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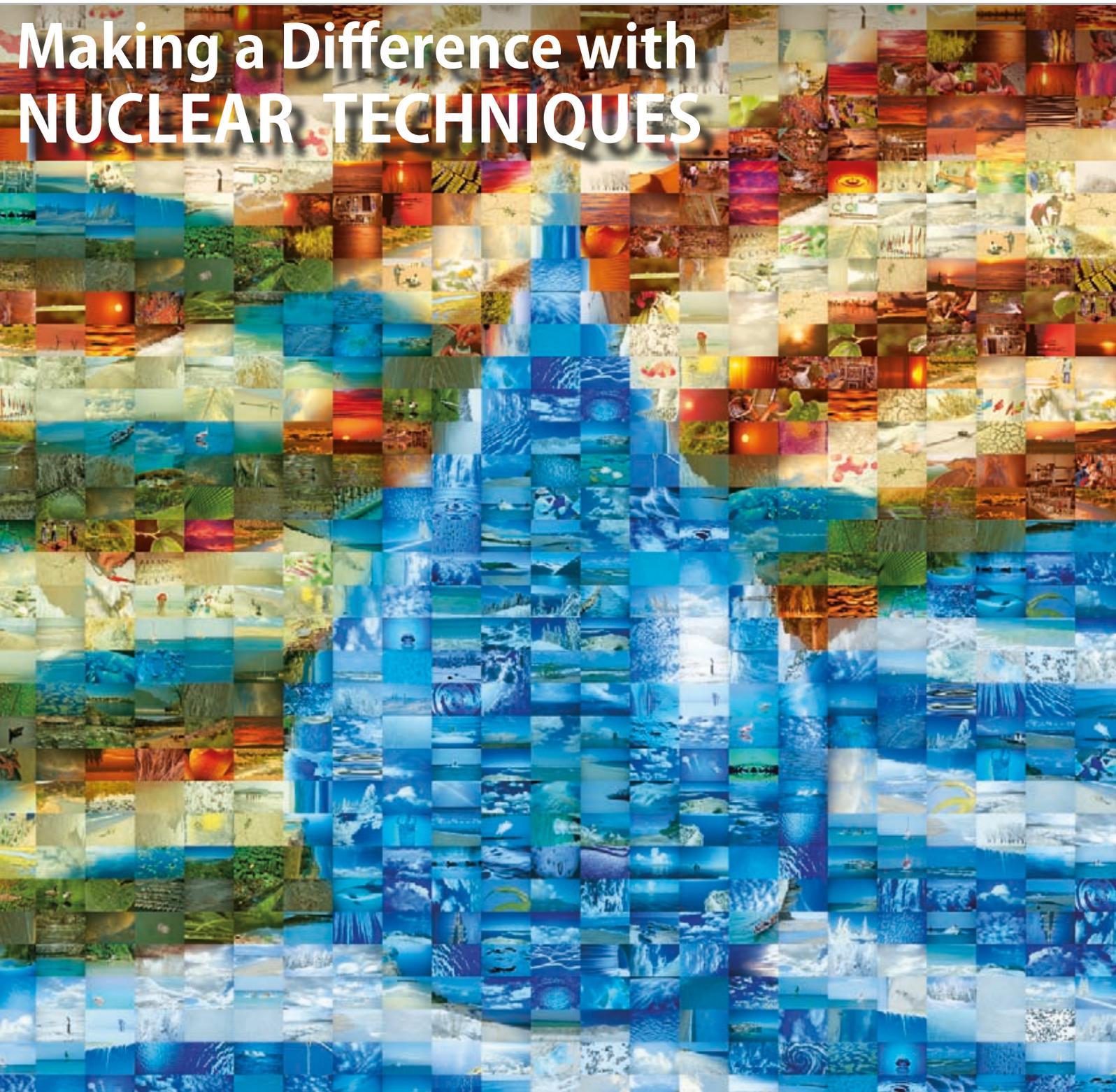
International Atomic Energy Agency
Atoms for Peace

WATER MATTERS

International Atomic
Energy Agency
SCIENTIFIC FORUM

20–21 September 2011
Vienna, Austria

Making a Difference with
NUCLEAR TECHNIQUES





WATER MATTERS





Why Water Matters

The world faces acute water shortages. The current African drought is just the latest tragic example. One billion people have no access to adequate drinking water. Five million – mainly children – die each year due to water-borne diseases. Those numbers are expected to rise.

