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Science for Peace and Security Committee

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Issues covered in this newsletter:

- the new SPS Programme;
- former NATO Science Programme grantee wins the Nobel Prize;
- disposal of rocket fuel *mélange* in Azerbaijan;
- hydrogen energy technologies;
- defence-related environmental activities;
- preserving the ecosystem of the Gulf of Aqaba;
- social and psychological aspects of terrorism;
- social and psychological effects of radiological terrorism.

Inaugural meeting of the new NATO Committee

The new NATO Committee on Science for Peace and Security (SPS) held its inaugural meeting on 20 October 2006 at NATO Headquarters in Brussels, Belgium. This edition of the newsletter will take a detailed look at the newly launched SPS Committee and its Programme. This is the result of a new streamlined approach to NATO's cooperative partnership programme approved on 28 June 2006 by the North Atlantic Council, NATO's principal decision-making body. This newsletter will also provide examples of the wide range of activities supported by the SPS Programme, which includes both NATO-supported and nationally-funded activities. Detailed information on the SPS Programme is available on the programme's new website at www.nato.int/science

"The times they are a-changin'" - Bob Dylan's words would serve well as a motto for the innovation and reform that have brought about the creation of the new Science for Peace and Security Programme. In keeping with the reform of the Programme, the publishing work associated with it will also change with the times and seek to enhance its reach and relevance. Starting in 2007, we will take progressive steps to maximise the impact of our publishing work. SPS news, which is usually time-sensitive and best published as quickly as possible, will be made available on the SPS website (www.nato.int/science) and via an email newsletter. Future print versions in a newsletter-type format will focus on specific areas and priorities of the SPS Programme. These print editions will be available to all interested readers and can be ordered online. We will provide further practical information in due course.

A glance at the Science for Peace and Security Programme

The recently launched Science for Peace and Security Programme (SPS) is now fully operational in its support for practical, concrete projects with tangible output focused on security, environmental sustainability and the specific priorities of Partner and Mediterranean Dialogue countries. The new SPS Committee, replacing both the Science Committee (SCOM) and the Committee on the Challenges of Modern Society (CCMS), has become the primary NATO committee supporting practical cooperation in civil science and innovation. This change was driven by the rapidly evolving global security environment and the resulting emergence of common priorities between the previous Security through Science Programme and the CCMS Programme.

Science for Peace and Security Committee

Under the guidance of the North Atlantic Council (NATO's principal decision-making body), the SPS Committee pursues the following main objectives:

- conducting cooperative projects to contribute to NATO's strategic objectives, with emphasis on partnership;
- promoting regional cooperation through projects of mutual benefit;
- fulfilling a forward-looking role in identifying future security threats, raising awareness and finding solutions;
- supporting nations' decision-making by providing a forum for bringing together scientists, experts and policy makers to address critical problems, and by creating networks of experts to stimulate NATO-Partner cooperation.

The SPS Committee, chaired by the NATO Assistant Secretary General for Public Diplomacy and made up of a representative from each nation, meets twice a year in plenary session. At one of these sessions the Committee meets in Euro-Atlantic Partnership Council (EAPC) format, when the 26 NATO-country representatives are joined by colleagues representing 23 Partner countries. A third plenary meeting of the SPS Committee may be held each year if the Committee finds it necessary. One of the meetings may be held in a NATO Partner country. The NATO-Russia Council (NRC) SPS Committee meets twice a year, bringing together 27 representatives from the NATO countries and Russia.

Science for Peace and Security Programme

The SPS Programme, which includes activities funded by NATO as well as by nations, focuses on the following general areas:

- computer networking to develop digital connectivity in Partner countries;
- engagement of the young generation of scientists;
- conducting projects that respond to the needs of the Partner and Mediterranean Dialogue countries;
- developing and maintaining expert networks in key fields;
- conducting nationally-funded studies and projects involving government and non-government experts in the framework of the SPS Programme.

The Programme offers grants to scientists in NATO, Partner and Mediterranean Dialogue countries to cooperate on priority research topics, which include Key Priorities (in the areas of "defence against terrorism" and "countering other threats to security") and Partner country priorities. Grants are also offered to assist the academic community in Partner countries to set up basic computer networking infrastructure. Several support mechanisms are available, including

support for applied Research and Development projects, workshops and summer schools.

