

MOROCCO

Cooperative Activities under the SPS Programme



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Morocco has been involved in NATO science activities since 1999. In total, scientists and experts from Morocco have had leading roles in 77 activities, and more have joined various cooperative activities as key speakers and participants.

Today, NATO science activities enable close collaboration on the two key priorities of **defence against terrorism** and **countering other threats to security** and are managed under the Science for Peace and Security (SPS) Programme. SPS activities contribute to NATO's strategic objective of

partnership, helping to connect scientists and experts from NATO countries with their counterparts from Partner and Mediterranean Dialogue countries through workshops, training courses, team collaborations and multi-year projects.

All activities supported by the SPS Programme are approved by NATO nations on the basis of consensus.

Examples of Activities

On 26 June–2 July 2009 in Terme di Spezzano, Italy a workshop led by a Moroccan scientists from the Mohammed V-Agdal University in Rabat, Morocco, and an Italian counterpart examined methods for **“Detection of Biological Agents for the Prevention of Bioterrorism”**. The co-directors recognised the need for new analytical technologies and integrated systems that provide rapid and accurate information on natural and manmade pathogenic organisms, explosives, toxins and other hazardous materials. The main objective was to provide attendees with the necessary information and know-how to perform mass spectrometry on various bioterrorism agents and to identify areas for future research and international collaboration. [ref 983529]

As part of the project **“Investigating Salinity and Radioactivity in Water Resources in**

Morocco”, scientists from Morocco have been working with American experts to study the degradation of water resources in the country by salinity and natural radioactive substances. Any degradation of water quality reduces agricultural production and tourism and has a severe effect on the economy and is a potential cause of instability and conflict between rural and urban societies. The objective of the project is to investigate all major aquifer basins in Morocco and to support better water management practices. An integrative water quality database and monitoring programme will be installed at the Hydrological Agency, incorporating measurements of oxygen, hydrogen, strontium, sulphur, radium and uranium in groundwater samples from the various basins. Among the end-users are the National Office of Drinking Water and the Regional Office of the Agricultural

Development of Souss-Massa, both in Agadir. [ref 983134]

In the collaborative project “**Remediation Processes in Uranium and Other Mining Explorations**”, investigators from Morocco, Tunisia, Germany and Portugal are cooperating on a project to clean up soils contaminated with uranium and other heavy metals. Certain plants have the ability to resist toxicity by attracting metal-resistant bacteria containing active genetic elements breaking down the toxic salts, heavy metals and radioactive elements to less toxic molecules. The aim of the project is to isolate and characterise such metal-resistant bacteria, and to use them to make new plants that can grow on the polluted soil left over from mining activities. The efficiency of new plants to stabilise heavy metals and to reduce the soil toxicity will be evaluated in laboratories and field trials, and the results will be transferred to local authorities and mine owners for reforestation and remediation of soil. [ref 983311]

In the field of energy security, scientists from 6 countries; France, Germany, Mauritania, Morocco, USA and Turkey are cooperating on a project to use the prevailing trade winds over the Sahara Desert to produce hydrogen for sustainable energy systems. This collaborative project, entitled “**Sahara Trade Winds to Hydrogen**”, involves building two research platforms at the main research centres in Morocco and Mauritania. The aim is to integrate intermittent sources of renewable energies into the weak grid infrastructure of the Saharan/Sahel region, and the initiative will later be extended to other countries in the region that also have

extremely limited electricity-generating capacities. Hydrogen produced by wind-driven electrolysis can be used for power storage and also for fuel or chemical feedstock in specific industries. [ref 982620]

Scientists from Morocco, Italy, Portugal, Tunisia and the United Kingdom have collaborated since January 2007 on a project to identify sources of pollution in Mediterranean region and European oak forests. The plan of the project, entitled “**Elimination of Poly-Chlorinated Phenols**



Project co-director Dr. Sidi Mohamed Ould Mustapha (left) and other project participants hoist a cord to install an anemometer boom on the tower, as part of a project to use wind-driven electrolysis to produce hydrogen for energy storage.

from **Forest Soils and Groundwaters**”, has been to measure the poly-chlorinated phenol (PCP) classes that are dispersed in the soil groundwater and sediments. Other chemical contaminants such as pesticides and wood preservative are also being identified. The scientists study the effects of pollutants on these ecosystems and develop remedial strategies. [ref 981674]