For over half a century, the IAEA has been doing everything it can to help, deploying its unique expertise in using nuclear techniques to understand and manage water. In more than 90 countries, our experts work with national counterparts to find, manage and conserve freshwater supplies and protect our oceans.

In the Santa Elena province in Ecuador, for example, the IAEA has worked with local partners to give over a quarter of a million people continuous access to fresh water for the first time. I saw this successful project myself in July 2011. Together with our partners, we investigate and measure the aquifers so that wells can be drilled in the right places and long-term sustainability of water supply is assured.

The IAEA is working with partners in Bangladesh to mitigate contamination of groundwater by natural arsenic, the worst such case in the world. The use of nuclear techniques made it possible to locate safe alternative supplies of water quickly and cheaply.

In Africa, where many farmers are confronted with arid growing conditions, water is becoming a rare commodity. The IAEA is working with 19 African countries to teach farmers to use appropriate,

small-scale irrigation technology, supported by nuclear techniques, to make sure that every drop reaches the crops to produce greater yields.

The IAEA's experts also use nuclear techniques to protect the marine environment. Pollution threatens many of the world's seas and oceans, on which countless people depend for their livelihood. In 12 countries that ring the Caribbean, for example, the IAEA is helping to establish a laboratory infrastructure to identify sources of pollution and better protect seas and coastlines.

In order to raise awareness among the world's decision-makers about water issues, and about the enormous benefits of using low-cost nuclear techniques to address them, I decided that the September 2011 IAEA Scientific Forum should focus on this subject.

During these two days, we wish to demonstrate how nuclear techniques can increase the effectiveness of Member States' programmes in water assessment, conservation, and management.

We will present our work with many national and international partners to improve global access to sustainable supplies of clean water and to protect the environment.

I welcome your active participation in this IAEA Scientific Forum.

Yukiya Amano
IAEA Director General



WATER MATTERS

Tuesday, 20 September 2011

10.00

Opening Session

Inaugural address by the IAEA Director General, **Mr Yukiya Amano**

Mr Steven Chu, Secretary of Energy, United States of America

Ms Amina Benkhadra, Minister for Energy, Mines, Water and Environment, Morocco

Mr Srikumar Banerjee, Chairman, Atomic Energy Commission, India

Mr Andrei Bourrouet Vargas, Vice Minister for Energy, Costa Rica

Followed by:

Discussion with the IAEA project partners from Ecuador and Water Tasting

12.00–14.00

Lunch Break

14.00–16.30

Water Matters: Making More Water Available

Mr András Szöllösi-Nagy, Rector, Institute for Higher Education in Water, UNESCO

Mr Matthew Larsen, Associate Director, United States Geological Survey, United States of America

Mr Yuji Maruo, Senior Adviser, Japan International Cooperation Agency (JICA), Japan

Ms Catherine Tovey, Senior Water Resources Specialist, The World Bank

Mr John Dodson, Head, Institute for Environment at the Australian Nuclear Science and Technology Organisation (ANSTO), Australia

Mr James S. Famiglietti, Director, UC Center for Hydrologic Modeling, University of California, Irvine, United States of America

Mr Guillermo Q. Tabios III, Director, Institute of Civil Engineering, National Hydraulic Research Center, Philippines

18.00–20.00

Reception at the VIC restaurant



Wednesday, 21 September 2011

10.00–12.00

Water Matters: Tackling Water Scarcity and Saving Water in Agriculture

Ms Jane Wamuongo, Assistant Director, Kenya Agricultural Research Institute (KARI), Kenya