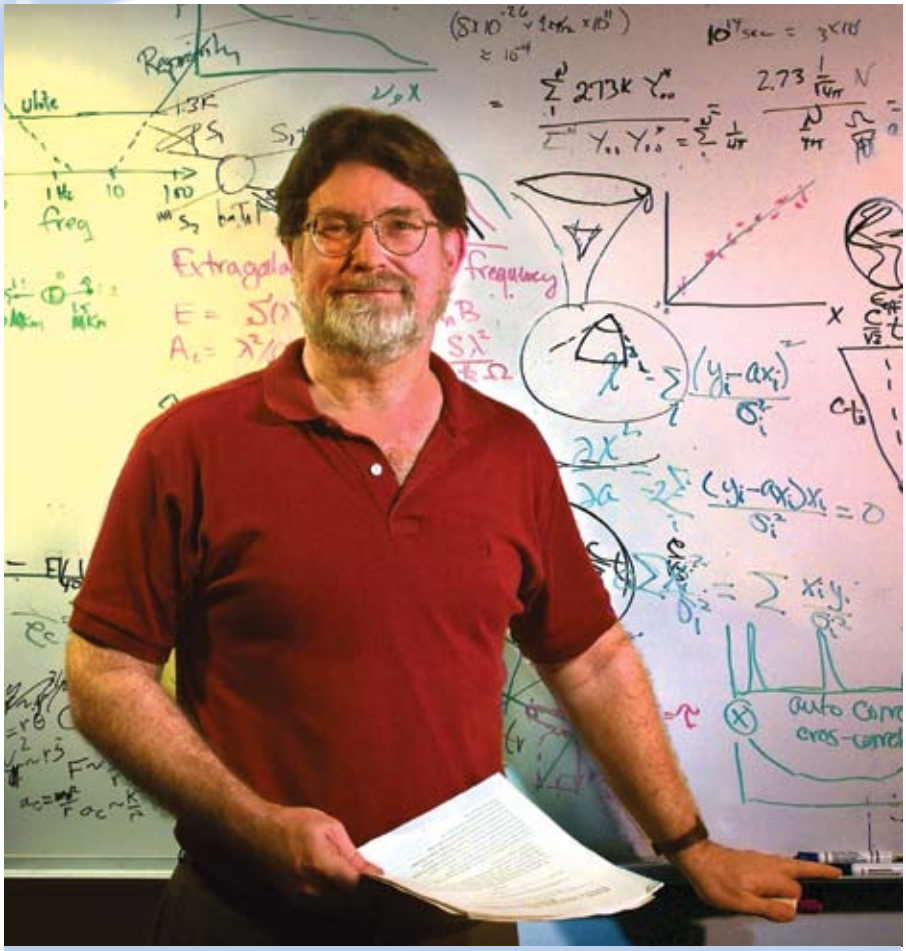
In addition, both NATO and Partner countries can make proposals to initiate pilot studies, short-term ad hoc projects and topical workshops as well as to co-sponsor international conferences and seminars. These nationally-funded activities relate to the following topics: the environmental impact of military activities; regional and cross-border activities; conflicts related to the scarcity of resources; risks to the environment leading to economic and political instability; and, non-traditional threats to security.

More detailed information on NATO and nationally-funded activities are available on the SPS Programme website at www.nato.int/science

Looking ahead – keeping the best of the past

The SPS Programme has maintained the most effective elements of both previous programmes. This includes the CCMS network of government experts, its long-term studies and nationally-funded activities. The SCOM focus on security-related projects and civil research, capacity-building, and networking of civil science communities has also been conserved. The Programme will continue to be a vehicle to foster practical cooperation and trust between countries and within key regions while supporting NATO's priorities, such as the fight against terrorism. The SPS Committee's simplified and integrated structure will result in a new level of co-operation and synergy between the participating government and academic communities. Researchers, academics and governments experts from NATO and its cooperative partners will play a role in helping the Alliance identify, understand and respond to emerging threats and challenges. The Programme will provide a single contact point for NATO civil science and technology cooperation as well as a clearer interface with other international organisations. There will also be increased emphasis on "top-down" projects responding to nations' priorities aligned with NATO's strategic objectives. An additional requirement detailed in the SPS Terms of Reference is for a special focus on reviewing and assessing both the conduct and the results of the activities carried out. This will bring a new level of accountability to the Programme and help ensure the effectiveness of its activities.

