

11-15
January
2010
Nicosia
Hilton
Cyprus

Energy, Water & Climate Change in the Mediterranean & the Middle East

Conference Program



THE CYPRUS
INSTITUTE



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Midlife Crisis
Meditation
Rate Change
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Energy, Water & Climate Change in the Mediterranean & the Middle East

Conference Program

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Max Planck Institute for Chemistry, Germany

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Welcome

Greenhouse gases, notably CO₂, continue to increase in the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) states with “very high confidence” that the anthropogenic accumulation of greenhouse gases is affecting the Earth’s climate. Actually, the CO₂ increase is accelerating and there are no signs that this trend will reverse soon. The IPCC considers it “likely” that the doubling of CO₂ since pre-industrial times, expected to occur within this century, will lead to a global warming of 2- 4.5°C, while substantially larger temperature increases are not excluded.

The United Nations have formulated the objective to stabilize greenhouse gases at a level that prevents dangerous anthropogenic interference with the climate system. Although the term “dangerous” climate change is not well defined, the Copenhagen Accord states that the global average temperature should not exceed 2°C above the pre-industrial level. One could argue that the exceeding of 2°C is regarded as dangerous. Unless restrictive emission policies are implemented, it is improbable that this target will be achieved, and climate change may have impacts that are highly undesirable, or even catastrophic and intolerable.

A robust result of climate projections is that “wet regions will get wetter and dry regions dryer”. Arid and sub-humid regions are expected to be particularly strongly affected through extended droughts and weather extremes. The Mediterranean and the Middle East, with a combined population of more than 400 million, diverse economic, social and cultural identities, are particularly vulnerable. Clearly there is a need to reconsider energy and water policies, and cooperate internationally. The conference aims to contribute to this effort, assess the science, and help develop sustainable strategies to ameliorate the adverse impacts of climate change.

I am grateful to the staff of The Cyprus Institute for organizing the conference, the participants for highly interesting contributions, and I look forward to the discussions.

Prof. Jos Lelieveld

Chairman, Program Committee

The Cyprus Institute/Max Planck Institute for Chemistry

Monday, 11 January 2010

15:00 - 18:00 Registration

Opening Ceremony

18:00 - 18:30 Welcome addresses

Costas N. Papanicolas (*President of The Cyprus Institute, Cyprus*)

Titos Christofides (*Under Secretary to the President of the Republic of Cyprus*)

Michalis Polinikis (*Ministry of Agriculture, Natural Resources and the Environment, Cyprus*)

18:30 - 19:00 Opening Lecture

Can we “fix” the Climate Problem?

Jos Lelieveld (*The Cyprus Institute, Cyprus / Max Planck Institute for Chemistry, Germany*)

19:00 Opening reception

Tuesday, 12 January 2010

Climate change: are we facing a crisis?

09:00 – 12:50 Morning session

Mediterranean Climate History

Jürg Luterbacher (*Justus-Liebig University of Gießen, Germany*)

Climate Change and the Eastern Mediterranean Precipitation Regime

Manfred A. Lange (*The Cyprus Institute, Cyprus*)

10:20 – 10:50 Coffee break

Solar Dimming and Brightening over Thessaloniki, Greece

Christos Zerefos (*Academy of Athens, Greece*)

Climate Modelling and Scenarios: From a Global to a Mediterranean Perspective

Hervé Le Treut (*Institut Pierre Simon Laplace, France*)

Climate Change Projections over the Mediterranean Region

Filippo Giorgi (*Abdus Salam International Centre for Theoretical Physics, Italy*)

12:50 – 14:30 Lunch

Tuesday, 12 January 2010 ↓

14:30 – 18:00 Afternoon session

Water-Borne Diseases and Climate Change

Jan C. Semenza (*European Centre for Disease Prevention and Control, Sweden*)

The Challenge of Climate Science

Antonio Navarra (*Euro-Mediterranean Centre for Climate Change, Italy*)

Downscaling Climate to the Regional Scale:

The U.S. Climate Impacts Assessment

Don Wuebbles (*University of Illinois, USA*)