Ms Ann Tutwiler, Deputy Director General, Food and Agricultural Organization (FAO)

Mr Elias Fereres, Professor, Institute of Sustainable Agriculture, Spain

Mr Xurong Mei, Director General, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences, China

Mr Christopher Smith, Deputy Chief, CSIRO Land and Water, Australia

Mr Royol Chitradon, Director, Hydro and Agro Informatics Institute, Thailand

12.00–14.00

Lunch Break

14.00–16.00

Water Matters: Protecting the Oceans

Ms Roberta Delfanti, Head, Technical Unit, Marine Environment and Sustainable Development, ENEA, Italy

Mr Luis Valdes, Head, Ocean Sciences, Intergovernmental Oceanographic Commission, UNESCO–IOC

Mr Jean Pierre Gattuso, Research Professor (Directeur de recherche), Laboratoire d'Océanographie de Villefranche, France

Ms Ana Carolina Ruiz Fernandez, National Autonomous University, Mexico

Ms Elvira Sombrito, Consultant, Scientific Consultancy and Analytics, Inc. Philippine Nuclear Research Institute, Philippines

16.00–16.30

Closing Session





WATER MATTERS

Opening Session



Mr Yukiya Amano
(IAEA Director General)



Mr Steven Chu
(United States of
America)

HE Mr Steven Chu is the United States Secretary of Energy in charge of implementing President Obama's ambitious agenda to

invest in clean energy, reduce dependence on foreign oil and address the global climate crisis. Dr Chu is a distinguished scientist and co-winner of the Nobel Prize for Physics (1997). He has devoted his recent scientific career to the search for new solutions to our energy challenges and stopping global climate change. Prior to his appointment, Dr. Chu was the Director of the Department of Energy's Lawrence Berkeley National Lab, where he led the lab in pursuit of alternative and renewable energy technologies. He also taught at the University of California as a Professor of Physics and Professor of Molecular and Cell Biology. Previously, he held positions at Stanford University and AT&T Bell Laboratories. The holder of 10 patents, Dr. Chu has published nearly 250 scientific and technical papers. Dr. Chu is a member of the National Academy of Sciences, the American Philosophical Society, the Chinese Academy of Sciences, Academia Sinica, the Korean Academy of Sciences and Technology and numerous other civic and professional organizations. He received an A.B. degree in mathematics, a B.S. degree in physics from the University of Rochester, and a Ph.D. in physics from the University of California, Berkeley as well as honorary degrees from 15 universities.



Ms Amina Benkhadra
(Morocco)

HE Ms Amina Benkhadra is the Minister for Energy, Mines, Water and Environment of Morocco and responsible for establishing a strategy for the energy and water

sectors focussed on supply security, widening access to energy, regional integration and sustainable development. Prior to her appointment in 2007, Dr Benkhadra held a number of leading positions in the Moroccan energy sector. She was the Managing Director of Office National des Hydrocarbures et des Mines (ONHYM) from 2003 to 2007 and, as of 2000, was Managing Director of the Office National de Recherches et d'Exploitations Pétrolières (ONAREP). In January 2000, Ms Benkhadra was appointed a member of the Experts Committee in charge of Investment Promotion. She was the Secretary of State in charge of the Mining Sector Development from 1997–1998 and Director of Mines in the Energy and Mines Ministry from 1994–1997. Currently she chairs the Moroccan Mineral Industry Federation (FDIM) and is a Member of the National Council for Foreign Trade, positions she assumed in October 2002. Ms Benkhadra is a graduate of 'Ecole Nationale Supérieure des Mines', Paris, where she received her Doctor Engineer in mineral sciences and techniques.





