How rice research could clear Egypt’s skies

*It’s a phenomenon known locally as the “black cloud”, and it plagues Egypt every autumn after the rice harvest: an estimated 4 million tonnes of rice straw is burnt every season, spewing some 80,000 tonnes of carbon dioxide into the skies. It leaves a choking, toxic layer of thick smog hanging just 25 meters above over the entire Nile valley for weeks, and adds to the already polluted air over the Cairo megalopolis.*

Although Egyptian authorities have tried to stop farmers from setting the straw ablaze, many ignore the appeals, saying it is easier to burn than bring it to government-affiliated recycling centres. Now, however, ingenious research could banish the black clouds: by turning the rice straw into products as varied as table tops, food supplements, and activated carbon for water filters. By showing how rice straw, husks and bran have value as commodities, it could not only chase away the autumn smoke, but also foster a hitherto untapped recycling business in the region.

“We’ve been looking into how this environmental burden can become a source of income,” says Amr Helal, a board member of the Egyptian Chamber of Industry and Engineering, who is leading key pilot projects researching different uses for rice waste. “I don’t call it rice waste. I call it rice residue, and I see it as a blessing rather than a curse.”

In one project, aided by a € 132,093 grant from the European Union, Helal and his research partners in Cairo, France and Germany have turned rice straw and husks into activated carbon and natural fibre plastic composites.

The research partnership converted the rice husks into activated carbon through the process of pyrolysis, which involves exposing fibres to a high temperature in an airless environment. The resulting material, with its high absorption capacity, is used commercially to purify water, oil and gas. For the natural fibre plastic composites – which are used to make furniture, marine decking and consumer goods – the husks and straw were first reduced into powders and granules, then mixed with plastic polymers, resulting in a material that is half the price of conventional polymer.

Another EU-funded project, supported by a € 154,000 EU grant, involves using rice’s

## Participants

Egypt (Coordinator), Germany,  
France

<http://ricencare.com/FundedProjectsDetails.aspx?FPID=3>

brown outer layer, the bran, for ‘nutraceuticals’, which are nutritional pharmaceuticals or food products that promise health and medical benefits like lowering blood pressure. Rice bran contains 65% of the total nutrient capacity of the grain, and is a potent source of vitamins, minerals, proteins and fibres.

It is usually used to feed cattle, because it turns rancid within a few hours of milling. However, the latest research, involving partners in Cairo and Germany, has stabilised the bran through an infrared heating process. Helal says the project has already succeeded in producing rice bran extract in pill form, and looking at mixing it with fish oils to get Omega 3 to create a unique dietary supplement.

While it may still be a while before these innovations are rolled out on a large scale, they have already attracted the interest of businesses in Europe, keen to partner production. And they offer the potential to rid Egypt of a blight that makes the rice harvest a bittersweet time of the year for locals. “Rice is a wonderful crop, but we should be

using all of it,” says Helal. “With smart research, we can create useful businesses, and at the same time cast out that vile black cloud.”

*This project has been financed by the European Neighbourhood and Partnership Instrument (ENPI) of the European Union.*



## DEVCO-RDI Sunny Vehicles

# The solar car driving Egypt into the future

### Participants

Egypt (Coordinator), Italy, United Kingdom

*It doesn't look much like the car of the future: the vehicle parked in a workshop in Sharm el-Sheikh, Egypt's Red Sea tourist haven, resembles nothing more than a golf cart or a milk float. But thanks to its pioneering solar technology, it could pave the way for the production of Egypt's first ever eco-friendly road vehicle.*

The prototype is one of four built by the Sunny Vehicles project, which is developing the solar-powered electric cars for the Egyptian passenger and light transport market. The eco-friendly machine converts sunlight into energy with photovoltaic cells on the roof, which means there are no-fuel costs and zero greenhouse gas dioxide emissions.

Project coordinator Ahmed Abdel Hafez says the initiative was driven mainly by environmental concerns. "Over the years, Sharm el-Sheikh has grown as a city," he says. "That's good for the economy but the increase in vehicles and emissions is making it dirty and unhealthy. We decided to do something to save our treasured city, so we built an eco-friendly, solar car."

Backed by a € 246,975 grant from the European Commission, Sunny Vehicles is also supported by local Sharm El Sheikh-based engineering firm Airtec, Egypt's

Mansura and Suez Canal universities, the Egyptian Establishment for Import - Export and Communications Agencies (BISO) and Jordan's Royal Scientific Society, as well as Italy's Comcor Engineering and University of Modena, both of which work with famed Italian car brands Ferrari, Lamborghini and Fiat.

The main prototype, which the team hopes to develop into a two-seater city run around car or small transport vehicle, can travel at 40-50km/h with around 80km autonomy. However, the team has also developed a sportier, dune buggy, which can be used for desert, and reaches 100km/h.

The innovative simplicity of cars lies in the charging process: each vehicle takes about ten hours to fully charge and any excess energy is stored in the batteries for cloudy days or night time. "Charging is not a problem," Hafez says. "Sharm el-Sheikh is a city full of sunshine; the

sun glows 365 days a year for more than 10 hours a day."

There are other advantages: the solar panels work silently so they don't add to the noise pollution already on the road; and the electric motor is more efficient and quiet than a petrol engine, with few vibrations produced by the smaller, lighter and easier to maintain motor. Much work remains to be done before Sunny Vehicles is ready to go into production, including cutting the cost of materials, and boosting the performance of the solar cells and batteries. "But every day we learn something new, and use it to improve the car," says Hafez.

In June 2011, the prototype has already been showcased around the country. Hafez talks of using the technology in buses and boats in Egypt's tourist centres, and says the zero emission electric motors

will help transform the image of the region. "It is easy: you do not have to pay anything, so long as the sun shines," he says.

*This project has been financed by the European Neighbourhood and Partnership Instrument (ENPI) of the European Union.*



EFAS

# A European Flood Alert System to protect Europe's cities

Participants

Italy (Coordinator)

<http://ies.jrc.ec.europa.eu/our-activities/support-for-member-states/euopen-flood-alert-system.html>

*In August 2002 Europe was struck by a disastrous flood when the Elbe and Danube overflowed, affecting the Czech Republic, Austria, Germany, Slovakia, Poland, Hungary, Romania and Croatia. The cities of Dresden and Prague particularly suffered extensive damage. In response to this disaster, the European Commission's in-house science service, the Joint Research Centre (JRC), launched the European Flood Awareness System (EFAS).*

In 2010, when a big flood hit Poland, the Czech Republic, Germany, Hungary, Slovakia and Serbia, the situation was quite different. National authorities had improved their communication strategies between the countries. Furthermore, EFAS allowed for combined efforts to result in an overall much more efficient response to the crisis. "It was a big success for EFAS; floods were forecast and flood alerts were issued well in advance" says Jutta Thielen del Pozo, a meteorology researcher who leads EFAS at the JRC. The Monitoring and Information Centre (MIC) operated by the European Commission, which coordinates civil protection internationally was also alerted.

"Aid management was improved during the 2010 crisis, and MIC also used our forecast

extensively to keep track of the situation in the many countries affected, resulting in the emergency being successfully dealt with," says Thielen del Pozo.

"Our mission is to give an overview, to inform the National water authorities and international civil protection services a little bit earlier, so they are prepared and can organise actions and aid quicker," says Thielen del Pozo.

There are now 32 EFAS partners, mainly national and regional hydrological authorities. EFAS sends warnings to these partners from 3 to 10 days in advance. These partners can also consult the EFAS Flood Portal on a daily basis. The portal issues maps of Europe where danger zones are indicated by "hot spots". EFAS collects weather information and

forecasts, such as rainfall, twice a day from different weather services in Europe and from over 2000 ground stations that cover all the river basins in Europe. "You would see a hot spot when there is a probability for exceeding certain thresholds," says Thielen del Pozo.

And when these data reflect a danger for floods, EFAS informs the partners. In 2011 EFAS issued 9 alerts.

Besides earlier warnings, EFAS has also increased communication between national authorities, as meetings and training for members are organised, "The Danube is shared by 18 countries and our meetings have contributed to exchange of information between the authorities. This is important because river conditions in one country can cause problems in another country downstream.

"The Rhine is another example, and a common trans-national forecasting system has been developed between the Netherlands, Germany France and Switzerland " says Thielen del Pozo, "but for many other river basins EFAS

is the only system providing trans-national overviews and forecasts for the entire basin."

*The European Commission's in-house science service, the Joint Research Centre, carries out direct research funded by the European Commission's Framework Programmes. Research activities showcased in this publication are funded by FP7.*



EFFIS

# Reducing forest-fire danger and damage on a European scale

*About one million hectares of forests, which corresponds to one third the size of Belgium, are destroyed by fire every year in the Mediterranean basin. Forests are an important economic resource in that region, and the loss of forests weighs on the economies of the affected countries, especially in North Africa where a warming of 2 degrees Celsius and decreasing rainfall has been recorded. It is expected that climate change in North Africa will substantially increase the yearly losses to fire.*

In 1998, the European Commission's in-house science service, the Joint Research Centre (JRC), created a research group to develop advanced methods for the evaluation of forest-fire danger, and the mapping of burnt areas, covering the whole of Europe. The European Forest Fire Information System (EFFIS) became operational in 2000. Over the years, most EU member states, and neighboring countries, including Turkey, joined the network. "The main objective of EFFIS is providing support to forest and civil protection services of the EU and the

Member States," says Jesus San Miguel Ayanz, a JRC researcher and the coordinator of EFFIS.