Former NATO Science Programme grantee wins the Nobel Prize



Professor George F. Smoot

Professor George F. Smoot of the University of California at Berkeley, US, who has been awarded the 2006 Nobel Prize for Physics together with Dr John C. Mather, was the recipient of a Collaborative Linkage Grant under the former NATO Science Programme.

With NATO support, Professor Smoot cooperated in 1999 with an Italian colleague, Professor Marco Bersanelli from the Istituto di Fisica Cosmica e Tecnologie Relative - National Research Council in Milan, on a project on "Galactic Emission Mapping".

Professor Smoot and Dr Mather, a senior astrophysicist at US space agency NASA's Goddard Space Flight Center in Maryland, US, have been honoured "for their discovery of the blackbody form and anisotropy of the cosmic microwave background radiation (CMB)". Through NASA's Cobe Satellite, they managed to measure the CMB, which is what is left of the energy triggered by the Big Bang – the event that created the Universe 14 billion years ago.

Editorial

This editorial appears next to two articles which aptly illustrate the quality and scope of the Science for Peace and Security Programme. One article is a reminder that, almost every year, a Nobel Science Prize winner happens also to have been a past recipient of a NATO Science programme grant – a vivid testimony of the interest our programme attracts in the scientific community and of the quality of our applications selection process. The second article concerns the *mélange* project in Azerbaijan – a conversion technology with very tangible benefits, put together thanks to our excellent network of scientists and experts.

The Nobel Prize winner is working on pure science in astrophysics, which may not have direct or immediate implications on our daily life. The *mélange* project, on the other hand, is a pilot plant which will help a Partner country get rid of a toxic product. Such is the wide span of science – ranging from grand theory that may appear esoteric to most of us, to applications whose benefits are obvious to each and everyone. Yet, the latter would never have been possible without the former.

So it is with our Science for Peace and Security Programme. To launch good scientific projects with high impact and visibility, meeting our Partnership goals, we need also to fund an array of workshops, linkage grants and other theoretical activities which will form the basis to develop and maintain our network of expertise. But the balance has evolved over the years: five to ten years ago, we spent much of our budget on fundamental science; today, the bulk of financing goes to tangible projects and activities.

In a nutshell, a basis of pure science and theory will remain, along with the need to nurture more technology-based and tangible projects that are relevant to NATO. This is an absolute necessity to meet the expectations of our Partners and the demands of NATO members.

Jean Fournet

Mélange rocket fuel disposal project in Azerbaijan

➪ *Mélange* is a highly toxic and corrosive rocket fuel oxidiser formerly used by Warsaw Pact countries. This dangerous substance is currently stored in containers that are progressively deteriorating. The high risk of leaks from these containers represents a serious threat to the environment and public health.

Mélange plant with a capacity of minimum five tonnes per day

In 2004 the Azeri government requested NATO's cooperation to deal with this threat notably during the meeting of the former Science Committee in Baku, Azerbaijan, and in response, the Committee approved a *mélange* disposal project which was then developed as a Science for Peace (SfP) Project.

A transportable conversion plant was officially inaugurated in Azerbaijan on 4 July 2006 by NATO Assistant Secretary General for Public Diplomacy, Jean Fournet, and the first deputy Prime Minister of Azerbaijan, Abid Sharifov.

With the NATO Maintenance and Supply Agency (NAMSA) as the project's executing agency, the plant began neutralising the 1,200 tonnes of *mélange* stored in two sites at Mingachevir and Alat. As the latter has been identified as the site presenting the highest risk to the environment and public health, the plant began operating there. Using an environmentally-safe chemical process, it is able to convert more than 5 tonnes of *mélange* per day into a non-hazardous, low-grade fertiliser.

The *mélange* plant in Alat is currently operating 24 hours a day and has converted 80 tonnes of *mélange* into a first phase liquid end product. The liquid will be subsequently dried and delivered to the Azerbaijan National Academy of Sciences for use as an ingredient in locally produced compound fertilisers.

The Azeri government is participating in the project, by supplying the necessary infrastructure, consumables and logistic support. This activity is implemented under Azerbaijan's Individual Partnership Action Plan with NATO.