International Atomic Energy Agency SCIENTIFIC FORUM



Mr Srikumar Banerjee
(India)

HE Mr Srikumar Banerjee is the Chairman of the Indian Atomic Energy Commission and Secretary to the Government of India, Department of Atomic Energy. He is one of the leading experts in materials science and technology in the country and has made outstanding contributions to many materials-related areas, basic as well as application-oriented. Dr Banerjee joined Bhabha Atomic Research Centre (BARC), Mumbai in 1967 after obtaining B. Tech. in Metallurgical Engineering from Indian Institute of Technology (IIT), Kharagpur. He also obtained Ph.D from IIT, Kharagpur while working in BARC. As Director, BARC during 2004–2010 he provided leadership in the development of Advanced Reactor Technology, Fuel Cycle technology and strategic programmes. Dr Banerjee is a recipient of many national and international awards and honours, among others, National Science Academy (INSA) Prize for Materials Science, MRSI-Superconductivity and Materials Science Prize, Indian Nuclear Society (INS) Award and Padma Shri, MRSI Distinguished Materials Scientist of the Year Award. Notable among the international awards are Acta Metallurgica Outstanding Paper Award and Alexander von Humboldt Research Award. Dr Banerjee is a Fellow of Indian Academy of Sciences, Indian National Science Academy, National Academy of Sciences India, Indian National Academy of Engineering, Maharashtra Academy of Sciences and Third World Academy of Sciences.



Mr Andrei Bourrouet Vargas
(Costa Rica)

HE Mr Andrei Bourrouet Vargas is the current Vice Minister of Energy and Environment of Costa Rica. He is a civil engineer and holds a Doctorate from the Escuela Técnica Superior of Barcelona in Spain and a Postgraduate Degree in Management of Energy and Clean Production from the University of Maastricht and the University of Twente in the Netherlands. He is a member of the Costa Rican Engineers Association and of the International Water Association. He worked for the Ministry of Transportation and Public Works and as a special advisor to the Vice President and to the Ministry of Environment and Energy in previous Administrations. He has worked in the private sector as a consultant for companies such as Holcim and is a former member of the Costa Rican Industry Chamber. Mr Bourrouet has participated in more than 40 scientific publications with emphasis on Water and Energy Resource Management and has a large amount of experience in Environmental Project Development both in Costa Rica as well as in Central America and Spain. He was also a researcher and university professor at the INCAE Business School, the Universidad Politécnica de Cataluña, the Universidad de Barcelona, the Universidad de Costa Rica and others.





WATER MATTERS

Water Matters: Making More Water Available



Prof. András Szöllösi-Nagy (UNESCO)

is Rector of UNESCO-IHE Institute for Water Education in Delft, the Netherlands. Prior to this appointment, he was Director of the Division of Water, Secretary

of the International Hydrological Programme (IHP) and Deputy Director-General of the Natural Sciences Sector of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Prof Szöllösi-Nagy significantly enhanced UNESCO's response capacities in the area of freshwater through a variety of actions including establishment of UNESCO-IHE, 23 UNESCO Water Centres and the UN World Water Assessment Programme (UN WWAP). In addition, Prof Szöllösi-Nagy was instrumental establishing the UNESCO-IHE Institute for Water Education in 2003 and was a key player in the integration of the Institute's education and research programmes.



Dr Matthew Larsen (United States of America)

is currently Associate Director for Climate and Land Use Change at the United States Geological Survey (USGS). Dr Larsen is responsible for

USGS climate-change research, adaptation, and mitigation programs as well as geographic analysis & monitoring and land remote-sensing programs. Previously, he served as the USGS Associate Director for Water, from 2008 to 2010. Prior to this duty, he was the Chief Scientist for Hydrology and led the USGS National Research Program in hydrology. He is currently the Chair of the U.S. National Committee for the UNESCO International Hydrological Programme and is the author of 70 scientific reports and journal articles.



Dr Yuji Maruo (Japan)

is a Senior Adviser specialized in Water Resources Development and Groundwater Management at the Japan International Cooperation Agency (JICA). Dr Maruo holds the D. Sc. degree from Faculty of

Science, Hokkaido University, Japan. He has been working at JICA as a groundwater development specialist for more than 20 years. He has supervised groundwater development and management projects of JICA in many developing countries and has profound knowledge about science and technology related to groundwater particularly in Africa. He was also assigned as a Chief Advisor for the Ethiopian Water Technology Center Project (Groundwater Development and Water Supply Training) in Ethiopia from 2003 to 2006.