EFFIS developed several techniques that allow a better assessment of fire damage and high risk areas. Methods to rapidly assess fire damage in Europe were introduced in 2000, allowing the creation of European forest fire danger maps and real-time high-resolution fire damage maps that are updated daily. These maps are available on the web to the public and indicate fire-danger zones for seven days. "What we predict is the probability that a fire could spread over a very large area," says San Miguel Ayanz, who adds that the warning time will be extended to 15 days in the future: "This information increases the preparedness of these countries, they can reshuffle the means for firefighting that they have". These forecasts are based on daily weather forecasts for all of Europe obtained from metrological services. The aim of the forecasts is to

Participants

Italy (Coordinator)

<http://ies.jrc.ec.europa.eu/news/255/15/EFFIS-going-global.html>

increase fire prevention, preparedness, and fire fighting capabilities. EFFIS also set up a European-scale database of forest fires, encouraging a number of countries to join.

An interesting result is that the number of fires and burnt has not increased in the last decade, probably thanks to a quicker response by firefighters. This possibly mitigates the effect of climate change, argues San Miguel Ayanz, which has been noticeable. "The fire season is becoming longer, instead of June to September, it now extends from March to October".

A network of experts on forest fire meets regularly with the EFFIS members. Recently, representatives of countries in the Middle East and North Africa (MENA): Morocco, Algeria, Tunisia, Lebanon and Syria took part in these meetings, and plans are now on the table to include MENA countries in the EFFIS network; they are expected to join EFFIS in 2012. "I am very positive that we will have them on board," say San Miguel Ayanz. Some countries have already set up bilateral collaborations, such as Italy with Tunisia and Spain with Morocco, he reports.

Advantages for MENA countries will be the availability of experts to build up a network

and also the possibility of applying many of the technologies already in use in Europe. For the European Mediterranean countries, experience gained in North Africa will allow them to prepare for similar conditions of global warming expected to take place in about 20 years.

Another important role of EFFIS is the dissemination of scientific information. "We try to use EFFIS as much as possible to link their research findings to the operations," says San Miguel Ayanz. Research findings are presented at the experts' meetings. "We are dealing with members from forest services and civil protection, and they are usually not so aware of new research results. It is a good instrument to link research and policy making at the operational level."

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ENEA-MATS

## Egypt taps into solar

### Participants

Italy (Coordinator), Egypt, France, Germany, United Kingdom

[www.2020-horizon.com/Multipurpose-Applications-by-Thermodynamic-Solar-\(MATS\)-s25077.html](http://www.2020-horizon.com/Multipurpose-Applications-by-Thermodynamic-Solar-(MATS)-s25077.html)

FP7	Proj. N°	268219	Total costs:	€ 20 500 000	EU contribution:	€ 12 000 000	Duration:	from:	July 2011
							to:		Jan. 2015

*The vast majority of Egypt's power is currently provided by natural gas-fired power stations. Recently however, the country's government has pledged to generate 20% of its power from renewable sources by 2020 (12% from grid-connected wind turbines and 8% from hydro, solar and other renewables). This implies adding a capacity of about 7000 MW of wind and approximately 1000 MW of solar power technologies*

A € 12.5 million EU-funded project in the country aims at taking the first tentative steps to fulfilling this promise by exploiting the abundance of solar energy and providing adequate local requirements for power and heat.

The Multipurpose Applications by Thermodynamic Solar or MATS project began as recently as July 2011. Within 42 months, this ambitious initiative intends to build a plant capable of producing electricity, heat, cooling, and desalinated water, by using solar energy integrated with other energy sources which are available locally.

The MATS project is divided into three phases. The first phase will see each component of the system being developed via experimentation and numerical modelling, while the second will involve the construction of the actual

plant near Alexandria on the Mediterranean coast. The last phase will be devoted to experimental demonstration in the plant, which is expected to produce, each year, more than 3.000 MWh of electricity and about 8.900 MWh of thermal energy.

The Concentrating Solar Power (CSP) technology due to be used in the plant has been developed by ENEA, the Italian national agency for new technologies, energy and sustainable economic development. The technology will use molten salts as heat transfer fluid and will produce heat and power from solar sources integrated with renewable fuels, such as biomass, biogas and industrial residues.

"The thermal energy produced in this plant will be the energy source in a desalination unit as well as for the heating and cooling of the surrounding area," says MATS Project

Co-ordinator, Fabrizio Fabrizi. "The plant will produce energy "on demand" due to the integration with a back-up system containing various alternative fuels. This makes the system flexible and allows for continuous power production."

The MATS project brings together partners from the research and industry fields of various countries. Working alongside Italy's ENEA there are research partners from France, United Kingdom, Germany and indeed Egypt. In addition, industrial partners from Italy and Egypt will feature.

"It is expected that the work carried out over the coming years will validate the new technology in Egypt which as we all know is a perfect location for solar irradiation," says Fabrizi. And it is not only Egypt that stands to benefit. "All things going well, this approach may well be replicated across the Mediterranean," he adds.

The project's replication would in fact see the MATS project spreading even more good news across the Mediterranean region. Technology transfer, skills training, and job creation are just some of the future benefits being mentioned.





# FATE

## Monitoring pollution in Europe: what and where

### Participants

Italy (Coordinator)

<http://ies.jrc.ec.europa.eu/our-activities/scientific-achievements/the-fate.html>

*Imagine you are an enthusiastic gardener and cherish a perfect lawn. Instead of picking the weeds by hand you use an herbicide that kills all the weeds except the grass. The result is that you will have added a considerable amount of chemicals to the soil, some of which are nasty, persistent and will stay around for a long time. The rain will transport these chemicals via sewage systems to rivers, and ultimately these chemicals will end up somewhere, in lakes or the sea. There they will enter the food chain, and be part of your next fish dinner.*

Trying to keep track of how pollutants spread through the soil, ground water, and rivers, and how they are transformed is the aim of FATE (Fate and impacts of pollutants in terrestrial and aquatic ecosystems), a research action by the European Commission's in-house science service, the Joint Research Centre (JRC). "We work with different groups dealing with environmental policies and colleagues in the European Commission, providing the scientific" underpinning for the actions to be taken," says Giovanni Bidoglio, unit head of "water resources" in the JRC.

A wide range of pollutants affect the terrestrial and aquatic ecosystem. They originate from industry, the use of motor vehicles, pharmaceuticals and farming, such as the use of fertilizers, pesticides and herbicides.

An important activity is finding out where these compounds are released into the ecosystem. FATE coordinates several monitoring programmes and collects data from a number of laboratories in different European countries. This activity also includes collecting data about how the pollutants distribute themselves in the ecosystem by several mechanisms, such as rain, sewage, and waste disposal. FATE also acts as an intermediary between local laboratories and the European Commission regarding compliance to permitted levels of certain pollutants, where the measurement techniques must be comparable.

A second activity is trying to understand the mechanisms influencing the distribution of pollutants, such as the transport through the atmosphere of PCBs (Polychlorinated biphenyl

compounds, highly toxic products that are not biodegradable). This is done by a dedicated team, using computer modeling. They help create maps identifying high risk areas, and areas that are vulnerable. For example, the presence of certain endocrine disrupters (compounds that affect hormonal systems in animals and humans) in rivers can interfere with the reproduction cycle of certain fish, but also end up in human food, explains Bidoglio.

The result of gathering this data is the creation of data bases and interactive maps. These maps show hotspots of pollutants, and

also the areas that are specifically vulnerable. They also show how certain pollution levels evolve over time and change their location. Also by looking at different scenarios policy makers can be advised on what actions should be taken.

*The European Commission's in-house science service, the Joint Research Centre, carries out direct research funded by the European Commission's Framework Programmes. Research activities showcased in this publication are funded by FP7.*



IES

# Cleaning up Europe's rivers

*Inland freshwater rivers and streams are the arteries of Europe's waterways. However, as they flow to the coast they not only transport nutrients and wildlife, but also chemicals and contaminants. Human activity such as agriculture, industry and wastewater all has an effect on the quality of the ecosystems.*

To tackle this problem the EU's Water Framework Directive (WFD), established in 2000, provides EU legislation that promotes the sustainable use of resources and a greener Europe. During the past decade all EU member states were obliged to establish methods to monitor ecological quality of their lakes, rivers and coastal waters.

There has been a coordination effort by the European Commission's in-house science service, the Joint Research Centre (JRC), and experts from all EU countries are working together, compiling databases and harmonising the WFD environmental objectives across the EU. In 2008, a first set

of results was completed, defining a comprehensive set of targets, and a second wave of results is expected to be published this year, completing the work.

