

# PROGRAMME AND ABSTRACTS

*KNOWLEDGE AND FUTURE*



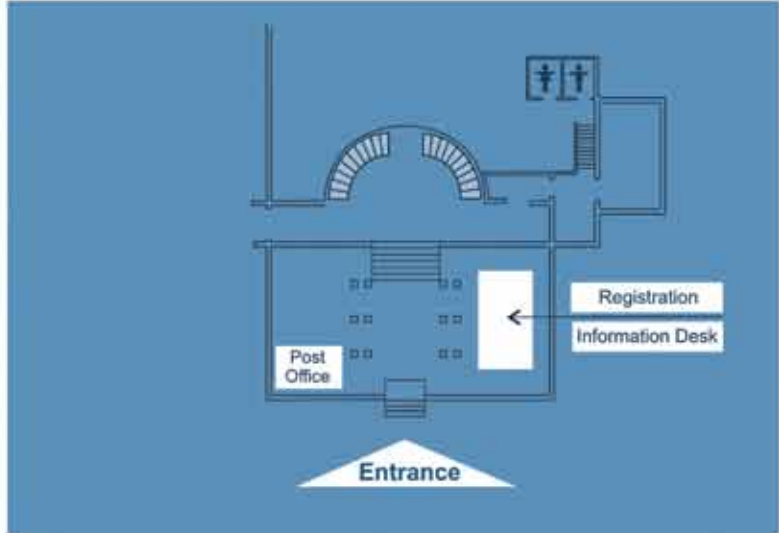
## WORLD SCIENCE FORUM

5-7 NOVEMBER 2009  
BUDAPEST, HUNGARY

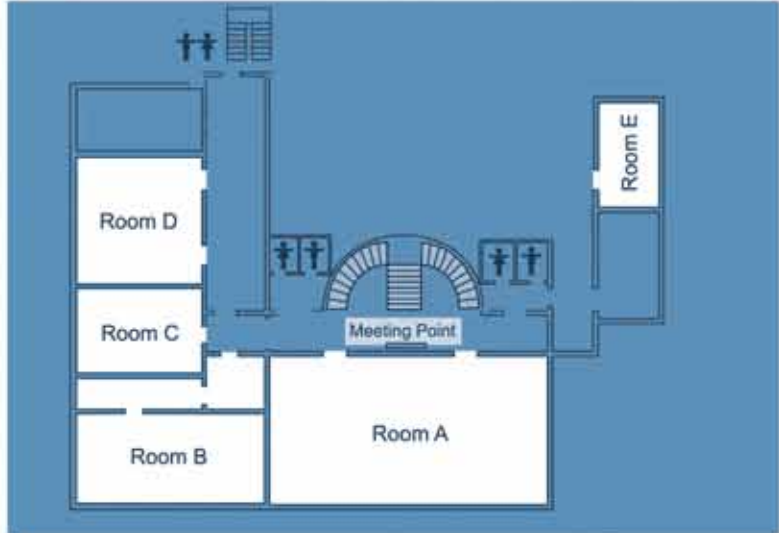


# ROOM MAP

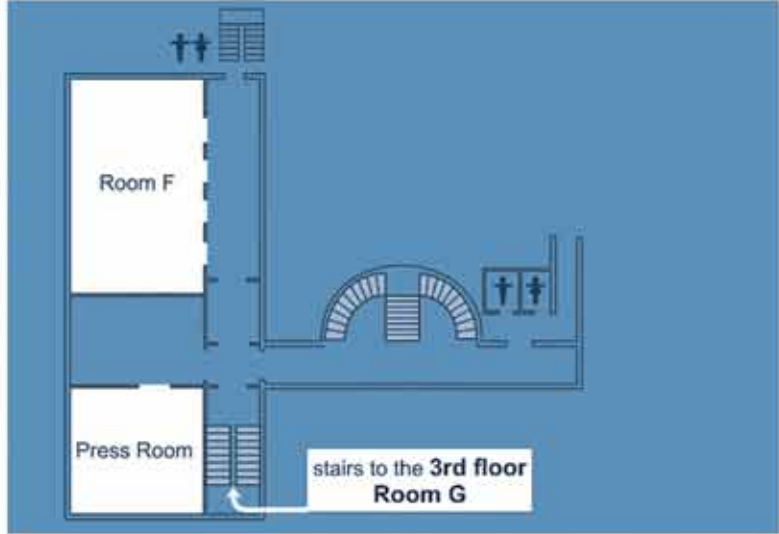
Hungarian Academy of Sciences



Ground floor



1st floor



2nd floor

# Contents

Patrons	2
Steering Committee	2
Governing Board	2
Welcome	3
Programme at-a-glance	4
Programme	5
Wednesday, 4 November 2009	5
Thursday, 5 November 2009	5
Friday, 6 November 2009	12
Saturday, 7 November 2009	18
World Science Forum on the Internet	19
General information	19
Social programmes	20
Speakers, facilitators, chairs, and schedule	21
Abstracts	24

# Patrons

**László SÓLYOM**, President of the Republic of Hungary  
**José Manuel Durao BARROSO**, President, European Commission  
**Koïchiro MATSUURA**, Director-General, UNESCO  
**Catherine BRÉCHIGNAC**, President, International Council for Science (ICSU)