16:30 – 17:00 Coffee break

17:00 – 18:00 Panel discussion

Sultan T. Abu-Orabi (*Yarmouk University, Jordan*)

Paul J. Crutzen (*Chemistry Nobel Laureate, Max Planck Institute for Chemistry, Germany*)

Charles Kennel (*Scripps Institution of Oceanography, USA*)

Manfred A. Lange (*The Cyprus Institute, Cyprus*)

Zev Levin (*Tel Aviv University, Israel*)

Wednesday, 13 January 2010

Technological options and possible strategies

09:00 – 12:50 Morning session

Climate Change and Water Resources

Mahmoud Abu-Zeid (*Arab Water Council, Egypt*)

Managing Water as an Economic Resource

Theodore Panayotou (*Cyprus International Institute for Management, Cyprus*)

10:20 – 10:50 Coffee break

Air Pollution and Climate Change in Eastern Mediterranean and Middle East

Mehmet Karaca (*Istanbul Technical University, Turkey*)

Co-Generation of Electricity and Desalinated Water from Solar Energy

Costas N. Papanicolas (*The Cyprus Institute, Cyprus*)

Energy Challenges and Opportunities in the Mediterranean Region

Emanuela Menichetti (*Observatoire Méditerranéen de l’Energie, France*)

12:50 – 14:30 Lunch

Wednesday, 13 January 2010 ↓

14:30 – 18:00 Afternoon session

The Need for Nuclear Energy in the Middle East

Khaled Toukan (*Jordan Atomic Energy Commission, Jordan*)

Climate Change and Risk Management

Mikdat Kadioglu (*Istanbul Technical University, Turkey*)

16:30 – 17:00 Coffee break

17:00 – 18:00 Panel discussion

Mohamed Abdel Aal (*The Arab Center for Studies for Arid Zones and Dry Lands, Syria*)

Mahmoud Abu-Zeid (*Arab Water Council, Egypt*)

Salvatore Califano (*National Academy dei Lincei, Italy*)

David Marks (*MIT, USA*)

Khaled Toukan (*Jordan Atomic Energy Commission, Jordan*)

20:30 Conference dinner

Thursday, 14 January 2010

Policy options and international initiatives

09:00 – 12:50 Morning session

Water Shortage and Policies

Venice K. Gouda (*National Research Center, Egypt*)

Climate Change, Agriculture and Food Security in MENA

Luis Constantino (*World Bank*)

10:20 – 10:50 Coffee break

Climate Change and Health Policies in the Mediterranean

Roger Aertgeerts (*WHO European Centre for Environment and Health, Italy*)

After Copenhagen: Evaluation, Critique, Next Steps

Richard N. Cooper (*Harvard University, USA*)

Copenhagen 2009

Where to? Where from?

Benito Mueller (*University of Oxford, UK*)

12:50 – 14:30 Lunch

Thursday, 14 January 2010 ↓

14:30 – 18:00 Afternoon session

Climate Policies in the Mediterranean in the Aftermath of Copenhagen

Costas Cartalis (*Standing Committee for the Environment, Hellenic Parliament, Greece*)

Climate Change and International Trade:

The Challenges Ahead

Thomas Cottier (*World Trade Institute, Switzerland*)

Meeting the Challenges of Tomorrow:

The Role of International Science and Technology

Collaboration in the Mediterranean Area

Joshua Jortner (*Tel Aviv University, Israel*)

Egypt: Towards a Knowledge based Economy

Yasser Elshayed (*Ministry of Higher Education and State for Scientific Research, Egypt*)

16:30 – 17:00 Coffee break

17:00 – 18:00 Panel discussion

Édouard Brézin (*École Normale Supérieure, France*)

Costas Cartalis (*Standing Committee for the Environment, Hellenic Parliament, Greece*)

Richard N. Cooper (*Harvard University, USA*)

Andreas Demetriou (*Ministry of Education & Culture, Cyprus*)

Joshua Jortner (*Tel Aviv University, Israel*)

18:00 – 18:30 Closing Remarks

Friday, 15 January 2010

10:00 - 12:00 Morning session

Discussion and follow up

12:00 - 15:00 Excursion

Walk through historic Nicosia

EWACC2010 Social Program

The EWACC2010 Social Program is available for accompanying persons and includes access to the opening ceremony & reception, all lunches, the conference dinner on January 13 and two excursions.