Dr Catherine Tovey (The World Bank)

is a Senior Water Resources Specialist with the World Bank. Since joining the Bank in 2004, Dr Tovey has worked extensively on safe urban/rural water supply and groundwater resources management in South Asia and Latin America. She is currently overseeing the water resources portfolio in Bangladesh, including the preparation of investment lending operations to augment water resources in Bangladesh's Southwestern coastal areas in the context of river sedimentation and climate change adaptation, the upgrading of Bangladesh's surface and groundwater hydrological network, and pollution management of water resources in the Greater Dhaka catchment area. Dr Tovey has also worked on the design and implementation of two earlier Bank projects in Bangladesh providing arsenic-free safe water to Bangladesh villages and medium towns. She is also the Manager for the Bank's Groundwater Management Advisory Team (GW-MATE).



International Atomic Energy Agency SCIENTIFIC FORUM



**Dr John Dodson
(Australia)**

is Head of the Institute for Environmental Research at the Australian Nuclear Science and Technology Organisation in Sydney. He graduated PhD from the Australian

National University and has worked at the University of Canterbury (New Zealand), the University of New South Wales (Sydney) and has held Chairs at the University of Western Australia (Perth) and Brunel University (London) before joining ANSTO. Dr Dodson's research has focussed on Quaternary environmental change and human impacts on environmental systems in Australia, New Zealand, Pacific Islands, Ireland and China. He has published over 150 journal articles and books.



**Prof. James S. Famiglietti,
(United States of
America)**

holds a joint faculty appointment in Earth System Science and in Civil and Environmental Engineering at the University of California, Irvine,

where he is the Founding Director of the UC Center for Hydrologic Modeling. His research group uses satellite remote sensing to track water availability and groundwater depletion on land, and has been working for many years towards improving hydrological prediction in regional and global weather and climate models. Before joining the faculty at UCI in 2001, Dr. Famiglietti was an Assistant and Associate Professor in the Department of Geological Sciences at the University of Texas at Austin, and was the Founding Associate Director of the UT Environmental Science Institute.



**Dr Guillermo Q. Tabios III
(Philippines)**

is a Professor of Civil Engineering and Director of the National Hydraulic Research Center of the College of Engineering at the University of the Philippines at Diliman,

Quezon City. He holds a Ph.D. in Civil Engineering (1984) from Colorado State University, Fort Collins. Dr Tabios specializes in hydrology, hydraulics and water resources engineering. In particular, he has taught and conducted researches in stochastic and computational hydrology and hydraulics as well as water resources system engineering. He is an Academician of the National Academy of Science and Technology and Board Member of the National Water Resources Board.





WATER MATTERS

Water Matters: Tackling Water Scarcity



Dr Jane Wamuongo (Kenya)

is the Assistant Director of the Natural Resource Management Division, Kenya Agriculture Research Institute (KARI). She coordinates research in land use planning, soil

and water management, integrated soil fertility management, irrigation, drainage and climate change at KARI. She has intensive experience in issues relating to water-saving in agriculture in Kenya and in the African setting. Her current research interests are in conserving and managing water in agriculture in the face of climate change for sustainable agricultural production. Dr Wamuongo has also contributed to several important publications, such as peer reviewed journal papers and the recent book on "Enhancing agricultural productivity in East Africa: Development and up-scaling of green manure legume technologies in Kenya."



