NATO
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# Water – a key security asset

Access to reliable and sufficient water sources is usually accepted as a fundamental human right. According to World Bank estimates, over one billion people do not have access to safe water, 40 per cent of the world's population faces water shortages, and three billion lack sanitation. Some 80 per cent of infectious diseases are waterborne, killing millions of children every year.

Water has in many cases exacerbated or been the cause of conflict in several regions of the world. Many of these conflicts could have been prevented through sustainable water management agreements, for which fact-finding projects on water resources are a prerequisite.

*"Whereas some 300 000 people were killed in armed conflict in 2000, as many people die each and every month because of contaminated water or lack of adequate sanitation".*

*Worldwatch Institute, State of the World 2005*

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The demand for water continues to grow at an increasing rate around the world. The quantity of clean water available to communities to use and drink has an impact on economic and social development. In cases where resources are already scarce, droughts and floods can lead to migration, or the construction of dams and large-scale pollution can create poverty due to loss of livelihood.

This phenomenon has been identified as a common denominator of the causes of conflict in most civil wars that have emerged in Africa, South Asia, and Latin America during the last decade.

NATO facilitates a variety of projects that are directly related to water issues since they are considered of critical importance in today's security environment. Flooding, droughts, as well as the management or protection of infrastructure for water supplies are examples of the types of projects the Alliance supports.

*"Water has the power to move millions of people − let it move us in the direction of peace."*

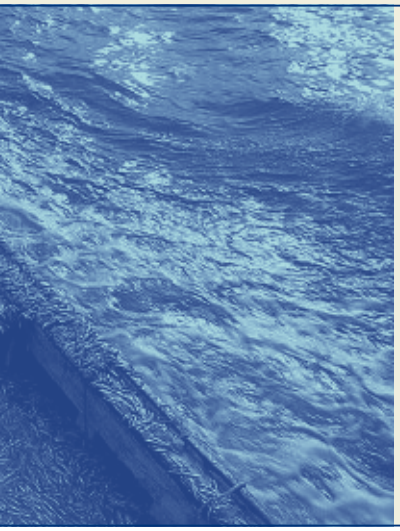
*Mikhail Gorbachev, President, Green Cross International*

NATO's Science Committee with its Security through Science Programme, and the Committee on the Challenges of Modern Society (CCMS) have facilitated a diverse range of water management projects in many regions of the world. These projects not only build capacities, but also generate dialogue between states, governments, organisations, and scientists at a national level, as well as at an international level.

Some projects sponsored by NATO have a direct impact on security issues such as real-time monitoring of rivers to avoid both droughts and floods. Others are directed at providing support for applied research and development projects that relate to industrial challenges or environmental problems in the Alliance's Partner or Mediterranean Dialogue countries. The projects are carried out jointly by scientists from these countries, as well as from NATO countries, in collaboration with the end-users. End-users can be commercial industries working on industrial projects, as well as local authorities and governmental bodies working on environmental projects.

## *What is the NATO Programme for Security through Science?*

***The NATO Programme for Security through Science contributes to security, stability and solidarity among different countries by applying cutting-edge science to problem-solving. A further aim is to catalyse democratic reform and support economic development in NATO's Partner countries in transition. The Security through Science Programme offers grants in support of collaborative activities in the areas of defence against terrorism, countering other threats to security and Partner-country priorities. Topics supported also include environmental security.***



## *What is the Committee on the Challenges of Modern Society?*

***This committee was created in 1969 with the initial aim of addressing problems affecting the environment and quality of life of citizens living in member countries. It is a forum where member and Partner countries can share knowledge and experience on technical, scientific and policy aspects of social and environmental matters in both the civilian and military sectors. Its main objective is to tackle environmental security and societal problems already under study at the national level and, by combining the expertise and technology available in NATO and Partner countries, arrive fairly rapidly at valid conclusions and make recommendations for action.***

## >> Countering the environmental degradation of the Black Sea

The Black Sea is the main water system shared by six countries: Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine. Its economic and ecological benefits are invaluable for the local population, providing them with income from the fishing industry, transport and tourism. At the same time it is one of the most polluted waters on earth, putting the health of the local population at risk and creating poor living conditions. The World Bank estimates that pollution of the Black Sea causes economic losses of approximately US$500 million per year.


Several national and international organisations − including NATO − have supported scientific projects that tackle these issues from different angles and raise awareness among the populations and governments concerned. These collaborative efforts resulted in a Strategic Action Plan for the Rehabilitation and Protection of the Black Sea that was signed by the environment ministers of all six riparian countries in October 1996.