Coordinating all 27 EU member states is no mean feat. Hundreds of scientists across the EU have worked together to record and share results of ecosystem analysis. "All the EU countries have to establish methods to quantify the ecological status of their rivers, lakes and coastal waters. Good Ecological Status (GES) means that biological indicators – things like fish, plants and animals that live in the water show healthy conditions. We are making sure GES has the same meaning in all

## Participants

Italy (Coordinator)

<http://ies.jrc.ec.europa.eu/our-activities/support-for-eu-policies/european-aquatic-ecosystems.html>

the different countries in Europe," says Wouter van de Bund, coordinator of the project at the JRC.

"Thanks to the coordinated efforts of scientists from all Member States, we have managed to establish methodologies in most EU countries so they can achieve good ecological status and can be comparable across Europe," continues van de Bund.

Several thousand new chemicals enter European water systems each year but knowledge of the long-term environmental effects is far from complete. This triggers a vicious circle: because little is known of their effects, substances are not regulated, and therefore not monitored.

The only way to break out of this circle is to perform investigative monitoring. The European Commission aims to compile a

sound database of new substances providing the scientific foundation for new legislative monitoring obligations to be drawn up.

By analysing samples and using innovative predictive tools for modelling pollutants in rivers and coastal zones, scientists are tracking the path pollutants take in river systems.

And what can be measured can also be monitored. Monitoring serves not only to rate the quality of EU water systems, but also to ensure policy is having the desired effect.

*The European Commission's in-house science service, the Joint Research Centre, carries out direct research funded by the European Commission's Framework Programmes. Research activities showcased in this publication are funded by FP7.*



INCAM

# Sustainable Lebanon: preserving natural resources for the future

## Participants

Lebanon (Coordinator), France,  
Italy

[www.cnrs.edu.lb](http://www.cnrs.edu.lb)

FP7	Proj. N°	265419	Total costs:	€ 600 000	EU contribution:	€ 500 000	Duration:	from:	Jan. 2011
							to:	Dec. 2012	

*Driving along a stretch of Lebanon's scenic Mediterranean coast, one might not realise that the country is dealing with major environmental challenges.*

*Groundwater is flowing into the sea, while at the same time salt water is seeping into coastal lands. Rainfall and river flows have been falling for the past 30 years. Development along the coast, where more than 70% of the country's population lives, is disrupting marine ecosystems.*

Over-forested and degraded land is threatening the country's wealth of biodiversity. Agricultural lands for olive orchards and other crops are being damaged. Unregulated quarrying has deteriorated coastal mountain ecosystems and soil quality. And, only a small portion of solid waste is being recycled or composted.

These trends are having effects across society and the economy, impacting health, energy agriculture, production, transportation and tourism.

In 2011, an EU-funded project began an in-depth analysis of these challenges with an eye toward developing long-term solutions. Whether speaking of the lush Yammouneh Valley, the threatened bottlenose dolphin, pristine forestlands or Lake Qaraoun, Lebanon has a long list of treasures in need of preservation.

The project – “Improving National Assessment and Monitoring Capacities for Integrated Environmental and Coastal Ecosystem Management,” or INCAM – is being led by the prestigious National Council for Scientific Research (CNRS) in Beirut.

The two-year project, which is supported by € 500,000 in European Commission funding, includes as partners the Institute of Research for Development in France and the Mediterranean Agronomic Institute of Bari in Italy.

The initiative not only reflects the EU's growing cooperation with its neighbours in Mediterranean-wide research efforts, but also an evolving environmental consciousness in Lebanon.

“If you would talk to people on the street, many would say that they lack confidence in our ability to manage natural resources and protect the environment,” said CNRS researcher Elise Noujeim. “But recently, sensitivity toward the environment has been growing. A new generation is becoming aware about issues such as energy and recycling. And as a country, we are trying to do as much as possible.”

The main objective of the INCAM project is strengthening CNRS' capacities and expanding staff training and education – all directed toward transforming the institute into a centre of excellence. The ultimate goals are to find solutions for Lebanon's environmental challenges, broaden the role of government decision-makers, and even redefine the country's own understanding of what it means to live and work sustainably.

The foundation of INCAM is an exhaustive environmental inventory of the country – on land, in the sea and, most importantly, along the coast. “We have collected as much information as possible about our natural resources,” Noujeim said. The inventory itself is built upon an extensive database being supported by CNRS'

French partner, the Institute of Research for Development.

With a complete inventory, Noujeim said, CNRS will develop a five-year roadmap to improve the protection and management of the country's natural resources. INCAM's research will assess the current condition of natural resources, support sustainable development, and improve integrated resource management with special attention on coastal and marine ecosystems.

The environment will not be the only beneficiary of INCAM. CNRS staff members will attend training sessions at EU research institutes, and the project is expected to stimulate interest among students to pursue advanced degrees in environmental disciplines.

From a European perspective, the INCAM project stands to provide a wide range of benefits. CNRS' Italian partner, the Mediterranean Agronomic Institute of Bari, will distribute the project's findings throughout the European research community. An EU-Lebanon knowledge-sharing system will be built, Euro-Mediterranean research and training collaboration will be enhanced, and INCAM's findings will assist the European Commission in developing future policies.

JOIN-MED

# Helping industry conserve the world's most valuable asset

*It may have been missed by the rest of the world but the Mediterranean's southern rim is brimming with a tech-savvy citizenry: the region has witnessed a booming ICT sector in recent years with many new businesses sprouting up in areas as varied as healthcare, interactive learning and intelligent transport systems (ITS).*

Yet for all the technological ingenuity coming out of the southern Mediterranean, the most ambitious ICT researchers are stymied by scale and limited by the boundaries of national research policies. Now, however, a new initiative is bringing ICT research organisations from both shores of the Mediterranean into support networks so they can learn from one another.

The aim of the initiative, JOIN-MED, is to promote closer research co-operation across the region. Although each country currently has its own national research programmes, they often duplicate their neighbouring counterparts, while being too fragmented to produce worthwhile results.

JOIN-MED's project co-ordinator, Raphael Koumeri, says the initiative has shown researchers in the southern Mediterranean how cooperation can give a huge boost to their efforts. "They have very clever people, but they spend their time doing research as individuals,"

he says. "We tell them that they are often doing the same or complementary research. Since they are often short of cash and infrastructure, it makes sense to work together. We have been doing this in Europe for a while, but in the southern Mediterranean, they are unused to it."

The two-and-a-half year JOIN-MED project, which received a € 910,000 grant from the European Commission, gathers partner institutes and universities in Germany, Morocco, Tunisia, Algeria, Lebanon, Syria, Egypt, Cyprus, the Palestinian territories and Jordan. It supports networking in two key ways. Firstly, with an interactive web directory of research organisations from both the European Union and the Mediterranean partner countries. And secondly, through cross-regional networking events that bring the key players together.

ICT research is already playing an increasingly important role in the entire region, not only with strong teams at universities and institutes but

## Participants

*Greece (Coordinator), Algeria, Cyprus, Egypt, Germany, Jordan, Lebanon, Morocco, Palestinian-administered areas, Syrian Arab Republic, Tunisia*

[www.join-med.eu](http://www.join-med.eu)

FP7	Proj. N°	231550	Total costs:	€ 1 100 000	EU contribution:	€ 900 000	Duration:	from: Feb. 2009	to: July 2011
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also with emerging research policies guiding the future development. And there is the potential for much more. In Tunisia alone, where the ICT sector jumped from an already impressive 10% of GDP in 2009 to 13% in 2011, some 33% of students are oriented towards computer science, 38% of the population is connected to Internet, and one out of five Tunisians are connected to social networks.

JOIN-MED's programming partner Thies Wittig says that further down the line, the project could offer the Mediterranean countries the chance to get involved in EU research projects. "Many of them would be excellent partners," he says.

But the main achievement of the project has been to bring researchers together. "We've been able to create a new mindset. They have learned to meet and work together, which was not in their mentality before," Wittig says, pointing out that a lack of opportunity meant they had no idea about possible partners, or how to get in touch. "Now they understand how important it can be. And they now talk amongst each other, whereas before they used to hide from each other."

It was only in the 1980s, some three decades after the European project began, that the EU launched its own research programme. Mediterranean countries are a long way from developing equivalent programmes, but this could at least represent the start of a new approach by key players in the region to their common IT research challenges.



## MAP2ERA

# Boosting research on Morocco's medicinal plants

## Participants

Morocco (Coordinator),  
Germany, France, Spain

[www.usmba.ac.ma](http://www.usmba.ac.ma)

FP7	Proj. N°	266575	Total costs:	€ 500 000	EU contribution:	€ 400 000	Duration:	from: Dec. 2010	to: Nov. 2012
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*The use of plants in medicine is as old as medicine itself. Today, in the age of high-tech drug design, the pharmaceutical industry continues to draw on naturally occurring compounds in its search for new treatments. The fragrance and nutritional supplement industries are perhaps even more reliant on plant-sourced chemicals.*

But where to find them? Morocco is a country rich in untapped medicinal and aromatic plant life. Morocco's Institut National des Plantes Médicinales et Aromatiques (INPMA) estimates that there are around 4,200 species to be found there, of which 800 are found only within the kingdom.