# Steering Committee

## Chair:

**E. Sylvester VIZI**, Former President, Hungarian Academy of Sciences (HAS)

## Co-Chair:

**Werner ARBER**, Nobel Laureate

## Members:

**Deliang CHEN**, Executive Director, International Council for Science (ICSU)  
**Prince EL HASSAN BIN TALAL**, Former President, Club of Rome  
**Walter ERDELEN**, Assistant Director-General for Natural Sciences, UNESCO  
**Mohamed HASSAN**, Executive Director, The Academy of Sciences for the Developing World (TWAS)  
**Rolf-Dieter HEUER**, Director-General, European Organisation for Nuclear Research (CERN)  
**Yee-Cheong LEE**, Chair, Governing Board, International Science, Technology and Innovation Center (ISTIC) of G77+China  
**Alan I. LESHNER**, Chief Executive Officer, American Association for the Advancement of Science (AAAS)  
**László LOVÁSZ**, Director, Mathematical Institute, Eötvös Loránd University, Budapest  
**Yongxiang LU**, President, Chinese Academy of Sciences (CAS)  
**Marja MAKAROW**, Chief Executive Officer, European Science Foundation  
**Yuri S. OSIPOV**, President, Russian Academy of Sciences (RAS)  
**Martin SCHUURMANS**, Chairman of the Board, European Institute of Innovation and Technology  
**Hiroyuki YOSHIKAWA**, President, National Institute of Advanced Industrial Science and Technology (AIST), Japan

# Governing Board

## President:

**József PÁLINKÁS**, President, Hungarian Academy of Sciences

## Honorary President:

**E. Sylvester VIZI**, Former President, Hungarian Academy of Sciences

## Vice President:

**Tamás NÉMETH**, Secretary General, Hungarian Academy of Sciences

## Members:

**Mustafa EL-TAYEB**, Director, Science Policy and Sustainable Development Division, UNESCO  
**Balázs GULYÁS**, Executive Director of World Science Forum  
**József HÁMORI**, President, Hungarian National Commission for UNESCO  
**Gusztáv HENCSEY**, Executive Secretary of World Science Forum  
**Norbert KROÓ**, Vice-President of the Hungarian Academy of Sciences  
**Ferenc KUMIN**, Representative of the Office of the President of the Republic of Hungary  
**István LÁNG**, Head of the Organizing Committee of World Conference on Science, 1999  
**Diana MALPEDE**, Science Policy and Sustainable Development Division, UNESCO  
**István SZEMENYEI**, Representative of the Prime Minister's Office  
**István TAKÁCS**, Representative of the Ministry of Foreign Affairs

## Secretary:

**Péter GROSSCHMID**

# Welcome

In order to promote the quality of the dialogue on the new roles and challenges of scientific knowledge within today's global society, in partnership with the Hungarian Academy of Sciences and the Hungarian Government, UNESCO and ICSU organised the first **World Conference on Science** in Budapest, Hungary in 1999. As then State Secretary responsible for Science and Education in Hungary, it was my honourable task to endorse the initiative of UNESCO and ICSU as an unique endeavour to provide scientists and science policy makers with a new global platform for discussing vital issues of common interest.



Encouraged by the success of the World Conference on Science, the Hungarian Academy of Sciences initiated a series of events called **World Science Forum** taking place biannually in Budapest. As in 2001 UNESCO assigned the day of the 10th of November to serve as “**World Science Day**”, a day dedicated to science and scientists, biannual World Science Fora take place in Budapest on and around the World Science Days of every odd year.

The first World Science Forum, focusing on “Knowledge and Society”, took place from 8 through 10 November 2003, the second World Science Forum on “Knowledge, Ethics and Responsibility” was held from 10 through 12 November 2005, whereas the third one lasted from 8 through 10 November 2007 and focused on “Investing in Knowledge: Investing in the Future”.

Well over 1 200 scientists, politicians, decision makers from all over the world have participated in the work of the past World Science Fora, making them unique and highly diverse events. The Summaries, brochures as well as the video-archives of the previous Fora can be accessed on this web site.

The main missions of the World Science Forum 2009 are:

- to provide major stakeholders with a global forum for dialogue on science and its role and responsibility in the 21st century,
- to better understand and promote the need for science and scientific advice in political and economic decision-making,
- to exchange views and ideas on how to communicate science and its basic values to societies at large and to the various stakeholder groups.

It is my pleasure to welcome you to the Fourth World Science Forum, organised by the Hungarian Academy of Sciences in partnership with UNESCO and ICSU to be held in Budapest on 5-7 November 2009. The Forum - focusing on “**Knowledge and Future**” - will not only mark the tenth anniversary of the first World Conference on Science, but will also look forward and give us a strategic vision of the future of science in the global society of the 21st century.

## József PÁLINKÁS

President of the Hungarian Academy of Sciences  
President of World Science Forum – Budapest 2009