NATO's ultimate goal is to demonstrate the effectiveness of this conversion technology in order to assist other Partner countries in *mélange* disposal projects. Kazakhstan, Ukraine and Uzbekistan also have large quantities of *mélange* stored on their territories. The project in Azerbaijan is expected to be completed by mid-2007, and may then be moved to another Partner country for the same purpose.

A video on the inauguration of the *mélange* treatment plant is available on the NATO website at http://www.nato.int/multi/video/2006/vid2006e.htm

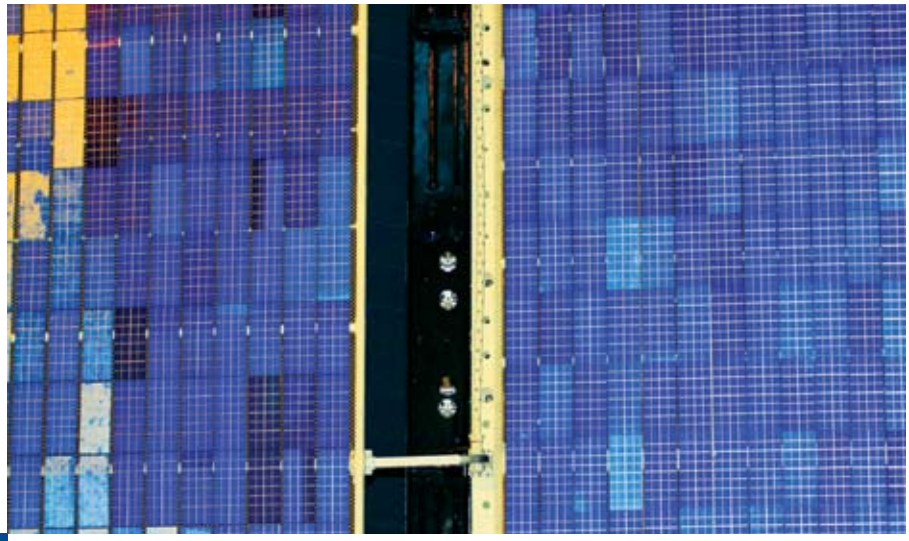
Energy and environmental security: an open issue

The continuity of supply of fossil fuels, particularly crude oil, is nowadays increasingly governed by political, economic and ecological factors. Political developments have an impact on fuel prices, while environmental concerns require a reduction in greenhouse gases and toxic emissions. Hydrogen energy technologies could be the answer to the search for alternative and cleaner energy sources.

Hydrogen can be produced from sustainable and renewable sources. Currently, it is mostly made by partial oxidation or steam reforming of oil and natural gas, methanol reforming and water electrolysis. Production possibilities are diverse, even modified algae can produce hydrogen. The production of hydrogen is relatively simple compared to the processes for making conventional fuels, meaning that no country would be able to control its supply. Hydrogen, with its ability to store energy, can act as an energy carrier and is particularly suitable for renewable energy systems. Surplus wind energy or solar energy produced under good conditions can be used to produce hydrogen via electricity. Hydrogen is a carbon-free energy source. When hydrogen is used in fuel cells, there are no harmful emissions.

Experts and researchers met for a NATO Advanced Research Workshop in Istanbul, Turkey, from 7 to 10 August 2006, with the aim to assess the issues related to the development of hydrogen energy technologies. The workshop was organised in cooperation with the United Nations Industrial Development Organisation - International Centre for Hydrogen Energy Technologies (UNIDO-ICHET). Based in Istanbul, UNIDO-ICHET acts as a conduit for knowledge and technology flow between developed and developing countries by providing support, facilities and expertise concerning all aspects of energy conversion technologies involving hydrogen. Participants in the workshop addressed the technological, financial, legal and institutional barriers to a cost-competitive, standardised, widely accessible, safe and environmentally friendly hydrogen economy.

A number of challenges remain, including the use of hydrogen as an energy carrier and the safety of hydrogen storage, fuelling and transportation. International rules and regulations, laws and technical standards need to be adjusted to facilitate the transit of hydrogen-based fuels.