Monday, 11 January 2010

- 18:00 - 19:00 Opening ceremony and lecture by Jos Lelieveld
- 19:00 - 20:00 Reception

Tuesday, 12 January 2010

- 09:30 - 13:00 Excursion to Lefkara village which is famous for its lace and silver handicraft. A walk through the village, a visit to the museum and free time for shopping. Return to the Hilton Cyprus Hotel at 13:00 hours.

Wednesday, 13 January 2010

- 20:30 Conference dinner at a local Cypriot Tavern

Friday, 15 January 2010

- 12:00 - 15:00 Lunch and Excursion
A walk through historic Nicosia with a visit to Hadjigeorgakis Kornesios House, the Omerieh Mosque, the Hamam - the Turkish Baths and then a coffee at the Lions House.
15:00 Return to the Hilton Cyprus Hotel at 15:00 hours

Hilton Floor Plan



Floor map of the ground floor of Cyprus Hilton, indicating Ballroom A, the Othello Room and the Akamas Room:

Practical Information

Location

The conference takes place at the **Hilton Cyprus Hotel** and all sessions will be held in **Ballroom A**.

Registration & Information

The **Conference Desk** is located in the **Othello Room** and will be open for registration and information services from **Monday, 11 January at 15.00 hours**. The opening hours of the Conference Desk will be:

Monday, 11 January: 15:00 to 19:00

Tuesday, 12 January – Thursday 14 January: 08:30 to 17:00

Friday, 15 January: 08:30 to 13:00

Name badges will be provided at registration. The badges will grant delegates access to conference facilities, lunches and breaks. For reasons of security, you are kindly requested to always wear your badge.

Coffee breaks and lunches

All coffee breaks and lunches are **included** in the conference fee. **Coffee breaks** will take place in the foyer of **Ballroom A**, adjacent to the main conference room. **Lunches** will take place in the **Akamas Room**. **Lunch** will be provided upon showing conference badge.

Poster presentations

The poster presentations will be on display in the **Othello Room**, next to the conference information desk.

Internet Access

Internet access is generously provided by **CYTA**. In addition to two workstations at the CYTA Internet Café, complimentary wireless internet will be available in **Ballroom A and the Othello Room**. Login passwords can be obtained from the conference registration desk.

Transportation and Parking in Nicosia

Parking at the Hilton Cyprus Hotel, is free for delegates of the conference. A parking token will be provided by the hotel reception upon showing your conference badge.

Public transportation in Cyprus is limited. There is no train service available and bus services are not as consistent and frequent as in other countries. Bus time tables and schedules are available from tourist offices or directly from the bus companies. Be aware that services stop early daily (at approximately 18:00) and there is limited bus service on weekends (some areas have no service on Sundays). Bus fare is paid directly to the bus driver; exact change is required.

Shared and private taxi services provide an alternative method of transport with the options being: shared interurban service taxis, rural taxis and urban taxis. More information may be obtained from the Conference Desk at the Othello Room.

Sponsor



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Middle East
Mediterranean
Water
Change

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Abstracts

Climate Change and Water Resources

Climatic change and climatic variability pose series of challenges to the management of water resources. There is compelling evidence that such changes will increase with time. Observed medium and short term impacts in some parts of the world are given. Drivers and consequences of global changes are discussed. Predictions of different global circulation models on surface warming and on sea water rise are debated. Indications show that by 2050 the Middle East will practice 20 to 25% reduction in rainfall that will be accompanied by a temperature rise between 2-7°C. Sea water rise in such region of up to 80 cm will take place for the same period. Some adaptation and mitigation measures are suggested.