Of course, investment in such research is not as plentiful in Morocco as it is in Europe. The MAP2ERA project, made possible by a contribution of € 442,605 from the EU, is therefore a much needed boost. The project was launched in December 2010 to run for two years and its overarching goal is to reinforce the international research cooperation between INMAP and scientists in Europe.

MAP2ERA is the first EU-funded research project to be coordinated by a Moroccan university. It is also therefore leading the way

in drawing Morocco closer to the European Research Area (ERA). This integration, says Professor Abdessalam El Khanchoufi, Director of INPMA and Scientific Project Leader for MAP2ERA, is of mutual benefit, not only from a scientific point of view, but also for its "considerable political and strategic virtues".

The three project partners are the Institut de Chimie des Substances Naturelles (ICSN) in France, the University of Alicante in Spain and Giraf PM, a German project management company.

The project is not yet completed but, according to Professor El Khanchoufi, it is "already an undeniable success".



Project researchers have published in journals and books, and patents have been filed. Small businesses are being set up to exploit the early findings.

One of the fundamental goals of the project is to help with the training and networking of the INPMA researchers. This, too, has been a success with the first network and training event resulting in the filing of an application for a new research project in the field of renewable biowaste. In this way, MAP2ERA may have encouraged further research collaboration between Morocco and the EU.

Meanwhile, three researchers from INPMA currently benefit from internships at the prestigious ICSN, and three more are soon to follow in their footsteps. Participating in MAP2ERA has aided INPMA's inclusion in the wider scientific community and the Institute has presented at several international conferences. Staff have built

strong links with researchers in the partner institutions.

These kinds of collaborative opportunities are rare for scientists in Morocco, despite their obvious benefit to industry and academia across the Mediterranean. As Professor El Khanchoufi says, "Morocco is a developing country and despite all efforts, national budgets dedicated to research remain very poor. Research remains a very expensive activity which cannot be performed seriously without partnerships with European research centres and private companies."

MAP2ERA is very much a pilot project, as yet uncompleted, but there are sufficient signs to suggest that it will indeed spur further collaboration between the north and the south shores of the Mediterranean and benefit all parties involved.



MEDISCO

# Mediterranean Magic

*We are in Domaine Neferis, one of Tunisia's most famous wineries. This 460 hectare vineyard is located in a green and prosperous area of the country where agriculture is the main industry. Making the perfect wine is an arduous process at the best of times. It demands a lot of sun, good soil, water and cold temperatures. But how do you install an environmentally friendly and sustainable cooling system in a country so warm?*

Enter the MEDiterranean food and agro industry applications of Solar COoling technologies - or MEDISCO as it is known. This European Commission funded initiative has developed and tested a refrigeration system driven by solar energy for the food and agro industry in the Mediterranean region. The three and a half year project that began in October 2006 took advantage of the local conditions in Tunisia and elsewhere and provides real results which are both economically and socially sustainable.

The only effective way of ensuring a more environmentally friendly energy supply is by using renewable energy. By going renewable, we will also be able to diversify our energy sources and reduce the dependence on gas, coal and oil. "We all get heat from sun. We feel it on our bodies when it's warm," says Prof. Mario Motta, MEDISCO's Project Coordinator. "We also derive electricity from solar energy but

who ever heard of getting cold from sun? That's what MEDISCO is about. It turns heat into cold. In a way, it's magic." Yet, to really understand the magician's trick, one has to look closely at how MEDISCO actually works.

The process involves single axis tracking concentrating collectors that essentially orient panels towards the sunlight. These collectors are capable of producing heat at about 200°C which in turn drives an absorption-refrigeration machine. This machine cools a water-glycol mixture up to negative temperatures of about -10°C.

"By using heat instead of electricity, the wine is kept at the correct temperature required during the wine production process. This temperature varies depending on the wine typology and time required," says Prof. Motta.

## Participants

Italy (Coordinator), Egypt, France, Germany, Morocco, Spain, Tunisia

www.polimi.it						
FP6	Proj. N°	32559	Total costs:	€ 2 600 000	EU contribution:	€ 1 400 000
Duration:		from:	Oct. 2006	to:		Mar. 2010

MEDISCO is also proving its worth in tests at a dairy factory in Marrakech, Morocco. Hot weather there has often caused large quantities of fresh milk to go off meaning it cannot be sold to the public. Rural areas in the country where there are simply not enough energy resources available to run cooling equipment have also been affected by the high temperatures.

The countries involved in MEDISCO are Germany, Italy, France, Tunisia, Egypt, Morocco and Spain. And with an investment of € 1.4 million, the European Union has high hopes for the project's future application.

"MEDISCO is totally relevant – we have proven that a new solar cooling concept works. The concept definitely has a future in hot and arid regions." says the Professor.

Indeed, experts echo the sentiment saying that the refrigeration system developed and tested by MEDISCO could really help the Mediterranean and indeed other areas with no conventional means of refrigeration due to a lack of water and non-existent or unreliable energy sources.



MEDIBTIKAR

# Operation Innovation

## Participants

Algeria, Egypt, Israel, Jordan,  
Lebanon, Morocco, Tunisia, Turkey,  
Syria, Occupied Palestinian Territory

[www.medibtikar.eu](http://www.medibtikar.eu)

*In 2006, several years before innovation became the buzz word across the world, the EuroMed Innovation and Technology Programme (Medibtikar) was making waves across the MEDA region. This three year, € 7.24 million programme successfully offered the Mediterranean Partner Countries (MPCs) new and improved instruments to stimulate innovation. It also encouraged networking between the MPCs and the European Union.*

The name Medibtikar is a combination of the words 'Mediterranean' and 'Ibtikar' - Arabic for innovation. The programme's beneficiary countries were Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Syria, the Palestinian Authority, Tunisia, and Turkey. And its beneficiary organisations were public and private entities concerned with increasing the competitiveness of small and medium-sized enterprises (SMEs). Medibtikar's operational base was in Cairo, Egypt.

From the outset, Medibtikar's ultimate goal was to provide the MPCs with new ways to stimulate innovation and networking. At the same time, the EU's expertise encouraged good practice in technology and knowledge transfer in administrations, enterprises, industry federations and chambers of commerce. The result of this recently gained expertise is new

innovation opportunities for SMEs across the region.

Medibtikar offered a plethora of services along what it calls "five axes of activities". The five include services to incubators and technoparks; the development of technology transfer mechanisms, finance for innovation; and finally, innovation management and sectoral support. The programme also developed various tools which were critical to its success. Training sessions and workshops crucial for future innovators were organised across the MEDA region and beyond. Meanwhile, reports, studies and guidebooks were produced and distributed to a database of relevant stakeholders. Crucially, high level meetings between key European and Mediterranean innovation figures were organised - these were vital for exchanging examples of best practice.

"Medibtikar has definitely helped administrations, SMEs, industrial federations, chambers of commerce and others to develop an innovation culture in business," says Medibtikar's Project Coordinator, Dr. Raimund Bröchler at INTRASOFT International. "It also supported the creation of intermediary organisations in charge of implementing support policies for SMEs, such as Innovation and Technology Centres, TechnoParks and Incubators as well as connecting beneficiary countries to well established European networks."

Medibtikar has achieved many notable successes. They include a feasibility study on the Regional Innovation Financing Facility (RIFF) in each beneficiary country. This study resulted in recommendations that addressed various deficiencies in financing schemes across the MEDA region.

In addition, local business support organisations joined the EU's "Enterprise Europe Network" providing SMEs in Egypt, Syria, Morocco and Tunisia access to a network of over 2,500 economics and technology experts in over 40 countries.

Cooperation has been a key feature in the programme. Besides being multi-country in scope, the Medibtikar also participated with international organisations such as the World Bank and UNESCO.

When Medibtikar finished in 2010, it was clear to all that the initiative had met its objectives. The programme had designed a myriad of innovation strategies and projects and developed an innovation culture for many businesses in the MEDA region. It also helped set up innovation organisations that have supported and will continue to support innovation in the years to come.

*This project has been financed by the MEDA programme of the European Union.*



MIRA

# Real Partnerships. Real Results

*The Mediterranean sea is a huge marine ecosystem with an area of 2.5 million km<sup>2</sup>. The wellbeing of this unique ecosystem is vital for the health of the 427 million people living in the countries around it and the 175 million visitors it receives each year. Nevertheless, it remains fragile and continues to deteriorate due to the devastating effects of pollution. Effective decontamination is crucial and this is just one area where the Mediterranean Innovation and Research coordination Action (MIRA) is making a welcome impact.*

Launched in 2008, MIRA is a dialogue and action platform encouraging scientific and technological collaboration between the Mediterranean Partner Countries (MPCs) and the EU Member States. To date, over 40 water-related projects have been undertaken in the region with an analysis of results due to shape the Horizon 2020 Initiative - itself aimed at decontaminating the Mediterranean Sea by 2020.