Ms Ann Tutwiler (FAO)

is the FAO Deputy Director General for Knowledge. She is responsible for FAO's global agricultural development issues and strengthening its knowledge network and sharing its agricultural development policy

expertise around the world. She previously served as the Coordinator of Global Food Security in the Office of the Secretary of Agriculture, the United States Department of Agriculture (USDA). Prior to that, she served as the Senior Advisor for the Africa Bureau of the U.S. Agency for International Development (USAID) and as the Managing Director for Agricultural Markets at the William and Flora Hewlett Foundation. From 2002–2006, she was Chief Executive Officer of the International Food & Agriculture Trade Policy Council, an organization that she co-founded in 1987.



Prof. Elias Fereres (Spain)

is professor at the School of Agricultural and Forestry Engineering, University of Cordoba and a researcher at the Institute of Sustainable Agriculture and the Scientific Research Council of Spain (IAS-

CSIC). He has been President of the European Society of Agronomy and is currently President of the Royal Academy of Engineering of Spain. Dr Fereres is a member of the Academia Europaea and the Technical Advisory Committee of the World Water Assessment Programme of UNESCO. His area of expertise is centered on water sciences and engineering in relation to agriculture and the environment. Current research interests are focused on the relations between water use and food production and the sustainability of water-limited agriculture. He has used isotopes extensively in his research as critical tools to improve the efficiency of water use in food production and for resource conservation.



and Saving Water in Agriculture



Prof. Xurong Mei (China)

is the Director General of the Institute of Environment and Sustainable Development in Agriculture (IEDA), the Chinese Academy of Agricultural Sciences (CAAS), Beijing. He is also currently the Director of Key

Laboratory for Dryland Agriculture and Agro-Environment, Ministry of Agriculture (MOA), and the President of the Chinese Society of Agro-meteorology (CSA), China Association of Agricultural Science Societies (CAASS). He has been engaged in research on agricultural water use and management for more than twenty years, with specific emphasis on crop water requirements and productivity, water balance and food security. He currently serves as the expert panel of national mega-program relating to the control and management of water body pollution for the 2006–2020 period, and the Theme Leader Scientist of dryland agriculture for MOA.



Dr Christopher Smith
(Australia)

is the Deputy Chief, CSIRO Land and Water Division. He has undertaken research on water balance, crop water use, nitrogen cycling, nitrogen fixation, nutrient balances

of a variety dryland and irrigated agricultural systems. He has experience in the use of ^{15}N and nuclear techniques for measuring nitrogen and water cycles in agricultural and natural systems. Dr Smith is author or co-author of more than 200 papers, articles and reports. He has been awarded the John K. Taylor, OBE, Gold Medal (for Excellence in both Research and its Communication in Soil Science), the CSIRO Chairman's Medal (1999) and the CSIRO Medal for Research Achievement (2007). He is currently an associate editor of Soil Research.



Dr Royol Chitradon
(Thailand)

is the Director of Hydro and Agro informatics Institute, a public organization under the Ministry of Science and Technology and the Vice-Chairman of the team

for Multi-Functional Monkey Cheek Water Retention in Sanamchai-Mahachai Canals, Bangkok and Samutsakorn Province, following the King's initiatives. He is currently serving on the Steering Committee of both Government and Civil Society to monitor the government work, the Royal Irrigation Department. He also works as a Committee member for both Water Resource Management in the Suburban and Bangkok areas and Thailand Water Challenge: Community Water Resource Management. Furthermore, he is a counselor of the Committee Board of Infrastructure, Communication, Public Transportation and Logistics in the Industries, the Federation of Thai Industries.



WATER MATTERS

Water Matters: Protecting the Oceans



Dr Roberta Delfanti (Italy)

is senior researcher at the ENEA Marine Environment Research Centre (La Spezia) since 1983. She works in the field of marine radioecology and on the use of radionuclides as tracers for marine processes. Her

main research interest is in upper-ocean biogeochemical cycles and carbon flux and in sedimentation processes in coastal areas. She is author and co-author of peer-reviewed papers on these topics. Since 2002 she is the head of the ENEA Technical Unit Marine Environment and Sustainable Development and co-ordinates its multi-disciplinary activities.