# Programme at-a-glance

Hungarian Academy of Sciences			Parliament
Wednesday 4 November	Thursday 5 November	Friday 6 November	Saturday 7 November
<p>16.00 – 18.00 <i>Registration of participants</i></p> <p>18.00 – 20.30 <b>Cultural event</b> followed by the <b>Opening reception</b></p>	<p><b>09.00 – 11.30</b> <b>PLENARY SESSION</b> Room A</p> <ul style="list-style-type: none"> <li>• Opening addresses</li> <li>• Presidents' panel</li> <li>• Prize ceremony</li> </ul> <p>11.30 – 12.00 <i>Coffee Break</i></p> <p><b>12.00 – 14.00</b> <b>PLENARY SESSION</b> Room A</p> <p><b>1999 – 2009: Ten years after the World Conference on Science</b></p> <p>14.00 – 15.00 <i>Lunch</i></p> <p><b>15.00 – 16.30</b> <b>THEMATIC SESSIONS</b> Rooms A, D, F, G</p> <p>16.30 – 17.00 <i>Coffee Break</i></p> <p><b>17.00 – 19.00</b> <b>THEMATIC SESSIONS</b> Rooms A, D, F, G</p> <p><b>19.30 – 22.00</b> <b>Reception</b></p>	<p><b>09.00 – 11.00</b> <b>PLENARY SESSION</b> Room A</p> <p><b>Moving forward</b></p> <p>11.00 – 11.30 <i>Coffee Break</i></p> <p><b>11.30 – 12.30</b> <b>PLENARY SESSION</b> Room A</p> <p><b>Science communication</b></p> <p>12.30 – 13.30 <i>Lunch</i></p> <p><b>13.30 – 16.30</b> <b>THEMATIC SESSIONS</b> Rooms A, D, F</p> <p>16.30 – 17.00 <i>Coffee Break</i></p> <p><b>17.00 – 19.00</b> <b>PLENARY SESSION</b> Room A</p> <p><b>Forum of global science fora</b></p> <p><b>19.30 – 22.00</b> <b>Banquet</b></p>	<p><b>09.00 – 10.30</b> <b>PLENARY SESSION</b></p> <p><b>Closing session /1</b></p> <p>10.30 – 11.00 <i>Coffee Break</i></p> <p><b>11.00 – 12.30</b> <b>PLENARY SESSION</b></p> <p><b>Closing session /2</b></p> <p><b>12.30</b> <b>Farewell reception</b></p>

# Programme

## Wednesday, 4 November 2009

Hungarian Academy of Sciences (Budapest V. 9, Roosevelt Square)

16.00 - 18.00 Registration of Participants

### 18.00 – 20.30 Cultural event

#### Room A

**Live concert** by Tamás HACKI and ensemble  
followed by the

#### **Opening reception**

given by József PÁLINKÁS, President, Hungarian Academy of Sciences  
*Hungarian Academy of Sciences*

## Thursday, 5 November 2009

Hungarian Academy of Sciences (Budapest V. 9, Roosevelt Square)

08.00 – 09.00 Registration of Participants

### 09.00 – 11.30 PLENARY SESSION

#### Room A

#### 09.00 – 09.30

#### **Opening addresses**

*Chair:* József PÁLINKÁS, President, HAS

- József PÁLINKÁS, President, HAS; Host
- Koïchiro MATSUURA, Director General, UNESCO; Patron
- Catherine BRÉCHIGNAC, President, ICSU; Patron
- Personal Delegate of José Manuel BARROSO, Representative of the President of the European Commission; Patron
- László SÓLYOM, President of the Republic of Hungary; Patron

#### 09.30 – 11.00

#### **President's panel**

*Chair:* László SÓLYOM, President of the Republic of Hungary

- Mathis WACKERNAGEL, Executive Director, Global Footprint Network
- Dennis MEADOWS, Director, Institute for Policy and Social Science Research at the University of New Hampshire
- Stjepan MESIĆ, President of the Republic of Croatia
- László SÓLYOM, President of the Republic of Hungary

#### 11.00 – 11.30

#### **Prize ceremony**

*Chair:* Koïchiro MATSUURA, Director General, UNESCO



József  
PÁLINKÁS



Koïchiro  
MATSUURA



Catherine  
BRÉCHIGNAC



László  
SÓLYOM



Mathis  
WACKERNAGEL



Dennis  
MEADOWS



Stjepan  
MESIĆ

11.30 – 12.00 Coffee break

## 12.00 – 14.00 PLENARY SESSION

### Room A

#### 1999 – 2009: Ten years after the World Conference on Science

Chair: József HÁMORI, President of the World Conference on Science

- **Werner ARBER**, Nobel Laureate, Chair, Steering Committee, WSF
- **Walter ERDELEN**, Assistant Director General, UNESCO
- **Gudmund HERNES**, President, International Social Science Council (ISSC)
- **Alan I. LESHNER**, CEO, AAAS
- **Reiko KURODA**, Vice President, ICSU
- **Hans Joachim SCHELLNHUBER**, Director, Potsdam Institute for Climate Impact Research (PIC)



József  
HÁMORI



Werner  
ARBER



Walter  
ERDELEN



Gudmund  
HERNES



Alan I.  
LESHNER



Reiko  
KURODA



Hans Joachim  
SCHELLNHUBER



14.00 – 15.00 Lunch

## 15.00 – 19.00 THEMATIC SESSIONS

### Room A

#### Women in science

*Facilitator:* **Dame Wendy HALL CBE**, Member of the Royal Society, UK

*Rapporteur:* **Valéria CSÉPE**, Deputy Secretary General, HAS, Hungary

True and sustainable development of the global knowledge society is feasible only when the tokenism through gender empowerment turns into gender parity and equity. The contemporary challenges being faced today in the areas of many fields have a very close impingement on the day-to-day life of women. Moreover, policies and programs addressing the role of women in science have been constantly assessed and readdressed. However, whilst a growing number of students studying are female, only a small number of them get to the most senior levels. We call this the 'leaking pipe'.

The fields discussed in the session from this aspect are (i) Education – addressing the leaky pipeline thereby by retaining as many girls as possible up to the tertiary level with opportunities to move on to professional degrees; (ii) Employment – equal opportunities at recruitment level and clear affirmative actions facilitating career development which will require re-entry options too, good recognition and reward systems for work done and attractive remuneration packages; (iii) Empowerment – enhancing research skills through fellowship support for better knowledge (iv) Entrepreneurship – opportunities built in their career path to nurture innovation and sharpen their entrepreneurial skills with support from Universities, R&D Institutions and Financial Institutions.