Extensive safety assessments are necessary in order to have a sufficient basis for rules and regulations to be accepted by each country. For example, the maintenance of a hydrogen fuelling station is an area that requires international standards. In addition, while North America and Japan are increasing their investment in hydrogen-related research and development and coordinating with private industrial partners, European public financial support from the EU and member states remains at a significant lower and fragmented level.

If hydrogen energy technologies are effectively supported, they can ultimately contribute to the challenge of reconciling the security of energy supply with a reduced environmental impact of energy use.

Defence-related environmental activities

➪ A workshop on "Partnering for Solutions for Environmental Management System Implementation Challenges" took place at the National Military Academy in Tbilisi, Georgia, from 3-6 October 2006.

The event, which was co-sponsored by the Ministry of Defence of Georgia and NATO Science for Peace and Security (SPS) Programme, was the fourth in a series of workshops that addressed the practical challenges in the use of Environmental Management System (EMS) as a tool for addressing environmental issues in the military sector. EMS is also part of Georgia's Individual Partnership Action Plan with NATO.

EMS is defined as that part of the overall management system which includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, reviewing and maintaining an environmental policy. EMS provides management with the ability to protect and enhance the environment, as well as to minimise the environmental impact of military activities.

The workshop achieved its goals and delivered the following results:

- ➪ participants gained practical tools and techniques for implementing specific elements of EMS through case studies employing working groups;
- ➪ potential opportunities for and benefits of specialised training through the NATO School in Oberammergau, Germany were explored and,
- ➪ interest and commitment to mentoring partnerships between more experienced EMS practitioners and those who are new to the process were secured.

The issue of EMS is of particular interest to those within military establishments who are involved in environmental matters, particularly in the implementation of EMS, according to the principles of the International Organization for Standardization (ISO) 14001 standard. ISO, a network of the national standards institutes of 157 countries, is the world's largest developer of technical standards, and the most recognised EMS framework that helps organisations better manage the impact of their activities on the environment and demonstrate sound environmental management.

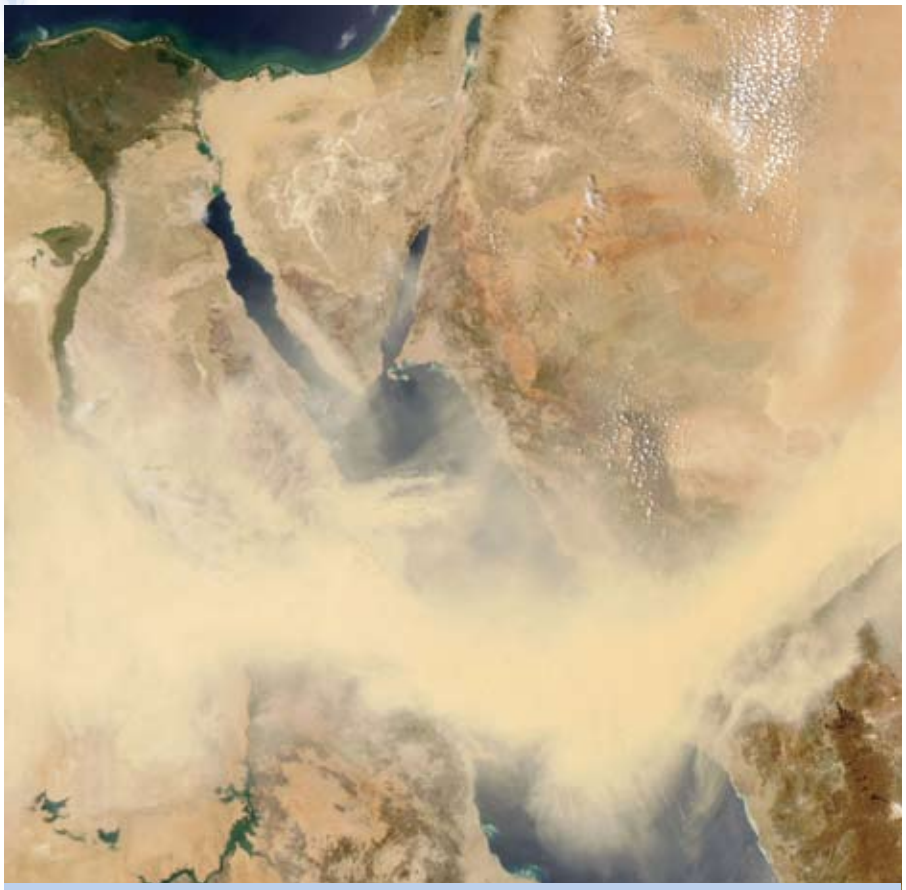
Armoured infantry vehicle crossing a river

© Dutch MoD

A Mediterranean Dialogue priority:

preserving the ecosystem of the Gulf of Aqaba

➪ Two coordinated Science for Peace Projects have been launched to assess threats to the ecosystems of the Gulf of Aqaba.