Dr Luis Valdes (UNESCO–IOC)

is the Head of Ocean Sciences at the Intergovernmental Oceanographic Commission of UNESCO since January 2009, and formerly (2000–2008) he has been the

Director of the Centro Oceanográfico de Gijón - Instituto Español de Oceanografía. With more than 30 years of experience in marine research and field studies related with marine ecology and climate change, he established in 1990 the time series program based on ocean sampling sites and marine observatories which is maintained by Spain in the North Atlantic and the Mediterranean Sea. In 2007, he got the ICES Services award.



Prof. Jean Pierre Gattuso (France)

is Research Professor (Directeur de recherche) at the Laboratoire d'Océanographie de Villefranche, CNRS and Université Pierre et Marie Curie-Paris 6. His main research

activity relates to the response of marine organisms and ecosystems to ocean acidification. He is the Scientific Coordinator of the FP7 large-scale integrated project EPOCA (European Project on Ocean Acidification) which brings together more than 180 researchers from 32 institutes. Jean-Pierre Gattuso is the Founding President of the European Geosciences Union Biogeosciences Division.





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Dr Ana Carolina Ruiz Fernandez (Mexico)

is a researcher at the National Autonomous University of Mexico with 15 years of experience in the study of trace metals pollution and eutrophication process in the aquatic environment. She has published 40 scientific articles and is member of the Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) since 2009. In 2010 she received the Sor Juana Inés de la Cruz Award that recognized the outstanding performance and contributions of a female member of the academic community at UNAM.



Dr Elvira Sombrito (Philippines)

is currently working as consultant on matters relating to the recurring harmful algal bloom (HAB) and other water-related issues. In 1997, Dr Sombrito helped to implement the IAEA Technical Cooperation project aimed at helping the Philippines address the HAB problem in the country, which established the receptor binding assay laboratory at the Philippine Nuclear Research Institute. Since then, and until she retired from government service in 2010, she served as the counterpart of the IAEA initiatives related to HAB, leading to the recognition of PNRI as an IAEA Collaborating Center on HABs in 2006.





WATER MATTERS

IAEA's work on water

Isotope Hydrology

The IAEA contributes uniquely to enable Member States in meeting their commitments for the Millennium Development Goals (MDGs) through the assessment of the adequacy of water supplies, optimization of resource management policies and decisions supported by scientifically-sound and reliable assessment rivers, lakes and aquifers, and a better understanding of the hydrologic cycle under present and future climate conditions. The Water Resources Programme assists Member States in assessing and managing their water resources in all aspects, with isotope hydrology as an integral part of their scientific and institutional strengths. Major activities are focused on isotope monitoring networks for use in hydrology, development and dissemination of global data products, improved or easily accessible analytical facilities for member states, and effective use of isotope techniques for solving member states' needs in water resource management.

Contact

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Water Management

The Soil and Water Management and Crop Nutrition (SWMCN) Section, with its associated Laboratory, is one of five Sections of the Joint IAEA/FAO Division of Nuclear Techniques in Food and Agriculture. It assists Member States to develop improved soil and water management practices for sustainable intensification of agricultural production. Through the application of nuclear techniques, it focuses on the development of methodologies and cost-effective soil-water technology management packages to: (i) improve soil quality and fertility for crop nutrition and production; (ii) increase on-farm and area-wide

water and nutrient use efficiency to combat water scarcity and prevent the inefficient use of applied fertilisers; (iii) minimize the impact of land use and soil and water management practices on greenhouse gas emissions; and (iv) reduce the effects of climate change on agricultural soil and water resources.

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Marine Environment

Preservation of a healthy marine environment and the sustainable development of marine resources are major tasks of the IAEA. As the unique group of marine laboratories in the UN system, IAEA-NAEL responds to regular requests for technical assistance not only from other UN agencies, but also its Member States, providing a better understanding of the monitoring and protection of the oceans through training courses and technical cooperation projects. IAEA-NAEL is also a networking international centre for analytical quality control services for radioactive and non-radioactive marine pollutants in the marine environment.

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