However, MIRA's scope goes beyond water decontamination. "We are constantly identifying other areas of common interests in order to create economic prosperity in the Mediterranean area. Energy, health and agriculture are just a few," says MIRA Coordinator, Prof. Rafael Rodriguez-Clemente.

With a network involving 30 partners in 20 countries, the MIRA platform gathers expert voices including leading scientific communities as well as policy makers and stakeholders, bridging the gap between policy and research. MIRA also provides state of the art information about EU and MPC scientific cooperation, offers training and capacity building, and organises events and workshops across the region to promote its work. Crucially, the project also provides vital feedback to the Monitoring Committee of the Euro-Mediterranean Cooperation (MoCo).

During the Euro-Mediterranean Partnership or Barcelona Process as it is also known, EU policy towards the Mediterranean countries became top priority. The EU and the MPCs expressed their shared wish for a Mediterranean space

## Participants

*Spain (Coordinator), Algeria, Bosna and Herzegovina, Cyprus, Egypt, France, Germany, Greece, Israel, Italy, Jordan, Lebanon, Malta, Montenegro, Morocco, Portugal, Tunisia, Turkey, United Kingdom, West Bank and Gaza Strip*

[www.csic.es/web/guest/home](http://www.csic.es/web/guest/home)

FP7	Proj. N°	211359	Total costs:	€ 4 900 000	EU contribution:	€ 3 900 000	Duration:	from:	Jan. 2008	to:	Dec. 2012
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of security, economic development and socio-cultural exchange, made possible through association agreements between both areas. MIRA's objectives are in line with the Barcelona Process in that it has a structuring effect on the Euro-Mediterranean Science, Technology and Innovation policy dialogue and creates partnerships with several stakeholders such as the Directorate General Enterprise and Industry of the European Commission, private enterprises and financial institutions.

Prof. Rodriguez-Clemente stresses MIRA's European dimension confirming the fact that the project is of such a scale that "no single Member State could have provided the necessary financial or personnel resources." MIRA support is thus a clear example of collaboration initiative that could have not been led by a single country which clearly shows the added value of EU involvement. Prof. Rodriguez-Clemente is also in no doubt

about the return on the EU's € 4 million investment in the project. "Results of MIRA are impacting the political decisions of the MPCs to participate actively in setting up a Euro-Mediterranean research and innovation space. The capacity building activities are now being used in bilateral cooperation projects to train a plethora of stakeholders. In addition, MIRA's cooperation with the European Research Area projects has provided a unique partnership between political authorities responsible for research and innovation and centres of excellence," he says.

The future is bright for MIRA which looks set to continue with further projects building on the impressive results already achieved throughout the Mediterranean area.

So, next time you're on holiday in southern Europe, be sure to look out for the "MIRA effect". You may be surprised.



## NARNIA

# Uncovering ancient history in the laboratory

*The world of archaeology has changed considerably since the days when wealthy enthusiasts such as Heinrich Schliemann excavated the site he believed was ancient Troy while Arthur Evans unearthed the spectacular Minoan palace of Knossos in Crete. While the shovel and the trowel are still important tools for finding ancient structures and artefacts, many of the exciting discoveries and breakthroughs are today being made in laboratories - a long way from the ancient remains.*

To support today's high-tech archaeology, a new generation of scientific researchers is emerging who are knowledgeable in archaeo-metallurgy, materials science, ceramic technology, DNA analysis etc. - to name but a few of the advanced techniques now available to throw light on the dating and usage of ancient sites hidden from view for hundreds or thousands of years.

Under the EC-funded NARNIA project an international group of universities and specialist private companies has been brought together to support young researchers wanting to enhance their skills in this area and develop long-term careers.

NARNIA-New Archaeological Research Network for Integrating Approaches to Ancient Material Studies - is an innovative endeavour to establish a highly-specialised research network to study ancient materials from the Eastern Mediterranean, a region of great

historical significance in the evolution of Europe and the Middle East.

Launched in 2010, the four-year project is supported through a € 4.6 million grant from the European Commission under the Marie Curie Initial Training Networks (ITN) programme.

NARNIA's raison d'être is to establish a broad partnership of research institutions and private enterprises. The project brings together university archaeology departments in Cyprus, the UK, France, Belgium and Jordan, together with research centres and specialist private organisations in Greece, Cyprus and the UK.

Through this comprehensive mobility scheme, young researchers will have the opportunity to continue their research careers at high profile universities and well-established private enterprises while working on research projects of great historical interest.

## Participants

Cyprus (Coordinator),  
Belgium, France, Greece,  
Jordan, United Kingdom

www.ucy.ac.cy									
FP7	Proj. N°	265010	Total costs:	€ 4 600 000	EU contribution:	€ 4 600 000	Duration:	from:	Dec. 2010
							to:	Nov. 2011	

"We aim to give these future archaeologists an awareness of the recent advances in technology and an understanding of their implications for theory and practice in the heritage environment," explained project coordinator, Dr Vasiliki Kassianidou, Associate Professor at the Archaeological Research Unit, Department of History and Archaeology, University of Cyprus.

"This well-structured research network aims to improve the career prospects for young researchers, develop their lab-based skills in the study of ancient materials, while contributing to the history and archaeology of the Eastern Mediterranean basin, a region of great historical, cultural and geopolitical significance."

The Eastern Mediterranean is an area rich in history and regularly throws up intriguing new finds which need the application of the latest scientific techniques and methodologies to properly understand their age, origin and function.

The discovery of the Uluburun shipwreck off the coast of south-west Turkey in 1982, for example, has led to great leaps in the understanding of the cultures and trading relations in the ancient past. The ship's cargo

of goods which included copper and tin ingots, jars with glass beads, olives, resin, ceramics, jewellery, weapons etc. has been extensively studied since then under laboratory conditions. Scientific dating of the hull and wood products showed that 15 metre transport ship sank some 3,300 years ago (built circa 1300 BC). Analysis of the contents has demonstrated the extent of trading links from northern Europe to Egypt via Cyprus (a major copper producer in the period) and extending as far west as Sicily. The ship transported products from nine or ten different cultures.

"Understanding patterns of trade in that era is another line of research which brings the most interesting results. It identifies, for example, that Cyprus was the most probable source for the copper used for the oxhide ingots found in Sardinia, France and Germany etc. This is helping with our understanding of the long-distance trade in the Eastern Mediterranean during the Bronze and early Iron Age," Dr Kassianidou says.

"The new generation of archaeological researchers we are encouraging will continue this good work into the future and help us better understand the fragments of our ancient history that we are unearthing in this region every day."

## PEGASO

# Brighter future for Mediterranean and Black Sea ecosystems

*Where better to enjoy a relaxing coastal trip than the Mediterranean? However, with large areas of this and the Black Sea basin under threat from environmental change, collaboration within the local scientific communities is more important than ever.*

Encouraging the development of analytical tools and data sharing is the aim of the EU-funded project PEGASO (People for Ecosystem-based Governance in Assessing Sustainable Development of Ocean and Coast).

“We want to link scientific results with decision making in these communities,” explains project co-ordinator Françoise Breton, who works at the Universitat Autònoma de Barcelona.

The four year project, which has benefitted from € 7 million EU funding, is integrating the work of 25 different institutions to create a database where researchers can pool their results. The Integrated Coastal Zone Management (ICZM) governance platform acts as a bridge between scientific communities and end users, allowing them to monitor changes and adapt conservation strategies, supporting the ICZM protocol for

the Mediterranean. This protocol was used for the first time in the Mediterranean, and the model is now forming the basis for solving similar problems in the Black Sea.

Furthermore, PEGASO is developing and refining tools to assess the sustainability of the coastal zones, which can be adapted to suit each partner organisation. Ten pilot zones have been identified, three in the Black Sea basin and seven in the Mediterranean, where the group is working with local experts to validate these tools.

Breton hopes this will allow the group to identify regions in danger of degradation, allowing targeted ecosystem conservation or rehabilitation efforts. “By analysing the health of the ecosystem we can help the decision makers tackle or even prevent the impact of, for example, climate change.”

## Participants

*Spain (Coordinator), Turkey, Romania, Switzerland, France, Belgium, Egypt, Italy, Lebanon, Morocco, Algeria, Croatia, Ukraine, Greece, United Kingdom*

<a href="http://www.uab.es">www.uab.es</a>							
FP7	Proj. N°	244170	Total costs:	€ 8 900 000	EU contribution:	€ 7 000 000	Duration: from: Feb. 2010 to: Jan. 2014

Currently halfway through the project, the team have received the support of all the countries in the Mediterranean and Black Sea basins, and are reviewing their specific needs.

“Our priorities are now to deepen the dataset by providing the best support for sharing results between the groups,” says Breton. “This way we can produce accurate accounts of the coastal and marine ecosystems.”

Among the tools under development are sets of indicators that will allow researchers to produce accurate maps of the coastal regions, the seabed and marine habitats. It is hoped that such maps will allow scientists to monitor changes in the ecosystem, and identify risk ‘hot spots’.

“Ten days of algal bloom reduces oxygen so much that marine species can die,” Breton explains. “If we can predict future events we can mitigate such problems.”