Climate Change and Health Policies in the Mediterranean

There is evidence that climate change contributes to the global burden of disease and premature deaths. The Mediterranean is one of the areas most at risk; several countries are conducting health impact assessments of climate change within the WHO/Institut Pasteur coordinated CIRCE project and other projects. From these studies and assessments, we can expect that projected climate change-related exposures to human health are likely to:

- increase heat-wave, drought and fire-related health impacts;
- change food-borne disease patterns;
- change the distribution of infectious diseases and potentially contributing to the establishment of tropical and subtropical species;
- increase the burden of water-borne diseases and water stress;
- increase the frequency of respiratory diseases and allergic disorders.

In particular, for the Mediterranean Region, climate models project decreased precipitation, revealing a vulnerability to climate change related to the risk of drying. Reduced runoff will exacerbate limited water supplies, decrease water quality, harm ecosystems and result in decreased crop yields. WHO/Europe assists its Member States in reducing ill health from water-related diseases by:

- supporting the implementation of the Protocol on Water and Health, the first international instrument for the prevention, control and reduction of water-related diseases in Europe;
- carrying out capacity-building activities at Regional, subregional and country level.

As long as climate change is not too rapid or strong, many of the health effects can be controlled by strengthening health systems and ensuring health all policies. This can include strengthening preparedness, public health services and health security, advocating action in other sectors to benefit health, better informing citizens and leading by example. Health systems need to strengthen their capacity to assess potential climate-related health effects, to review their capacities to cope, and develop and implement adaptation and mitigation strategies using appropriate innovative technologies, and to strengthen a range of key areas of work – from disease surveillance and control to disaster risk reduction – that are essential for rapid detection of and action against climate-related risks.

Climate change is felt globally. Future generations might be more affected. The 61st World Health Assembly called for the development and strengthening of action, and through resolution 61.19 urges Member States:

- (1) to develop health measures and integrate them into plans for adaptation to climate change as appropriate;
- (2) to enhance the capability of public health leaders to be proactive in providing technical guidance on health issues, be competent in developing and implementing strategies for addressing the effects of, and adapting to, climate change, and show leadership in supporting the necessary rapid and comprehensive action;
- (3) to strengthen the capacity of health systems for monitoring and minimizing the public health impacts of climate change through adequate preventive measures, preparedness, timely response and effective management of natural disasters;
- (4) to promote effective engagement of the health sector and its collaboration with all related sectors, agencies and key partners at national and global levels in order to reduce the current and projected health risks from climate change;
- (5) to express commitment to meeting the challenges posed to human health by climate change, and to provide clear directions for planning actions.

Pinhas Alpert

Tel Aviv University, Israel

Water Cycle Changes in the Mediterranean and the Middle East

The water cycle components over the Mediterranean are studied with the Japan Meteorological Agency's super high-resolution 20km grid global climate model and compared to CMIP3 ensemble.

The projected annual change rate of precipitation (P) for sea and land, are -11% and -10%, respectively. The increased evaporation over the Eastern Mediterranean was found higher than for the Western Mediterranean, but the precipitation decrease is lower. The river model suggests decreasing water inflow to the Mediterranean of about 36% (excluding the Nile).

The analysis of the relationships between moisture budget components of the current simulation sorted by the precipitation over the Mediterranean region shows that, all components balance quite well the moisture budget equation; the correlation coefficient between E-P and outflow-inflow is 0.89.

The study of changes in the moisture budget components for the end of the 21st century suggest that, in spite of increases in the total moisture inflow and outflow, as well as the evaporation, still the mean intensity of precipitation is decreased.