One of the projects launched in coordination with the Action Plan was the NATO Black Sea Operational Database Management System that brought together more than 125 scientists from the Black Sea countries and the United States. NATO mainly purchased computers, software and sample collecting devices, and supported the various trips for data collection. The scientists used biological, chemical and physiological data collected over more than four decades (1954-2002), and created the largest ecosystem database ever produced for the entire Black Sea. Based on the database and on continuous real-time data coming from research vessels, buoys and satellite images that are fed into the system, the scientists created a model that could measure the consequences of industrial incidents, oil spills or ecological disasters, such as the sudden eclosion of plankton that could provoke a lack of oxygen and kill fish.

The results of this project are the basis of a larger ongoing EU-funded project “Arena” that will help in rehabilitating the Black Sea.

## >> Wetlands restoration in the Aral Sea

About four decades ago, the Aral Sea was the fourth largest lake on earth, a main fresh water source for the populations of five countries: Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. Today, the lake has become a hyper saline pond.

The reason for this ecological disaster is the intensive cotton and rice production introduced during the Soviet era in the delta of the two main rivers – Amu Dar'ya and Syr Dar'ya. Instead of feeding the Aral Sea, the fresh water brought by these rivers was diverted during four decades to irrigate and wash the fields of these water-intensive crops. This caused salinisation, the disappearance of native fish species, the loss of a major fishery, and as the sea dried out, dust and salt storms. The climate changed and productive farmland was lost, while toxic materials were being deposited and the health conditions of communities deteriorated as the quality of drinking water became poorer. The local economy also changed, causing unemployment.

## Did you know?

- Since 1960, the Aral Sea has lost 75 per cent of its water volume. According to predictions, it will disappear within 15 years.
- Its salinity increased from 10 g/l in 1960 to 100 g/l in 2004, which is five times more than the salt concentration of the North Sea.

The experts agree that there is no way of rehabilitating the Aral Sea and its wetlands. However, certain parts could be saved and further damage limited if a sustainable water management system were put into place, together with more efficient irrigation systems.

Under the Security through Science Programme, the Integrated Water Resources Management for Wetlands Restoration project was launched, bringing Dutch and Uzbek experts together to work on the creation of a database and predictive model for the Amu Dar'ya delta. The project has been completed and the results handed over to Uzbek local authorities for their use as forecast models and decision-making tools. The expertise gained has also been transferred to Kazakhstan where a new project has started for the Syr Dar'ya river delta in the north.

In the case of both projects, the purchase of computers and software, the field trips and training of young scientists are supported by NATO.

NATO has also helped to equip the Karakalpakstan University in Nukus, in the Amu Dar'ya delta, with a Geographical Information System (GIS). With satellite images and the Global Positioning System, GIS maps have been developed, providing data that is key to water management.

# a key security asset

## >> Artemia production in the salt water of the Aral Sea

Experts have predicted that the salinity of the southern part of the Aral Sea may increase in the years to come if agricultural exploitation and water diversion are continued. The idea therefore emerged to exploit the salinity of the lake by introducing the aquaculture production of Artemia, a microscopic organism that is used as a commercial feed additive for shrimp and fish farms.

A new Science for Peace project has been launched aimed at the development of a model for the production of Artemia. This would draw up strategies related to harvest, transport and processing, using local assets. American, Belgian and Uzbek scientists are working on this project with national and local government bodies. NATO provides equipment for the sampling in the field and the laboratory experiments, as well as for the training of local experts. At this early stage of the project, the co-directors have already received a formal letter of interest from a commercial harvesting company located in Kazakhstan.

## Did you know?

- The largest production of Artemia is in the Great Salt Lake of Utah, United States.
- The global demand for Artemia biomass is about 2000 tons per year, and is on the increase. The revenues range between US$55 to 95 million per year.

## >> Real-time monitoring of the Nistru and Prut rivers

The Nistru and Prut rivers are vital to three countries: Moldova, Romania and Ukraine. However, there are frequent droughts that provoke health and environmental problems, as well as floods that have led to loss of life and property damage.

For a long time, there was no real-time information on water quantity and quality in any of the three countries. However, on 25 September 2003, four automatic water monitoring stations on the Nistru and Prut rivers, funded by NATO, were officially put into operation. The next step foreseen by this project is the collection and sharing of the data between Moldova, Romania and Ukraine.

*"It must be noted that transboundary water problems are a point of tension between Moldova, Romania and Ukraine and that real-time monitoring stations are key instruments and the basis of a rational approach to river management."*

*Programme Director, Science for Peace*

## Did you know?

Transboundary cooperation projects, supported by the UN Development Programme and Global Environmental Programme and NATO, are helping to understand the ecosystem of the Prespa Lake in the Balkan Peninsula. They aim to study the influence of climate change and agricultural practices on the ecosystem of the lake, which is an important fresh water resource and a tourist attraction. Scientists from the three riparian countries – Albania, Greece and the former Yugoslav Republic of Macedonia* − participate in the projects, forcing them to put aside differences that have caused tension in the region.