All these are serious problems for all the countries and continents, whose scientists presenting in the thematic session highlight their own contribution to the research field while having a leading position in different institutions and organizations. The participants' scientific expertise represents different disciplines such as astronomy, engineering, environmental research, physics, neuroscience. The presentations will focus on the topic how high performance in science may lead to positions where women have better opportunities in forcing better recognition of diverse workforce as a more innovative workforce, with a visible impact on scientific and business performance – delivering more solutions and better management decisions with greater flexibility. Therefore, promoting the position of women in science is important for more than just equity reasons.

**Dame Wendy HALL CBE**, Member of the Royal Society, UK

*Towards a science of the Web: the power of networks*

**Beatriz BARBUY**, University of Sao Paulo, Brazil

*Spectroscopy of the oldest stars*

**Sudha NAIR**, Programme Director, Biodiversity, MS Swaminathan Res. Foundation, India

*Women as co-creators of the global future*

**Julia KING**, Vice Chancellor, Aston University, Birmingham, UK

*Women and leadership, from an engineer's perspective*

**Ana Maria CETTO**, Deputy Director-General, IAEA

*Advancing the role of women in science: work in progress?*

**Penny D. SACKETT**, Chief Scientist, Australia

*Women in Science in Australia: Picking up the pace*

**Maria Teresa LAGO**, Center for Astrophysics, University of Porto, Portugal

*Searching for our origins – my (personnel) travel of three decades*

**Valéria CSÉPE**, Deputy Secretary General, HAS, Hungary

*Neuroscience in education – Research in service of future generations*



Dame Wendy  
HALL CBE



Beatriz  
BARBUY



Sudha  
NAIR



Julia  
KING



Ana Maria  
CETTO



Penny D.  
SACKETT



Maria Teresa  
LAGO



Valéria  
CSÉPE

## Room D

### Science funding in a changing global economy

*Organiser:* AAAS and WSF

*Facilitator:* **Alan I. LESHNER**, CEO, AAAS

*Rapporteur:* **Vaughan TUREKIAN**, Chief International Officer and Director, Center for Science Diplomacy, AAAS

**Tateo ARIMOTO**, Director General, Ristex, Japan

**Wilhelm KRULL**, Secretary General, VW Foundation  
*Enabling Breakthroughs – Fostering Creativity*

**Alan I. LESHNER**, CEO, AAAS

**Chuan Poh LIM**, Chairman, Agency for STR, Singapore

**Marja MAKAROW**, CEO, ESF

**Dong-Pil MIN**, Chairman, Korea Research Council of Fundamental Science and Technology

*Sharing research resources for global problems*

**Peter NIJKAMP**, Former President of EUROHORCS

**Sir George K. RADDA**, President, British Medical Research Council

**Henna VIRKKUNEN**, Science Minister, Finland



Alan I.  
LESHNER



Tateo  
ARIMOTO



Wilhelm  
KRULL



Chuan Poh  
LIM



Marja  
MAKAROW



Dong-Pil  
MIN



Peter  
NIJKAMP



Sir George K.  
RADD



Henna  
VIRKKUNEN

## Room F

### Science and ecosystem services – sustainability in nature

*Organiser:* IUCN

*Facilitators:* **Julia MARTON-LEFEVRE**, Director General, International Union for Conservation of Nature (IUCN) and **István LÁNG**, member of the Brundtland Commission

*Rapporteurs:* **Katalin CZIPPÁN**, European Vice Chair, IUCN Commission on Education and Communication, and **Tibor FARAGÓ**, State Secretary in charge of environment policy and climate policy, Ministry of Environment and Water, Hungary

**Goals:** The session intends to:

- Engage the scientific community in reaching out to explain to citizens and decision-makers the importance of ecosystem services
- Encourage new research on the connection between ecosystems and adaptation to and mitigation of climate change.
- Identify the key messages of science for decision making.

**Key Questions:**

- How do we manage human impact on the biosphere – both land and oceans so that ecosystem functions are not further degraded and biodiversity loss is halted?
- How do we reduce greenhouse gas emissions while reducing humans' negative impact on ecosystems?
- How do we put a just value on the services from ecosystems and ensure that these services reach a growing human population in an equitable manner?
- What institutions do we need to help ensure the role of ecosystems in the climate change challenge?
- What is the role of the scientific community in raising consciousness about these issues?
- How can science help construct a responsible society and identify the key actors in bringing about socio-economic changes needed?

**Angela CROPPER**, Deputy Executive Director, UNEP

**Brendan MACKEY**, Professor, Fenner School Environment and Society – The Australian National University

*On the relationship between biodiversity, ecosystem services and climate change*

**Natalia LUKINA**, Centre for Forest Ecology and Productivity, Russian Academy of Sciences (RAS)

*Understanding and conserving ecosystem services of forests*

**Mathis WACKERNAGEL**, Executive Director, Global Footprint Network

**Robert WATSON**, Chief Scientific Adviser, DEFRA, UK



Julia  
MARTON-LEFEVRE



István  
LÁNG



Angela  
CROPPER



Brendan  
MACKEY



Natalia  
LUKINA



Mathis  
WACKERNAGEL



Robert  
WATSON

## Room G

### Science and technology foresight and innovation policy for sustainability

Organiser: Chinese Academy of Sciences

Facilitator: **Yonglong LÜ**, Director, Bureau of International Cooperation, CAS

**Yonglong LÜ**, Director, Bureau of International Cooperation, CAS

**Penny D. SACKETT**, Chief Scientist, Australia

*Australia's foresighting activities: Planning today for a sustainable tomorrow*

**Jiarui WU**, Vice-President, Shanghai Institutes for Biological Sciences, CAS

*Biomedicine innovation for building up a sustainable development society*

**Linxiu ZHANG**, Institute of Geographical Sciences and Natural Resources Research, CAS

*China's Development Challenges and Role of Education*

**Hiroshi NAGANO**, Former Director-General of National Institute of Science and Technology Policy; Ministry of Education, Culture, Sports, Science and Technology, Japan