Costas Cartalis

Standing Committee for the Environment, Hellenic Parliament, Greece

Climate Policies in the Mediterranean in the Aftermath of Copenhagen

The Mediterranean region experiences changes in its climate which affect, in both direct and indirect ways, the state of the environment as well as development patterns of the Mediterranean countries. Water, soil, land and marine biodiversity and forests are at the heart of the main expected impacts of climate change. In addition, impacts with major direct physical consequences for human activity include energy, the coastal environment, tourism, agriculture and fisheries. In particular the energy model to be applied per State reflects the capacity of the region to comply with international guidelines for the protection of climate. Yet, the weak Copenhagen outcome complicates the efforts for the mitigation of climate change in the Mediterranean and also develops a framework of uncertainty in terms of the capacity of the countries to develop solid and binding policies for the protection of the climate. In this presentation, the overall international framework for the protection of climate will be examined, especially with respect to the Mediterranean region and the Copenhagen outcome. In addition, an effort will be made to assess the capacity of existing policies to protect the climate as well as to result in energy and development models which will sustain growth in the region and at the same time protect the fragile environment.

Richard N. Cooper

Harvard University, USA

After Copenhagen: Evaluation, Critique, Next Steps

This talk will attempt an evaluation of the outcome of the Copenhagen Conference of the UNFCCC Parties, offer a critique, and discuss the next steps to achieve global inter-governmental agreement on effective actions to mitigate emission of greenhouse gases.

Luis Constantino

Environment, Agriculture and Rural Development, Middle East and North Africa Region, World Bank

Climate Change, Agriculture and Food Security in the MENA Region

The presentation will provide a summary of recent analytical and policy work that the World Bank is undertaking in the Middle East and North Africa region (MENA). MENA is the most water-scarce region in the developing world, as well as one of the most dependent on foreign imports for its food supply (particularly cereals). Climate change is likely to exacerbate water scarcity, and to pose difficult trade-off to policy makers. As fluctuations in global grain markets widen, MENA governments might need to dedicate additional land, water or both to cereal production, at considerable costs, both in agriculture and in other sectors. The presentation will discuss policy implications, using recent work in Morocco and Yemen as examples.

Thomas Cottier

World Trade Institute, Switzerland

Climate Change and International Trade: The Challenges Ahead

Climate change mitigation and adaptation reaches way beyond the UN Framework Convention and specific agreements. It largely affects the structure of international law and the multilateral trading system of the WTO in particular. The keynote will introduce and discuss the main challenges which global and regional trade regulation will face with a view to support set goals of climate change mitigation and address new problems arising from climate change adaption.

Filippo Giorgi

Abdus Salam International Centre for Theoretical Physics, Italy

Mediterranean Climate Change: Observations and Future Projections

The evidence is mounting that the Mediterranean region is one of the most sensitive and vulnerable hot-spots to global warming. The last few generations of global climate model simulations of 21st century climate have provided a remarkably consistent picture of projected changes in the Mediterranean, including a substantial reduction of precipitation and increase in temperature and drought events particularly in the spring and summer seasons. To complement the global model information, coupled regional climate models are today available to provide fine scale climate information over the region usable in impact and adaptation work. This talk will review our present knowledge of observed and projected climate change over the Mediterranean and will discuss research priorities for the future.

Venice K. Gouda

National Research Center, Egypt

Water Shortage and Policies

Fresh water resources are amongst the major assets of all countries in the world. It is a key input for every single aspect of most economies.

Facing the water shortage challenges is a collaborative effort of all stakeholders involved. Those who are actual water users such as the agricultural, industrial and drinking water and sanitation sectors and stakeholders who are concerned about water resources because of their mandates such as health and environmental protection sectors.

An integrated water resources management plan for Egypt has been developed for safeguard its water resources in the future, and how it will best use these resources from both socio-economic and environmental perspectives.

Policies should be also directed towards encouraging R & D in certain areas e.g.: water desalination, efficient water treatment and reuse, as well as cultivation of biosaline farms.

Politicians and decision-makers are the persons who have greatest influence on the allocation of the financial budgets and the adoption of policies.

Joshua Jortner

Israel Academy of Sciences and Humanities, Israel

Meeting the Challenge of Tomorrow: The Role of International Science and Technology Collaboration in the Mediterranean Area

Mankind and our planet now face historically unique challenges – a more hopeful term than crises – related to our overuse and misuse of energy, water and the environmental commons. Getting to this point of unprecedented short-term prosperity and long-term danger has been a long-term cooperative effort – and so will its solution. It has required every more advanced and innovative S & T inputs – and so will its solution. The very magnitude, universality and intractability of these problems ensure that international S & T cooperation will play a crucial role in keeping our planet both prosperous and livable.