A central aim of PEGASO is that its work will continue to benefit researchers long after its completion in 2014. By setting up new methods of communication and data

sharing, Breton stresses that there will be long-lasting effects. Additionally, the training programmes offered aim to improve the current researchers’ skills, as well as allowing them to teach others.

Full integration of data across the regions will identify vulnerable sites and major environmental threats, allowing prioritisation of responses. The creation of sustainable planning guidelines will not only benefit scientific communities, but also local residents, the aquaculture and fishing industries, and will ensure that tourism is encouraged in an environmentally friendly way.

“The Mediterranean and Black Sea basins represent a vital resource upon which many millions depend, both economically and culturally. However, they face increasing pressures and environmental degradation,” adds Francesca Somma from the European Commission Joint Research Centre, a partner of the project. “The full implementation of the ICZM protocol would be a great step forward.”



PROCAS

# Mapping the vulnerability of Europe's seas

Participants

Italy (Coordinator)

<http://ies.jrc.ec.europa.eu/the-institute/units/global-environment-monitoring/action-21023.html>

*The seas are Europe's lifeblood. With the highest ratio of shoreline to land area of any continent, Europe is very much a maritime continent. Now, an EU-funded tool called EMIS (Environmental Marine Information System) allows policymakers and citizens to monitor those seas at the click of a button.*

This online database was created by the European Commission's in-house science service, the Joint Research Centre (JRC). Using data from satellites and computer models, EMIS provides current and historical data on all of Europe's seas, including surface temperature, salinity, and presence of plankton. By transforming raw data into a visual display, the software makes it easy for policymakers and the public to spot areas of concern and pick out trends over time.

"EMIS is a user-friendly tool which provides pan-European knowledge on marine matters. And that's a pre-requisite for any decision-making process related to coastal protection and the sustainable management of marine resources," says Nicolas Hoepffner from the JRC.

The reach of the European seas – the Mediterranean, Black, Baltic and North Seas, as well as the Atlantic Ocean – extends far

inland. The EU fishing industry is the fourth largest in the world, providing some 350,000 jobs, and Europe's coasts attract millions of tourists every year.

But some of Europe's seas are under threat. Nutrient runoff into the Baltic Sea has created some of the world's largest "dead zones" – areas where the sea's oxygen is depleted, threatening fish and other organisms. Warming of seas, caused by climate change, endangers the rich biodiversity in the Mediterranean Sea.

To tackle these problems, the EU adopted the Marine Strategy Framework Directive in 2008. The Directive requires that member states assess their seas and establish programmes to maintain or improve them to reach good environmental status by 2020.

EMIS and other tools are contributing to that task by mapping the vulnerability of Europe's seas. "Through systematic monitoring of key

physical and biological variables, the EMIS system can assist EU Member States in their assessment of their coastal and marine waters, as required by the Marine Strategy Framework Directive," says Hoepffner.

Another research focus in the JRC has been investigating major changes in European seas over the last 50 years. These analyses draw on both numerical modelling and satellite observations.

Research published in 2009 analysed the most complete satellite measurements of the Mediterranean Sea surface temperature to date. It indicated that the average surface temperature in the Mediterranean has been rising by 0.04°C per year over the last 20 years.

A complementary analysis, examining historical surface temperature of all the other European seas, is now in progress. The analysis reveals an increasing temperature of up to 0.09°C per year in specific areas, such as the southern Baltic Sea.

The JRC is also investigating the lifecycle of "phytoplankton blooms" – when numbers of microscopic algae rapidly increase in the sea.

These blooms can lead to dead zones, but they also are an important part of the marine food chain, as many fish, and even whales, feed on plankton.

The blooms change in timing and magnitude, and the JRC researchers are interested in understanding these dynamics.

"It has been demonstrated, in the US and Canada for instance, that a delay in the initiation of the bloom can affect the larvae of fish, and that in turn affects the abundance of fish for that year. Ongoing research is looking into what those effects are," says Hoepffner.

*The European Commission's in-house science service, the Joint Research Centre, carries out direct research funded by the European Commission's Framework Programmes. Research activities showcased in this publication are funded by FP7.*



SAFER

# An Earthquake early-warning system for a safer Europe

*Even 10 seconds can make a difference. When Japan was hit by the earthquake in 2011, early-warning systems were in place, and within seconds even the high-speed "bullet" trains stopped.*

*About half of Europe is also a high-risk earthquake area, especially Mediterranean countries like Greece, Italy, and also other regions around the Black Sea.*

Unlike for the weather, there are currently no reliable methods to predict earthquakes. However, earthquakes do send a warning signal. "When an earthquake occurs, the first wave-ground vibration that reaches you is not dangerous, but it contains vital information about the event," says Paolo Gasparini of the Physics department of the University of Naples and AMRA Scarl, a research organisation of the University. This initial ground wave travels very fast and arrives tens of seconds to minutes earlier than the main, destructive wave. The intensity of this initial ground vibration will indicate the destructive power of the earthquake.

But what is more important is that these seconds and minutes allow people to protect themselves or reach safety. The activation of

early-warning systems can also mitigate the impact of an earthquake by shutting down railways, gas pipes, and even nuclear power plants, explains Gasparini.

To start the development of an early-warning system in Europe, the European Commission funded, with € 3.6 million, a 30-month research programme called SAFER (Seismic early warning For Europe). Started in July 2006 and coordinated by the GeoForschungs Zentrum (GFZ) in Potsdam, Germany, researchers from 19 European institutions were part of the consortium. Also participating in the project were researchers from four

## Participants

Germany (Coordinator), Egypt, France, Greece, Iceland, Italy, Japan, Netherlands, Norway, Romania, Switzerland, Taiwan, Turkey

[www.gfz-potsdam.de/portal/gfz/home](http://www.gfz-potsdam.de/portal/gfz/home)

FP6	Proj. N°	36935	Total costs:	€ 4 900 000	EU contribution:	€ 3 600 000	Duration:	from:	Jun. 2006	to:	Jun. 2009
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institutions in Japan, the United States, Taiwan and Egypt.

"The main aim of the project was to develop a novel, early-warning capability for Europe utilising the initial, information-carrying wave produced by earthquakes," says Gasparini, who was a member of the SAFER Steering Committee.

Demonstrator projects were set up in Istanbul, Bucharest, Naples, Athens and Cairo. In Bucharest a warning system is already operational in the city, while in Istanbul such a system is implemented for the bridge spanning the Bosphorus.

The development of response strategies to earthquakes, which was not part of the SAFER project, is part of a current project called REAKT (Strategies and tools for Real-time EArthquake risk rEduction), that will deal with the people' responses. More specifically, REAKT

explores how to use the information coming from earthquake forecasts, early warnings and real-time assessments of the vulnerability of built structures. All this information will be combined in a probability framework that will be used by emergency managers to make decisions in real time. This system for risk reduction will be applied to vulnerable infrastructures, including trains, industries, hospitals, bridges, and schools.

REAKT will also study possibilities for forecasting earthquakes. "For example, the detection of moderate seismic activity or ground deformation can indicate an increase in the probability of a pending earthquake," says Gasparini.

An important result of SAFER is that it has primed the European research community for just this type of research. "We have developed a real network of experts, young people in many European countries, that have worked together for five years and together have gained valuable experience," comments Gasparini.

## SEADATANET

# SeaDataNet – sharing the sea's secrets

*From Sweden in the north to Greece in the south, almost every country in Europe borders an ocean or sea. Millions of people rely on these waters for their livelihoods, whether for fishing, trade or tourism.*

For decades, countries have, therefore, been making detailed measurements of the waters near their coasts, recording currents, seismic activity, and chemical composition, among others.

But the sea does not respect country borders. Ocean currents flow and marine life migrates, blurring geographical delineations. Data availability is of vital importance for marine research but most of the European data are fragmented, not always validated and not easily accessible. Scientists and policymakers often need information about the entire sea, not just the area off their own coastline, collected by their own government or organisation.

SeaDataNet, now in its second phase of funding from the EU, brings together marine data from 44 institutions in 31 countries, including three satellite data centres. It collates scientific data to construct a Europe-wide picture of the state of the seas. The online data collection provides an invaluable resource for those trying to

understand how the oceans affect our lives.

Dr Vittorio Barale, SeaDataNet II Strategic Promotion Coordinator, says: "The overall objective of the current SeaDataNet II project is to upgrade the existing SeaDataNet infrastructure into an operationally robust and state-of-the-art pan-European infrastructure."

Marine biologists, climatologists, geologists and more use the data to carry out investigations into the deep blue. In future, SeaDataNet II hopes to have even wider relevance. "The original development concerned only environmental data. Eventually, this will be expanded to cover a score of maritime sectors," says Dr Barale.

The availability of coupled environmental and socio-economic data may make the database more attractive to policymakers. Currently scientists use it extensively, but others stay away. Dr Barale hopes the planned upgrades will pique the interest of a wider spectrum of people.