*Japanese Foresight Activity and its Implication for Future*

**John BORIGHT**, Executive Director, Office of International Affairs, National Academy of Sciences (NAS), USA

*Foresight and Innovation Policy: a Goal Approached in Diverse Ways*

**James WILSDON**, Director, Science Policy Centre of the Royal Society, UK

**Robert SCHLÖGL**, Director, Fritz-Haber Institute, Max-Planck Society, Germany



Yonglong  
LÜ



Penny D.  
SACKETT



Jiarui  
WU



Linxiu  
ZHANG



Hiroshi  
NAGANO



John  
BORIGHT



James  
WILSDON



Robert  
SCHLÖGL

16.30 – 17.00 *Coffee break*

**19.30 – 22.00 Folk dance performance by Csillagszemű ensemble**

followed by the

**Reception**

given by István HILLER, Minister of Education and Culture, Hungary

*Palace of Arts*

## Friday, 6 November 2009

Hungarian Academy of Sciences (Budapest V. 9, Roosevelt Square)

### 09.00 – 11.00 PLENARY SESSION

#### Room A

#### Moving forward

Chair: **Walter ERDELEN**, ADG, UNESCO

- **Catherine BRÉCHIGNAC**, President, ICSU
- **Francis GURRY**, Director General, World Intellectual Property Organization (WIPO)
- **Kerri-Ann JONES**, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, USA
- **Ichiro KANAZAWA**, President, Science Council of Japan
- **Yongxiang LU**, President, Chinese Academy of Sciences
- **Michael OBORNE**, Director, OECD



Walter  
ERDELEN



Catherine  
BRÉCHIGNAC



Francis  
GURRY



Kerri-Ann  
JONES



Ichiro  
KANAZAWA



Yongxiang  
LU



Michael  
OBORNE

11.00 – 11.30 *Coffee break*

### 11.30 – 12.30 PLENARY SESSION

#### Room A

#### Science communication

Chair: **József PÁLINKÁS**, President, HAS

- **Bruce ALBERTS**, Editor-in-Chief, Science
- **Phillip CAMPBELL**, Editor-in-Chief, Nature
- **Mihály CSÍKSZENTMIHÁLYI**, Claremont Graduate University



József  
PÁLINKÁS



Bruce  
ALBERTS



Phillip  
CAMPBELL



Mihály  
CSÍKSZENTMIHÁLYI

12.30 – 13.30 Lunch

## 13.30 – 16.30 THEMATIC SESSIONS

### Room A

#### Science and youth

*Organiser:* World Association of Young Scientists (WAYS)

*Facilitators:* **Gaëll MAINGUY**, Chairman, WAYS, and **Péter CSERMELY**, Chairman, Hungarian National Talent Support Council

*Rapporteur:* **Mande HOLFORD**, PhD, Assistant Professor in Chemistry at the City University of New York

Scientific excellence in the long run lies in the intensity, commitment and quality of the recruitment process to pursue scientific research. Europe needs a large number of talented young scientists to answer the multitude of challenges, to solve the upcoming crisis-waves and to survive the world-wide competition. Science should be communicated in a different way today. The use of web-based tools has already profoundly modified the way science is conducted, published, taught and used for decision-making. The next decade should witness other profound changes of a similar order of magnitude. This session will explore the use of talent support to channel the best students to scientific research, including the national and world-wide networking possibilities. The current tools generated by the abrupt intrusion of the web will be summarized and their impact on science practices with a special focus on social networks will be discussed. Browsing through case studies and overviews, this session will strive to identify emerging trends and assess the potential impact of the recruitment process and web-applications on science quality, accessibility and cost efficiency in the near future. The session will also work out suggestions for the efficient dissemination of the messages of the World Science Forum, with special reference to the young generations.

**Catherine CESARSKY**, High Commissioner for Atomic Energy, France

*Introduction*

**Gaëll MAINGUY**, Chairman, WAYS

*Can Social Networks Tackle our Common Equation?*

**Raphael ADESIYAN**, Editor-in-Chief, Science Times, Nigeria

*Prioritizing science for Nigeria's development*

**Jenny BAESEMAN**, Director, Association of Early Career Scientists (APECS)

*Shaping the Future of Polar Research*

**Marin DACOS**, Director, Open Electronic Publishing Center (CLEO)

*Welcome to the Read/Write Web*

**Balsubramanian RAMANI**, Head of YPARD

*Collaboration in Science: the Web Revolutions*

**Zvi PALTIEL**, Chairman, Network of Youth Excellence

*Inspire Youth? Engage them in Contemporary Scientific Research*

**Franz MÖNKES**, President, European Council of High Ability

*Gifted Education in Europe: 1916 – 2009*

**Péter CSERMELY**, Chairman, Hungarian National Talent Support Council

**Máté OLÁH**, Secretary, Network of Youth Excellence

*Networking possibilities to promote science recruitment of talented students*



Gaëll  
MAINGUY



Péter  
CSERMELY



Catherine  
CESARSKY



Raphael  
ADESIYAN



Jenny  
BAESEMAN



Marin  
DACOS



Balsubramanian  
RAMANI



Zvi  
PALTIEL



Franz  
MÖNKS



Máté  
OLÁH

## Room D

### Mobilizing Policy for Science/Science for Policy to address global challenges

*Organiser:* UNESCO and ISESCO

*Facilitators:* **Mustafa EL-TAYEB**, Director, Science Policy and Sustainable Development Division, UNESCO, and **Diana MALPEDE**, Science Policy Division, UNESCO