As in other areas, the impetus for international and regional S & T collaboration rests on the:

1. Need to share essential, but limited human and financial resources;
2. Intrinsic regional nature of such problems as energy, water, food, climate;
3. International scope of social and ethical responsibilities of scientists;
4. Impact of S & T cooperation on economic, political and security cooperation;
5. Conflict mitigation by building bridges that S & T cooperation creates between countries.
6. Scenarios for a common future through research modeling and foresight activities.

In this presentation I will comment more fully on the need for international and regional S & T cooperation and on the unprecedented challenges – and opportunities – it faces in our times.

Mikdat Kadioglu

Istanbul Technical University, Turkey

Climate Change and Risk Management

Climate change and disaster risk reduction are now closely linked. More extreme weather events in future are likely to increase the number and scale of disasters, while at the same time, the existing methods and tools of disaster risk reduction provide powerful capacities for adaptation to climate change.

Especially in the Mediterranean and Middle East area, hydrometeorological disasters cause more damage than those which are of geophysical in nature. Climate change is likely to impact all the natural ecosystems as well as health and socio-economic systems in this region. Further, human activities that contribute to deforestation, land degradation and climate change not only result in huge losses to the environment, but also increase the vulnerability of the environment to disasters and alter the resilience of the natural environment by reducing its ability to recover effectively from damage. Shifting of focus from hazards to risk management could make our life safer.

Mehmet Karaca

Istanbul Technical University, Turkey

Air Pollution and Climate Change in Eastern Mediterranean and the Middle East

Although Mediterranean and the Middle East is house to 16% of the world population, they contribute to 30% of the total GDP due to high industrialization. This and geographical settings make this region highly vulnerable to air pollution. Among the sources of air pollution, Saharan Dust; Anthropogenic Sources in the European continent; and the megacities in the region (i.e., Istanbul, Athens, and Cairo) are the most critical ones. Under a changing climate, this region is among the most sensitive zones and it is essential to identify the contributing sources and develop efficient mitigation and adaptation measures.

Hervé Le Treut

Institut Pierre Simon Laplace, France

Climate Modeling and Scenarios in the Mediterranean

The Mediterranean area appears consistently as one of the most vulnerable to climate change, with a clear risk of increased drought situations. It is also a complex area subject to many influences, from Atlantic weather systems, Asian or African monsoons, and the variety of these influences is a source of uncertainty for future scenarios. The purpose of the talk, beyond a statement of the state-of-the-art understanding of these processes, will be to review the project Hymex, which will address them in the coming years.

Jürg Luterbacher

Justus-Liebig University of Gießen, Germany

Mediterranean Climate History

Knowledge of past climate can help address the question whether modern climate change is unprecedented in a long-term context and improve our understanding of natural climate variability. The lack of widespread long instrumental data, however, requires natural climate archives ("proxies") such as tree-rings, speleothems, corals, documentary evidence, marine and terrestrial sediments, etc. to statistically reconstruct climate in past centuries. I will present an overview of Mediterranean paleoclimatic indicators covering the past centuries and how this information can integrate for large scale temperature and precipitation reconstructions. The talk will end with perspectives for future interdisciplinary research in the field of paleoclimatology in the Mediterranean.

Emanuela Menichetti

Observatoire Méditerranéen de l'Energie, France

Energy Challenges and Opportunities in the Mediterranean Region

The presentation will provide an overview of the main energy trends in the Mediterranean region and the expected evolution under a business as usual scenario. By analyzing the main socio-economic indicators, the presentation will touch upon the main challenges that the region is expected to face if current energy paths are maintained, and the likely results in terms of climate-related pressures. The presentation will draw an alternative scenario where energy market and policy integration is enhanced and where technological innovation is used to bring benefits to the Mediterranean community. Recommendations for both policy makers and practitioners will be derived.