## >> Pilot studies on water management

The widespread aquatic environmental problem arising from surplus nutrients from sources such as municipal sewage, and agricultural runoff, led NATO's CCMS to initiate a pilot study on Modelling Nutrient Loads and Response in River and Estuary Systems.

The objective of the study was to develop water quality management tools for water bodies impacted by an over-abundance of nutrients. The study resulted in the creation of scientific information and predictive models through field sampling, laboratory studies and analysis. The locations chosen for this project were Belarus, Estonia, Latvia, Lithuania, Russia, Slovenia, Spain, Turkey and the United States.

## Did you know?

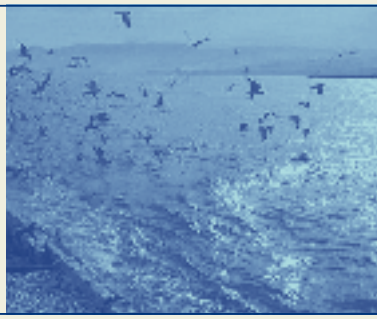
- Estuaries provide habitat for 75 per cent of commercial fish catch and 80-90 per cent of recreational fish catch.
- 60 per cent of the world's population lives near an estuary.
- 66 per cent of the largest cities in the world are located on estuaries.

In 1995, a pilot study on Ecosystem Modelling of Coastal Lagoons for Sustainable Management was launched by CCMS. The first phase of this project was finalised in 2000, with Turkey acting as the pilot country and the United States as the co-pilot country. It came to four main conclusions about coastal lagoons: they are the most valuable components of coastal areas in terms of ecosystem and natural capital; the concept of sustainable management of lagoons is neither clearly understood nor applied; the use of models as management tools has not yet been experienced or utilised; various models are being developed by many research groups and are being utilised.

This first phase is being followed by a second phase, under the leadership of Turkey, during which participants will apply ecological models in selected coastal lagoons as a decision-making tool for sustainable use and development.

### *What is a lagoon?*

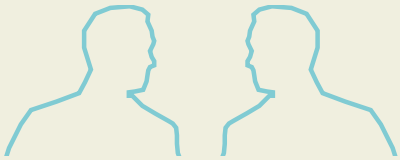
***A lagoon is an area of relatively shallow, quiet water with access to the sea but separated from it by sandbars, barrier islands, or coral reefs. The term lagoon is used to describe two types that share the physical characteristics described, but are otherwise distinct: coastal lagoons, found on most land margins, and coral reef lagoons.***



## >> The South Caucasus Cooperative River Monitoring Project

In spring 2003, the South Caucasus Cooperative River Monitoring project was launched by NATO's Science for Peace sub-programme, in cooperation with the Organization for Security and Co-operation in Europe. It aimed to establish a social and technical infrastructure that could monitor the water quality and quantity of transboundary rivers and ease data-sharing between Armenia, Azerbaijan and Georgia. Water supply and pollution problems affect the Kura and Araks rivers in the region, which is heavily reliant on river resources for social and economic development.

Maintaining high-quality fresh water resources helps to avoid water disputes that have the potential to intensify political and ethnic instability. It is therefore important to gather information on the ecological state of water resources. This not only contributes to the general development of countries of the South Caucasus, but it also plays a significant role for the conduct of specific projects such as the construction of oil and gas pipelines and the Europe-Caucasus-Asia transport corridor, which are dependent on this type of data.



## One Minute Interview

# >> Professor Freddy Adams, co-director of the South Caucasus Cooperative River Monitoring project

***How does river monitoring in the Caucasus promote security in the region?***

All water flows eventually into the sea and man-made borders cannot stop it from taking its course. With a common river system flowing through the three Caucasus countries, applied research on water resources with the eventual aim of systematic monitoring and common management of the joint river system is an important subject for cooperation.

Security is generated by trust, and mutual trust is most readily generated by actively working together on important future-oriented problems in areas of common interest. The water management of the Caucasus river systems on the basis of objective scientific collaboration is undoubtedly an important item of common interest and a good choice for building up confidence for a common future. It might lead the way to other symbiotic ways of cooperation.

For more information :

NATO Programme for Security through Science - http://www.nato.int/science/index.html

Committee on the Challenges of Modern Society - http://www.nato.int/ccms/index.html

ENVSEC reports - http://www.envsec.org

Water resources and security - http://www.nato.int/science/issues/water-security.htm

Integrated water management - http://www.nato.int/ccms/pilot-studies/IWM/iwm-index.htm

Ecosystem modelling of coastal lagoons for sustainable management - http://www.nato.int/ccms/pilot-studies/emcl/emcl-index.htm

(*) Turkey recognises the Republic of Macedonia with its constitutional name.

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