Satellite image of dust storm over the gulf of Aqaba (copyright NASA)

Human and natural threats to the Gulf's water

Clean sea water is one of the most important assets of the coastal populations living around the Gulf of Aqaba. Its coral reef – a unique hot spot of biodiversity – is a major tourist attraction that makes a significant contribution to the economy of the countries along the shores of the Gulf. However, human factors and natural processes are increasingly threatening the quality of the Gulf's water.

The reefs have been declining both in live coral cover and in the biodiversity of corals and associated organisms. The rapid growth of a wide range of human activities in surrounding coastal zones has resulted in the deterioration of all aspects of water quality, including decreasing transparency, eutrophication, and heavy metal and oil pollution.

In addition, the Gulf of Aqaba is exposed to the impact of global climate change processes, such as dust deposition stemming from desertification in adjacent land masses, ocean warming accelerated by the growth of atmospheric greenhouse gases and increased ultraviolet dosage due to ozone depletion.

With the support of a Science for Peace (SfP) grant, Israeli, Jordanian and Turkish scientists have teamed up to examine the synergy among anthropogenic factors and natural processes in a systematic way. Through the use of detectors and early warning elements, the team proposes to study and predict deleterious changes and processes taking place in the Gulf. The generated data sets will provide regional governments and non-governmental conservation bodies with the basis for the development of strategies to improve water quality and mitigate impacts of pollution on marine life, human health, and the well being of the coastal community.

By involving additional parties, this SfP project, expected to be completed by December 2009, will contribute to foster international collaboration for the protection of coastal waters and their resources. An expert from Egypt will assist the Jordanian scientists. Joint work will involve comparing results, training of young scientists, regular meetings and workshops, and personnel exchanges among the participating institutions.

Strengthening the local economies by preserving natural resources both as a shared natural heritage and tourist attraction may contribute to reducing

tensions in the region and building mutual trust among the countries involved.

The danger represented by nutrient and trace metal pollutants

Natural and human processes resulting in nutrient and trace metal pollutants have the potential to cause irreversible damage to the ecosystem of the Gulf of Aqaba, with environmental and economic consequences for the four surrounding countries – Egypt, Israel, Jordan and Saudi Arabia.

The natural processes determining the release of pollutants to the zone where most of the marine life resides include processes that take place in the oceans, land and atmosphere. External sources of terrestrial and atmospheric pollutants include dust deposition, river and ground water discharge and aquaculture. The combination of natural and human processes impact coral reefs, water cleanliness and beach quality, which might in turn reduce tourism and affect fisheries with negative consequences both for the environment and the economies of the region.

With the support of a Science for Peace grant, Israeli, Jordanian and US scientists will use state of the art techniques to quantify and evaluate the impact of these pollutants on the ecosystem of the Gulf. The team will integrate field, laboratory, modelling, and remote sensing data processing approaches.

The major outcome of this project, expected to be completed in August 2009, will be a monitoring infrastructure and a microchip with pollutants' indicators for future use by the ministries of environment of Israel and Jordan for environmental protection and decision-making.

This project follows the spirit of an agreement that Israel, Jordan and the US signed on 13-14 June 1999 to protect the Gulf of Aqaba. According to the agreement, joint teams of scientists from Israel and Jordan would work together to protect and research the coral reefs reserves in the Gulf. This agreement derived from the 1994 Israel-Jordan Peace Treaty.

Social and psychological aspects of terrorism

Experts from NATO, Partner and Mediterranean Dialogue countries gathered at a workshop in Washington, DC, US, from 7-8 September 2006 to discuss how social understanding of terrorism might help determine its nature and facilitate the implementation of defensive measures. The discussion was based on three approaches that explain the formation of terrorist organisations and the responses that have to be taken against these twisted structures within societies.