Benito Mueller

University of Oxford, UK

Climate Finance post Copenhagen

The "Agreed Outcome" of the Copenhagen Climate Conference is likely to bring about significant changes to the manner in which developed countries are currently supporting developing country climate change activities, not only with respect to the level of finance, but also in the way it is managed. The presentation will look into what was decided in Copenhagen, and how it compares with the prior expectations.

Antonio Navarra

Euro-Mediterranean Centre for Climate Change, Italy

The Challenge of Climate Science

Climate has become one of the hottest issues today, moving from an obscure scientific dispute to the status of a global geopolitical issue, but the concept of climate itself is a sophisticated concept that is not the static, intuitive, idea that we may use in everyday life. The basic mechanisms of climate are regulated by global energy balances and they are the result of complex nonlinear interactions among the several systems participating in the shaping of the Earth climate. The intensity of the non linear interactions generates an intense variability in climate that makes very difficult the detection of small, secular trends. The increase of carbon dioxide and of surface temperatures is now being established as a fact, but the attribution of the temperature rise to carbon dioxide increases is a complex decision process. We cannot perform crucial experiments in climate science and we have to rely on a combination of numerical experiments and consensus among experts to reach provisional explanations. Nevertheless, this process results in the accumulation of knowledge and we will have to live with the idea that this is the way in which climate science progresses.

Theodore Panayotou

Cyprus International Institute of Management, Cyprus

Managing Water as an Economic Resource

Water is an economic resource since its demand exceeds supply at zero price. Therefore, it must be managed in such a way as to maximize its total economic value by equalizing the marginal value of water across all uses. Casual observation of water use around the Mediterranean and the Middle East can establish the fact that water is not being managed as an economic resource but as a social and political resource, resulting in enormous waste of both water and other resources that go into its production and distribution. Partly due to mismanagement, and economic and population growth and partly due to climate change water resources in the region are becoming increasingly scarce. Yet, in the absence of efficient (full-cost) pricing of water, there is no indicator to reflect growing scarcity and trigger more efficient use and hence there is no negative feedback loop to return the system to equilibrium. The shortfall is invariably made up by rationing and inefficient supply expansion at significant economic, social and unaccounted-for environmental cost, as there can be no efficient supply expansion without efficient demand management to establish true deficits and values. The objective of this presentation is to make the case for, and identify the constraints to improved water management as a prerequisite to conservation and efficient supply expansion in response to increasing scarcity brought about by climate change.

Costas N. Papanicolas

The Cyprus Institute, Cyprus

Co-Generation of Electricity and Desalinated Water from Solar Energy

Cyprus, as most of the Middle East and North African (MENA) countries, have faced in their history protracted periods of drought. Climate change is predicted to exacerbate the problem by reducing the rainfall by as much as 40% by the end of the century; the observed recent decline of rainfall may indicate the onset of this effect. We present a co-generation scheme of producing electricity and desalinated water that has been investigated for Cyprus as it offers a pathway for adaptation to the climate crisis applicable to many regions of the Mediterranean and the Middle East.

Desalination of Sea Water (DSW) offers in principle a reliable and inexhaustible source of potable water. However, the leading DSW technology, the electricity driven reverse osmosis, is energy intensive and if fed by fossil fuels it intensifies the problem of carbon emissions. Cyprus is isolated from transnational power (electricity and gas) grids and completely dependent on fossil fuel (98%) for energy production. The need to develop renewable energy sources rapidly is imperative if Cyprus is to address its water needs and to meet the EU emission directives.

Cyprus, as a number of Mediterranean and Middle East Countries, has limited options in terms of renewable energy sources: a low wind and biomass potential, minimal geothermal power and complete absence of hydro power. The solar potential is excellent with small cloud coverage and a high factor of irradiation throughout the year, thus its utilisation provides a viable long term. Concentrated Solar Power (CSP) provides a clear advantage over other solar energy generation technologies (such as Photovoltaics) not only because it provides the most economic modality but primarily because it can be combined with heat storage, thus allowing continuous, base line operation.