## Participants

*France (Coordinator), Albania, Algeria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Georgia, Germany, Greece, Estonia, Finland, Iceland, Ireland, Israel, Italy, Malta, Morocco, Netherlands, Norway, Latvia, Lebanon, Lithuania, Poland, Portugal, Romania, Russia, Slovenia, Spain, Sweden, Tunisia, Ukraine, United Kingdom*

<a href="http://www.seadatanet.org">www.seadatanet.org</a>							
FP6	Proj. N°	26212	Total costs:	€ 10 500 000	EU contribution:	€ 8 700 000	Duration: from: Apr. 2006 to: Mar. 2011

First, though, SeaDataNet must mature into a fully operational online network, a formidable challenge. With over a million submissions of data since SeaDataNet was founded in 2006, there is already a vast amount of information available. Coordinating the data is not easy, and requires advanced technical standards.

All participating laboratories have to adopt coherent data management systems, and to label their data the same way. The semantic twists and turns of scientific data, and slight differences in measuring practices, need to be clarified so data can be usefully collated.

The SeaDataNet network extends beyond traditional European boundaries, to include countries bordering European seas such as Tunisia and Algeria on the Mediterranean. Nearly a third of all sea-trade worldwide passes through the Mediterranean, and half of goods carried are dangerous to some degree. With free access to SeaDataNet resources, scientists can track the effect hulking tankers and sleek white cruise liners may have on the ocean.

The EU is providing € 6 million funding over four years, up until 2015, to allow SeaDataNet to continue its work and upgrade its systems.

SeaDataNet II is aiming for greater compatibility with other scientific databases. The project is part of a wider initiative to bring together scientific data in Europe, EMODNet.

"The systems contributing to EMODNet are all slowly converging. SeaDataNet has been providing, and will continue to provide, quite a bit of technical support to all this," says Dr Barale. The Geo-Seas programme, for instance, also within the FP7 programme, is based in Britain and brings together data specifically relevant to geologists, working with the SeaDataNet database.

SeaDataNet comes at a time when scientists are grasping the opportunities presented by the internet for opening up data sources. For example, in December 2011 the EU announced its Open Data Strategy, to allow citizens to share and access data more easily.

One day, SeaDataNet II may become self-sustaining, but there are many hurdles to cross. "The basic frameworks to do this were set up by SeaDataNet I, but now it has to be turned into a viable operation," says Dr Barale.

## SEFLDOTT

# True bluefin: The breeding scheme promising a future for tuna

*Known as the tiger of the sea, the bluefin tuna or *Thunnus thynnus*, can grow to more than half a tonne, glide at speeds of up to 70km/hour, and migrate over thousands of kilometres.*

But for many people, the bluefin's majesty and grace in the water count for far less than the delicious taste of its rich, creamy red flesh: in January 2012, a 269kg bluefin tuna fetched a record 56.49 million yen (€ 564,000) at a Tsukiji market auction in Tokyo. Demand for the lucrative fish is driving it to extinction: despite global initiatives to limit the hunting, bluefin tuna populations have fallen an estimated 80% since 1970.

Until now, scientists have been unable to rear bluefins in captivity. However, a European initiative has announced a breakthrough that could set the tuna on the path to recovery. A project called SELFDOTT (Self-sustained Aquaculture and Domestication of Bluefin Tuna) has succeeded in breeding Atlantic bluefin in floating cages without the use of hormones.

After four years of research involving 13 institutes across Europe, researchers gleaned a viable mass of eggs from bluefin tuna in captivity. Raised in captivity by the Spanish Institute of

Oceanography (IEO) – which is coordinating SELFDOTT – the larval rearing grew to over 1kg in just over three months. Aided by a € 3 million research grant from the European Commission, the project expects many of juvenile bluefins to reach adulthood within four years and reproduce, therefore completing the biological life cycle of this species in captivity.

The project could have huge implications for bluefin. Although the runaway market for sushi has driven the global tuna glut, Europeans have also developed a huge appetite for the fish, and European trawlers have been amongst the most active tuna hunters. Recent moratoriums could help rebuild stocks, but bluefin breeding would speed the recovery.

SEFLDOTT project coordinator Fernando de la Gándara, a senior IEO researcher who has been involved in efforts to domesticate bluefins for over a decade, says the team had to cater for the special requirements of the fish, including its huge size, and its practice of roaming freely

## Participants

*Spain (Coordinator), France, Germany, Greece, Israel, Italy, Malta, Norway,*

[www.ieo.es/inicial.htm](http://www.ieo.es/inicial.htm)

FP7	Proj. N°	212797	Total costs:	€ 4 400 000	EU contribution:	€ 2 800 000	Duration:	from:	Jan. 2008
							to:	Nov. 2011	

over the open ocean. “The word “obstacle” does not exist in the bluefin tuna’s vocabulary,” de la Gándara says. “We have had to cope with a high mortality rate because of collisions against the walls and net of the tanks and cages.”

But the persistence paid off, and two years ago the project celebrated its first spontaneous, massive spawning. “It was a big and happy surprise,” de la Gándara says. “We have learnt that bluefin tuna rearing is possible in the same way that you can breed other species like sea bass, turbot or salmon.”

It will still take time to develop the farmed tuna: the fish needs a decade or more to mature. But de la Gándara says that if it succeeds, it could represent a vital step in the global efforts to rebuild bluefin tuna stocks. “The bluefin tuna is an emblematic species that has been feeding Mediterranean populations for thousands of years. This project could help continue the tradition,” he says. As for the research, de la Gándara admits that he still has a lot more to learn from the bluefin. “I can see that the more and more I study this species, the more I love it,” he says.



## SESAME

# A new research facility for the Middle East

*Well-known accelerators, like the Large Hadron Collider at CERN, the European Laboratory for Particle Physics near Geneva, smash subatomic particles together to study their properties. But there is another group of accelerators where electrons don't collide, instead they are kept circulating through a ring-shaped vacuum tube, called a storage ring. While they are racing around this ring they produce intense radiation.*

These accelerators, called synchrotron light sources, are the workhorses for a large number of scientific investigations, for example, the study of the chemical structure of proteins.

The instruments are, in fact, much more than simple light sources. They can produce light, or radiation, in a wide spectrum of wavelengths, ranging from x-rays through ultraviolet and visible light to infrared light. Another property is that the light beams synchrotrons produce are very fine, but very powerful at the same time, making them suitable for probing the structure of matter. They are used by scientists working in physics, materials science, chemistry, the life sciences and medicine, and environmental science.

Synchrotron light sources are large, complex and expensive. More than 60 of these machines, all located in rich countries, are used worldwide by

more than 30,000 scientists, but there are still too few of them to give all these scientists a chance to use the light beams for their research. "Even European users do not always get "beam time", says physicist Hafeez Hoorani, a researcher at the National Center for Physics in Islamabad. For researchers from the Middle East, the situation is far worse. No synchrotron light source is presently available in the Middle East, forcing local scientists to make expensive trips abroad to do their experiments.

In 1997 the Middle East Scientific Cooperation based at CERN proposed the creation of a synchrotron facility in the Middle East. The project, called

## Participants

*Jordan (Coordinator), Bahrain, Cyprus, Iran, Israel, Egypt, Pakistan, Palestinian Authority, Turkey*

[www.sesame.org.jo/sesame](http://www.sesame.org.jo/sesame)

SESAME (Synchrotron light for experimental Science and Applications in the Middle East) was first led by an Interim Council established in 1999 by Unesco, and was replaced by the current Council on 15 April 2004. The decision to build the machine was taken by the Unesco Executive Board in 2002.

Jordan was selected for the site. "Jordan is a stable, neutral country, and expressed much interest in the project," says Hoorani, who is the Scientific Director of the project. Jordan also contributed the land and the building housing the synchrotron. The Members of SESAME are currently Bahrain, Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority and Turkey.

Construction of the facility started in 2003, and in December 2011, at a SESAME Council meeting in Ankara, Hoorani could report that the electron source was completed and operational. The booster synchrotron, which accelerates the electrons before they enter

the main storage ring, will be completed at the end of 2012. Funding of the project is an ongoing process. Germany contributed by donating components from BESSY, a decommissioned synchrotron in Berlin. The European Union has already contributed € 3.5 million while the member states of SESAME have all pledged further contributions of up to € 3.8 million each for the construction of the main storage ring. The first beams will become available to the scientific community in 2015.

There is no doubt that the machine will foster research in the Middle East. "This project is already helping to stop the brain drain, and scientists are returning from abroad," reports Hoorani. It is also stimulating interest in science, and not only among young people. "SESAME brings science into the agenda of politicians," says Hoorani. He compares the impact of SESAME to that of CERN when it played a role in increasing post-war unity between the European countries. "Just as CERN did in 1954, SESAME brings nations together in the common pursuit of science—it is a project of science for peace," says Hoorani.

*This project has been financed by the European Neighbourhood and Partnership Instrument (ENPI) of the European Union.*

## SOWAEUMED

# A research alliance to fight dirt

*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.*

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.

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.

Then there is industrial pollution: 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.