*Rapporteur:* **Diana MALPEDE**, Science Policy Division, UNESCO

**Koïchiro MATSUURA**, Director General, UNESCO

**Abdulaziz Othman ALTAWAIJRI**, Director General, ISESCO

**Luiz Antonio ELIAS**, Deputy Minister of Science and Technology, Brazil

**Moneef R. ZOU'BI**, Director General, Islamic World Academy of Sciences (IAS), Jordan

**Ruth LADENHEIM**, Secretary of Planning and Policies in Science, Technology and Productive Innovation of the Ministry of Science, Technology and Productive Innovation, Argentina

**Juan Carlos Romero HICKS**, Director General of the National Council for Science and Technology, Mexico

**Crispus M. KIAMBA**, Permanent Secretary, Ministry of Higher Education, Science and Technology, Kenya

**Teiichi SATO**, Honorable Director, Tokyo National Museum, Japan

**Dato Lee Yee CHEONG**, Academician, Malaysia

**Bruce ALBERTS**, InterAcademy Council, USA

**Yongxiang LU**, President of the Chinese Academy of Sciences, China



**Mohamed HASSAN**, Executive Director, The Academy of Sciences for the Developing World (TWAS), Italy

**David COPE**, Director, Parliamentary Office of Science and Technology, Houses of Parliament, UK

**Patrick Amuriat OBOI**, MP, Uganda

**Ulla BURCHARDT**, MP, Germany

**Yoon CHUNG**, President, Korea Foundation for the Advancement of Science and Creativity (KOFAC), Korea

**Nadia EL-AWADY**, Board Member, World Federation of Science Journalists, Egypt

**Olivier PIOU**, Director General, Gemalto, France

**Hossam BADRAWI**, MP, Egypt



Mustafa  
EL-TAYEB



Diana  
MALPEDE



Koïchiro  
MATSUURA



Abdulaziz Othman  
ALTAWAIJRI



Moneef R.  
ZOU'BI



Ruth  
LADENHEIM



Juan Carlos  
Romero HICKS



Crispus M.  
KIAMBA



Teiichi  
SATO



Dato Lee Yee  
CHEONG



Bruce  
ALBERTS



Yongxiang  
LU



Mohamed  
HASSAN



David  
COPE



Patrick Amuriat  
OBOI



Ulla  
BURCHARDT



Yoon  
CHUNG



Nadia  
EL-AWADY



Olivier  
PIOU



Hossam  
BADRAWI

## Room F

### Science diplomacy

Organiser: AAAS

*Facilitator:* **Vaughan TUREKIAN**, Chief International Officer and Director, Center for Science Diplomacy, AAAS

*Rapporteur:* **Tom C. WANG**, Director for International Cooperation and Deputy Director for the Center for Science Diplomacy, AAAS

**Dan BITAN**, Co-director, IPSO

**David CLARY**, Chief Scientific Adviser to the Foreign and Commonwealth Office  
*Science diplomacy at the UK Foreign and Commonwealth Office*

**Hassan DWEIK**, Co-director, IPSO

**Nina FEDOROFF**, Advisor to the US Secretary of State

**Yoshinori KATORI**, Ambassador for Science and Technology Cooperation, Japan Ministry of Foreign Affairs

**Norman NEUREITER**, Senior Advisor, Center for Science Diplomacy, AAAS  
*Science Diplomacy in Action – Personal Recollections*

**Dragan PRIMORAC**, Former Minister of Science, Croatia

**Roland SCHENKEL**, Director General, Joint Research Center, EU



Vaughan  
TUREKIAN



Dan  
BITAN



David  
CLARY



Hassan  
DWEIK



Nina  
FEDOROFF



Norman  
NEUREITER



Dragan  
PRIMORAC



Roland  
SCHENKEL

16.30 – 17.00

*Coffee break*

**17.00 – 19.00 PLENARY SESSION**

**Room A Forum of global science fora**

*Chair:* **Werner ARBER**, Co-chair of the World Science Forum Series Steering Committee

*Representatives of global science fora:*

- AAAS: **Vaughan TUREKIAN**, Chief International Officer and Director, Center for Science Diplomacy, AAAS
- European Science Open Forum (ESOF): **Peter TINDEMANS**, Treasurer
- International Social Science Council (ISSC): **Heide HACKMANN**, Secretary General
- STS *forum*: **Koji OMI**, Founding President, Science and Technology in Society *forum*, Japan
- OECD Global Science Forum: **Stefan MICHALOWSKI**, Director
- World Bank Global Science Fora: **Joshua MANDELL**, Science and Technology Program Officer, The World Bank
- World Knowledge Dialogue: **Francis WALDVOGEL**, Executive Director
- London International Youth Science Forum (LIYSF): **Richard O'KENNEDY**, President



Werner  
ARBER



Vaughan  
TUREKIAN



Peter  
TINDEMANS



Heide  
HACKMANN



Koji  
OMI



Stefan  
MICHALOWSKI



Joshua  
MANDELL



Francis  
WALDVOGEL



Richard  
O'KENNEDY

**19.30 – 22.00 Banquet**

given by László SÓLYOM, President of the Republic of Hungary  
*Boat "EURÓPA"*

## Saturday, 7 November 2009

Hungarian Parliament (Budapest V. 1-3, Kossuth Lajos Square)

Shuttle buses leave from the Hotel Sofitel Budapest Chain Bridge at 08.00. Badge and passport are strictly required for entrance.