The Cyprus Institute motivated by the above considerations has launched a techno-economic feasibility study for the design of a plant which will combine CSP and proven desalination technologies for the co- production of electricity and Desalinated Sea Water (CSP-DSW project)*. Key feature of the CSP-DSW design is the combined thermodynamical cycle in which the thermal losses of the light harvesting and power-generation process are optimally utilized for desalination. A thermal storage unit which will provide a continuous operation is a crucial part of the design.

This novel cogeneration scheme addresses simultaneously both of Cyprus' needs: employment of its renewable energy sources and the increase of the production of desalinated water. This technology is scalable and of value to many other places throughout the globe. The key findings of the study and its applicability to adaptation strategy for the impending climate change for Mediterranean and MENA countries will be presented.

* The CSP_DSW project is being pursued by an international consortium which includes the following institutions: The Cyprus Institute, the Cyprus Electricity Authority, The Cyprus Energy Regulatory Authority, the Water Development Department, the Massachusetts Institute of Technology and the University of Illinois. It is funded by the Cyprus Government.

Jan C. Semenza

European Centre for Disease Prevention and Control (ECDC), Sweden

Water-Borne Diseases and Climate Change

The predicament of climate change calls for concerted public health action. Erratic and extreme precipitation events can cause contamination of drinking-water reservoirs which can lead to disease outbreaks; unusually hot summers can increase the growth rates of pathogens in open salt water bodies and result in hazardous exposures during recreational water use. The European Centre for Disease Prevention and Control (ECDC) has taken a proactive role and developed an ontology for water-borne diseases as well as a blueprint for a network to link environmental with epidemiologic data for analysis.

Khaled Toukan

Jordan Atomic Energy Commission, Jordan

The Need for Nuclear Energy in the Middle East

The recent renaissance of nuclear power in the industrialized countries is not the only factor driving the interest of nuclear power in developing countries.

The necessity for nuclear power in developing countries, and in particular the Middle East, is most often misunderstood by the industrialized countries, due to the abundance of oil and gas in the region. The greatest expansion of energy demand over the coming decades will be in the developing countries. Global predictions of energy demand and supply are misleading for policy or planning needs. Regional and, even better, national detailed projections are more accurate. A point of illustration is the Middle East, where the conventional opinion is of a "rich" oil-producing region. On a country-by-country basis, it is clear that many countries in the Middle East, are actually suffering under the toll of high oil prices. A case in point is Jordan, where more than 25 percent of the national budget is spent to import energy.

Don Wuebbles

University of Illinois, USA

Downscaling Climate to the Regional Scale: The U.S. Climate Impacts Assessment

While climate change is a global problem, its impacts occur at the local and regional scale. Regional integrated climate assessments are critical for informing sound climate mitigation and adaptation policy-making. In this presentation, I draw on experiences from recent assessments to illustrate how consistent analysis based on the latest climate science can be generated to understand the potential impacts on diverse sectors including water supply and quality, agriculture, ecosystems, human health, energy and transportation systems, economics and infrastructure, and other societal impacts. The recently published assessment of Global Climate Change Impacts in the United States provides key examples of such analyses.

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Solar Dimming and Brightening over Thessaloniki, Greece

Ultra-Violet (UV-A) solar irradiances show increasing trends at Thessaloniki, Greece, where air quality has been improving because of air pollution abatement strategies. In contrast, over Beijing where air quality measures were taken later, solar brightening was delayed. It will be shown that until the early 1990's UV-A irradiances over Thessaloniki show a downward trend of -0.5% per year, which reverses sign and becomes positive in the last decade ($+0.8\%$ per year). Both the negative rate of change (dimming) and the positive rate of change (brightening) are amplified in the UV-A solar irradiances, in comparison to the total solar irradiance, by a factor of 2.6. Satellite derived shortwave radiation over Beijing showed negative changes of -0.4% (1984-1991) and -0.1% per year during 1994-2006. The negative trend in solar radiation continued even during 2000-2006. Satellite-derived aerosol optical depth increased by $+1.0\%$ per year during 2000-2006, in agreement with in situ measurements of increasing aerosol optical depth.

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