Aided by a € 881.856 grant from the European Commission, the three-year 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

## Participants

*Spain (Coordinator), Croatia, Morocco, Sweden, Tunisia*

<a href="http://www.uab.es">www.uab.es</a>						
FP7	Proj. N°	245843	Total costs:	€ 900 000	EU contribution:	€ 800 000
Duration:		from:	Dec. 2009	to:		Nov. 2012

the partner organisations from Morocco and Tunisia.

Although the project is relatively small-scale, it is already applying state-of-the-art technologies. SOWAEUMED project manager Gustavo Pérez, from the Autonomous University of Barcelona (UAB) says nanoscience is being used to tackle some of the problems, helping to remove dissolved species from water streams. "Nanoparticles can be very effective in water treatment because of their high reactivity and a very high surface to volume ratio," he says.

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. But Pérez says there still needs to be more awareness of the dangers of practises like overusing pesticides and fertilizers, placing landfills on the banks of rivers, and dumping solid waste into the local water stream.

But ultimately, Pérez believes that the expertise and innovations that emerge from the project can help people in the region access clean water

when they need it. "The potential contribution to economic and social development, and its investment multiplier effect, creating jobs and generating wealth can only be good," he says.



VCVCL

# Controlling the killer

*Visceral leishmaniasis (VL) & cutaneous leishmaniasis (CL) are parasitic diseases transmitted to humans by the bite of sand flies. In VL, the parasite migrates to the internal organs such as liver, spleen and bone marrow. Signs and symptoms include fever, weight loss, mucosal ulcers, fatigue, anaemia and substantial swelling of the liver and spleen. VL if left untreated will almost always result in the death of the host. Meanwhile, CL is the most common form of leishmaniasis. It is a skin infection caused by a single-celled parasite that is also transmitted by sand fly bites and can cause facial disfigurement.*

Both diseases tend to affect children under 5 years old in Southern Mediterranean countries. However, in Northern Mediterranean countries, VL is more prevalent and is often associated with HIV infections.

Precise figures are not available but reports suggest that between 36,000 and 65,000 cases of VL and CL combined occur in endemic Mediterranean countries each year. The European Union and World Health Organisation (WHO) recognise the significance of the health problem and have called for research to develop innovative tools to control the number of sand flies due to the lack of available vaccines. This approach is known as vector control.

“Vector Control for Visceral and Cutaneous Leishmaniasis” (VCVCL) is a three-year, € 180,000 Marie Curie Fellowship programme which began in October 2008. The programme addresses the EU and WHO concerns by examining the potential for an alternative vector control strategy that targets the insects responsible for transmitting VL and CL. It is hoped that success may lead to new opportunities for sand fly control and thus reduced disease transmission.

Sex pheromones are secreted chemical factors that trigger an attraction response in members of the same sand fly species and lead to mating. Through laboratory and field-based behavioural and chemical studies, VCVCL

## Participants

United Kingdom (Coordinator),  
Tunisia

[www.kaele.ac.uk](http://www.kaele.ac.uk)

FP7	Proj. N°	220199	Total costs:	€ 167 689	EU contribution:	€ 167 689	Duration:	from:	Oct. 2008	to:	Oct. 2010
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focused on determining if sex pheromones are present in the sand flies that spread CL and VL and then determine if they have practical applications.

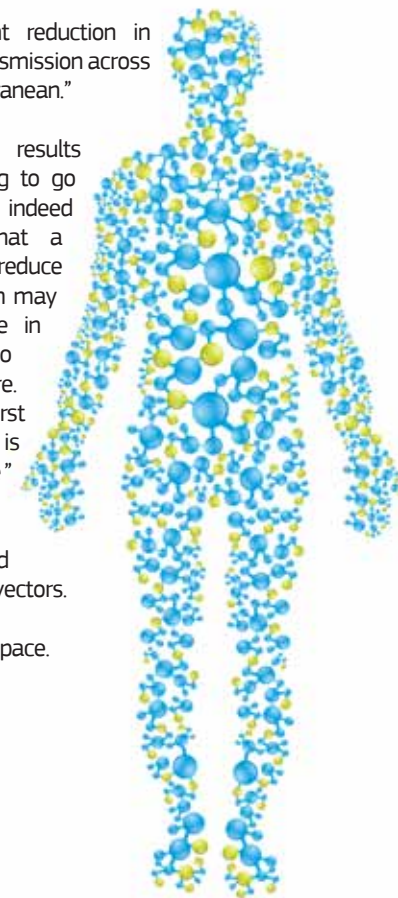
Interestingly, the same approach is being followed by the Keele University Research Group to develop sex pheromone based strategies for controlling the South American vector of VL. As the work on VCVCL was undertaken at Keele University, the benefits were obvious. On the one hand, the VCVCL team has significant skills in maintaining colonies, handling and understanding sand fly's behaviour. And on the other hand, the Keele group is well-versed in isolating, identifying and synthesizing insect sex pheromones and translating the results of bench research into practical outcomes. Working together effectively was thus of utmost importance.

“This research may lead to a new and environmentally benign method of controlling sand flies that transmit VL and CL in European and other countries,” says project coordinators Prof. Gordon Hamilton and the Dr. Elyes Zhioua. “We are hopeful that it will eventually lead to

a significant reduction in disease transmission across the Mediterranean.”

And if the results are anything to go by, there is indeed potential that a new tool to reduce transmission may be available in the not too distant future. For the first time, there is “evidence” of sex pheromones in old world leishmania vectors.

Watch this space.



## WATERBEE

## A wireless watering system

*It's the free advice every decent florist delivers when you buy their potted plants: how much water they need, and how often. And it's not just the occasional flower buyer who needs guidance on watering as even experienced farmers can misjudge how much to sprinkle on their crops, leaving them either parched or drenched. But now research is offering an intelligent irrigation system to monitor how much water is being held in the soil, automatically spraying when needed. Available as a smartphone app, it's a breakthrough that could save harvests, as well as trillions of litres of water wasted in world farming every year.*

Global agriculture wastes 60%, or 1,500 trillion litres, of the 2,500 trillion litres of water it uses each year, according to the WWF. Even in Europe, farmers still suffer during droughts, and the Mediterranean region, with its limited, fragile and unevenly distributed water resources is especially vulnerable: the 2003 heat wave cost about € 11 billion in lost crops. The waste is mainly down to inefficient irrigation systems. But better managed, it could mean more water resources for other basics like drinking, hygiene and cooking.

The new research harnesses technological advances in wireless networking, environmental sensors and soil water movement models. Aided by a grant of € 1.14 million from the European

Commission, the WaterBee Demonstration Action project – which gathered ten European partners over two years - brings the innovations together to help farmers irrigate where and when they need.

“We wanted to build something that is easy for farmers to use while being flexible and robust enough to survive in farm environments,” says John O’Flaherty, the technical director of Ireland’s Limerick-based National Microelectronics Applications Centre (MAC), which is spearheading WaterBee. “We tried to learn what the growers really needed. They are not interested in the technical specifications. They just want a simple service that helps them use less water, which is why we developed a smartphone app.”

## Participants

Ireland (Coordinator), Cyprus, Estonia, Italy, Malta, Spain, Sweden, United Kingdom

www.waterbee.eu						
FP7	Proj. N°	283638	Total costs:	€ 2 100 000	EU contribution:	€ 1 100 000
						Duration: from: July 2011
						to: Jun. 2013

Thanks to sensors planted across the field, the WaterBee system can continuously monitor water movement in the root zone. It uses a ZigBee-standard, low cost, low power consumption wireless sensor network, sending the data to an intelligent web service software application for analysis. Once the numbers are crunched - taking due account for weather and other local parameters - it automatically activates the selected irrigation nodes in the areas required.

Prototypes of the system have already been tested in the UK, Malta, Finland, Sweden, Spain, Italy and Estonia, using crops like lettuce,

courgettes, and berries. In the British trials, on Maris Piper potatoes, WaterBee used 56% less water than the local irrigation system in use.

The complete kit is expected to cost around € 3,500, and can be adapted for almost all terrains. “It’s cheap, and easy to deploy and run, so we can imagine it being used by farmers, growers, hotels, golf clubs, and even domestic homeowners,” says O’Flaherty. “At the same time, this system could have a wider impact in terms of water and cost savings, and environmental protection. As it’s user-friendly and doesn’t cost the earth, this could really change the way we farm.”







European Commission

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The EU has historically been active in the Mediterranean region through the Union for the Mediterranean, formerly known as the Barcelona Process. The Monitoring Committee (MoCo) for Euro-Mediterranean cooperation in research and innovation has also played and continues to play a key role in bringing together EU Member States and all Southern Mediterranean countries.

This brochure serves the purpose of showcasing a selection of success stories from various EU-funded S&T projects, which have shown tangible results for the people living in South Mediterranean countries. The brochure was launched at the "Euro-Mediterranean Conference on Research and Innovation: An agenda for a renewed partnership" that took place in Barcelona on 2 and 3 April 2012. This high level conference detailed the objectives of a medium to long term agenda of Euro-Mediterranean Cooperation in Research and Innovation and built on past experiences. The conference also promoted coordination between the European Commission, EU Member States and Southern Mediterranean policies and programmes.

### *Project information*



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