### 09.00 – 10.30 PLENARY SESSION

#### Closing session /1

Chair: **Balázs GULYÁS**, Executive Director of World Science Forum

- **Béla KATONA**, Speaker of the Parliament of the Republic of Hungary
- **representatives of the thematic sessions**
- **representatives of the satellite symposia**



Balázs  
GULYÁS



Béla  
KATONA

10.30 – 11.00 Coffee break

### 11.00 – 12.30 PLENARY SESSION

#### Closing session /2

Chair: **E. Sylvester VIZI**, Chair of the World Science Forum Series Steering Committee

- **Gordon BAJNAI**, Prime Minister of the Republic of Hungary
- **Ahmed ZEWAIL**, Nobel Laureate
- **József PÁLINKÁS**, President, HAS



E. Sylvester  
VIZI



Gordon  
BAJNAI



Ahmed  
ZEWAIL



József  
PÁLINKÁS

12.30

#### Farewell reception

given by Gordon BAJNAI, Prime Minister of the Republic of Hungary  
*Hungarian Parliament*

# World Science Forum on the Internet

## Forum web site

The web site of the Forum (<http://www.sciforum.hu>), which has served as an important tool in the preparatory phase of the World Science Forum, will be updated after the Forum with further presentations, conclusions and proposals for the future.

## Live broadcast

All sessions of the Forum (both plenary and thematic sessions) will be broadcast via the Internet for the wide public.

Thursday, 5 November:	09.00 – 19.00
Friday, 6 November:	09.00 – 19.00
Saturday, 7 November:	09.00 – 12.30

World Science Forum operates a remarkable video archive, available on the Forum web site [www.sciforum.hu](http://www.sciforum.hu), where you can visit the sessions of all previous Fora.

## General information

### Venues

World Science Forum is held at the Hungarian Academy of Sciences and the Hungarian Parliament.

5-6 November: Hungarian Academy of Sciences (*Budapest V. 9, Roosevelt Square*)

7 November: Hungarian Parliament (*Budapest V. 1-3, Kossuth Lajos Square*)

### Registration and information desk

The registration and information desk operates in the Hall on the ground floor of the Hungarian Academy of Sciences.

Wednesday, 4 November	16.00 – 18.00
Thursday, 5 November	08.00 – 19.00
Friday, 6 November	08.00 – 19.00

### Badge

Please, note that badges need to be worn at every Conference event you participate in, including the social programmes.

### Secretariat of World Science Forum

e-mail: [budapest@sciforum.hu](mailto:budapest@sciforum.hu); phone: +361 411 6209

# Social programmes

## **Cultural event** followed by the **Opening reception**

given by József PÁLINKÁS, President, Hungarian Academy of Sciences

Wednesday, 4 November, 18.00 – 20.30  
Hungarian Academy of Sciences, Room A  
(Budapest V. 9, Roosevelt Square)

**Live concert** by Tamás HACKI and ensemble  
**Reception** in the Academy Club

## **Folk dance performance by Csillagszemű ensemble** followed by the **Reception**

given by István HILLER, Minister of Education and Culture, Hungary

Thursday, 5 November, 19.30 – 22.00  
Palace of Arts  
(Budapest IX. 1, Komor Marcell Street)

Shuttle buses leave from the Hungarian Academy of Sciences at 19.00.

## **Banquet**

given by László SÓLYOM, President of the Republic of Hungary

Friday, 6 November, 19.30 – 22.00  
Boat "Europa"  
(Budapest V. Roosevelt Square)

## **Farewell Reception**

given by Gordon BAJNAI, Prime Minister of the Republic of Hungary

Saturday, 7 November at 12.30  
Hungarian Parliament  
(Budapest V. 1-3, Kossuth Lajos Square)

# Speakers, facilitators, chairs, and schedule

ADESIYAN Raphael – Friday, 6 November, 13.30 – 16.30, Room A

ALBERTS Bruce – Friday, 6 November, 11.30 – 12.30, Room A; 13.30 – 16.30, Room D

ALTAWAIJRI Abdulaziz Othman – Friday, 6 November, 13.30 – 16.30, Room D

ARBER Werner – Thursday, 5 November, 12.00 – 14.00, Room A; Friday, 6 November, 17.00 – 19.00, Room A

ARIMOTO Tateo – Thursday, 5 November, 15.00 – 19.00 Room D

BADRAWI Hossam - Friday, 6 November , 13.30 – 16.30, Room D

BAESEMAM Jenny – Friday, 6 November, 13.30 – 16.30, Room A

BAJNAI Gordon – Saturday, 7 November, 11.00 – 12.30, Parliament

BARBUY Beatriz – Thursday, 5 November, 15.00 – 19.00, Room A

BITAN Dan – Friday, 6 November, 13.30 – 16.30, Room F

BORIGHT John – Thursday, 5 November, 15.00 – 19.00, Room G

BRÉCHIGNAC Catherine – Thursday, 5 November, 09.00 – 11.30, Room A; Friday, 6 November, 09.00 – 11.00, Room A