11 September 2006, commemorative ceremony at NATO HQ to pay tribute to all the victims of terrorist attacks

The instrumental model views terrorism as a response to external incentives. It assumes that the rationality in the behaviour of terrorists is to attain their goals by using different means. Thus, increasing the cost of terrorism will lead to a decline of terrorist activities. Two strategies are proposed in this regard: defence (pre-emption, prevention) and deterrence (denial, retaliation). The organisational model views terrorist organisations as regular organisations governed by principles such as competition within the organisations and actions concerning the survival of the organisation. Organisational survival (for example, recruiting and retaining membership) takes priority even over ideology, which is often modified to serve organisational goals.

A cultural approach to terrorism, which points out that terrorism cannot be understood without considering the impact of culture on these organisations, has also to be factored in. "Extremist subcultures" or "anti-movements" provide the environment in which local cultural, political and religious norms and values, usually frustrated by real or perceived barriers of expression, acquire radicalised and rejectionist guises that later become the basis for terrorist ideologies and organisations.

Participants dealt with the following research questions:

- are the current approaches sufficient to understand terrorism?
- is there any relationship between social integration and terrorism?
- what are the cultural characteristics of terrorism?
- what are the effects of globalisation on non-western countries within the framework of terrorism?
- how does religion influence the information and activities of extremist organisations?

This workshop re-affirmed the importance of trying to understand the different aspects of terrorism and reached four main conclusions:

1. Theory of terrorism should take into account both instrumental and organisational approaches while adding a layer of cultural analysis to study the links that connect extremist sub cultures and anti-movements to the community.
2. The importance of religion in cultures cannot be overlooked, as extremists and terrorists wilfully interpret religious values in order to achieve their goals.
3. The effect of culture on extremist organisational evolution needs to be further explored.
4. Extremist organisations justify their actions by giving reference to Islamic tenets, which are newly introduced and not very well known. Understanding the bias of such interpretation will help formulate new counter-arguments against these deviant subcultures.

11 March 2004, terrorist attacks in Madrid

Demystifying the mystery: the psychological impact of radiological terrorism

Acts of radiological terrorism represent perhaps the most effective, ready-available tool terrorist groups can use to cause panic, disruption and inflict long-term psychological damage on the public. A NATO-Russia Advanced Research Workshop on "Social and Psychological Effects of Radiological Terrorism" was held in Bratislava, Slovakia, on 23-24 October 2006. Over two days, expert speakers addressed over 30 participants from academic, scientific and medical institutions and government agencies from a wide range of countries including the US, Indonesia, Russia, Austria, Germany and Sweden.

The workshop addressed in-depth, the following main themes connected with the social and psychological effects of radiological terrorism:

- origin, concept, definition, likelihood, availability of material, nuclear power infrastructure safety and security;
- lessons from past accidents: Goiania (Brazil); PO Mayak/Techa River Radiation Contamination (Russia), Chernobyl (Ukraine);
- psychological and medical effects including among others distress responses, behaviour changes and psychiatric disorders;
- societal strengths and vulnerabilities including radiophobia, economic and environmental impact, different needs of general public, role of private sector, role of the media;
- international approaches: cooperation and programmes:
- preventing and mitigating psychological effects including risk communication and long-term care.

Dr. Igor Khripunov, University of Georgia and co-director of the project, noted in his conclusions that the psychological effects of a radiological attack would far out-weigh those created by other terrorist weaponry (including chemical and biological) due to radiophobia (fear of radioactive exposure) and other misconceptions.

Upcoming events

- **Pilot Study Meeting on "Food Chain Security",**
  26-27 January 2007,
  Lisbon, Portugal

- **Advanced Research Workshop on "Safety, Reliability and Risks Associated with Water, Oil and Gas Pipelines",**
  4-8 February 2007,
  Alexandria, Egypt

- **Advanced Research Workshop on "Decision Support for Natural Disasters and Intentioned Threats to Water Security",**
  22-25 April 2007,
  Dubrovnik, Croatia

- **Advanced Research Workshop on "Prevention, Detection and Response to Nuclear and Radiological Threat",**
  2-5 May 2007,
  Yerevan, Armenia

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