BURCHARDT Ulla – Friday, 6 November, 13.30 – 16.30, Room D

CAMPBELL Philip – Friday, 6 November, 11.30 – 12.30, Room A

CESARSKY Catherine – Friday, 6 November, 13.30 – 16.30, Room A

CETTO Ana María – Thursday, 5 November, 15.00 – 19.00, Room A

CHEONG Dato Lee Yee – Friday, 6 November, 13.30 – 16.30, Room D

CHUNG Yoon – Friday, 6 November, 13.30 – 16.30, Room D

CLARY David – Friday, 6 November, 13.30 – 16.30, Room F

COPE David – Friday, 6 November, 13.30 – 16.30, Room D

CROPPER Angela – Thursday, 5 November, 15.00 – 19.00, Room F

CSÉPE Valéria – Thursday, 5 November, 15.00 – 19.00, Room A

CSERMELY Péter – Friday, 6 November, 13.30 – 16.30, Room A

CSÍKSZENTMIHÁLYI Mihály – Friday, 6 November, 11.30 – 12.30, Room A

DACOS Marin – Friday, 6 November, 13.30 – 16.30, Room A

DWEIK Hasan – Friday, 6 November, 13.30 – 16.30, Room F

EL-AWADY Nadia – Friday, 6 November, 13.30 – 16.30, Room D

EL-TAYEB Mustafa – Friday, 6 November, 13.30 – 16.30, Room D

ELIAS Luiz Antonio – Friday, 6 November, 13.30 – 16.30, Room D

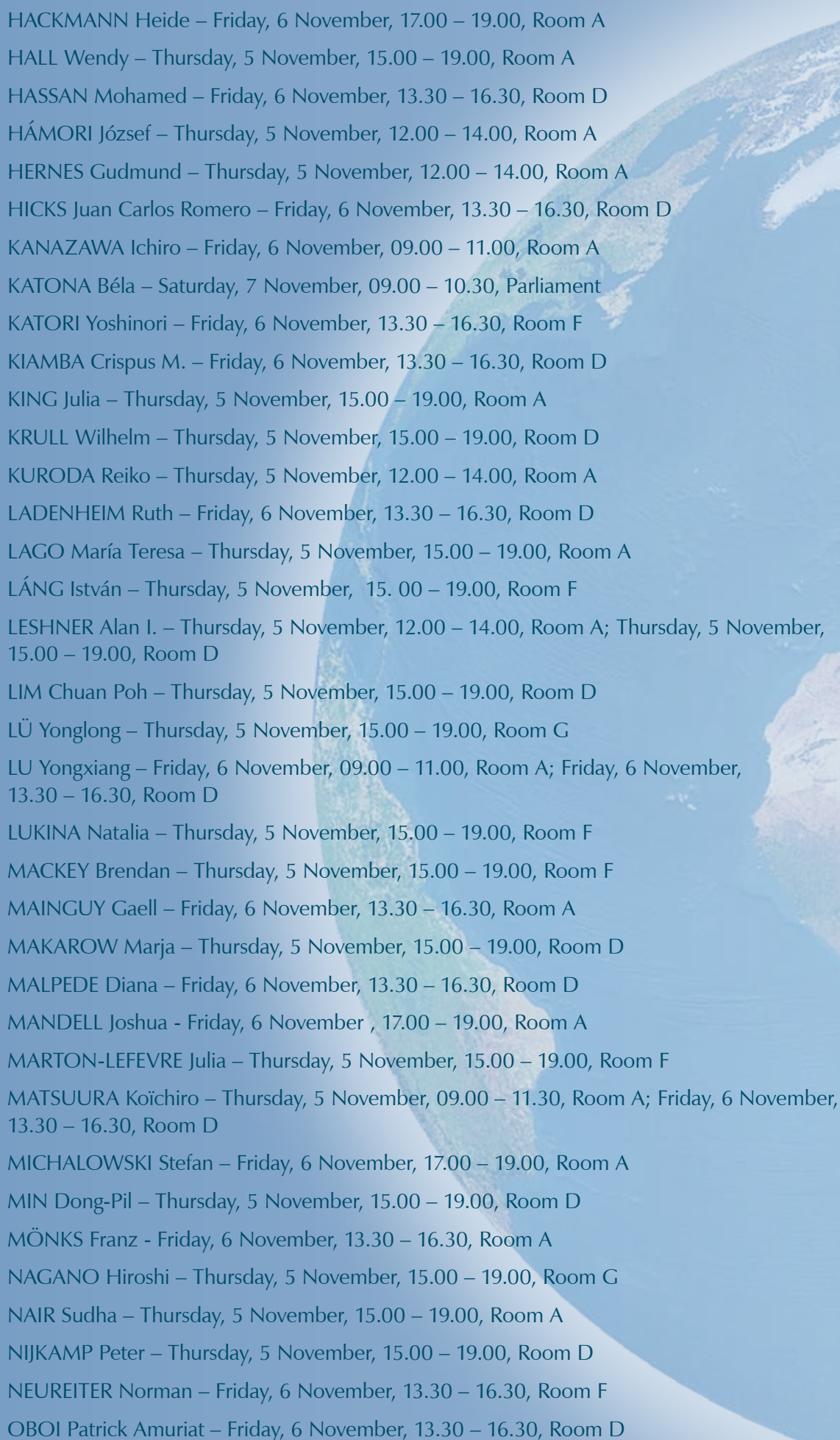
ERDELEN Walter – Thursday, 5 November, 12.00 – 14.00, Room A; Friday, 6 November, 09.00 – 11.00, Room A

FEDOROFF Nina – Friday, 6 November, 13.30 – 16.30, Room F

GULYÁS Balázs – Saturday, 7 November, 09.00 – 10.30, Parliament

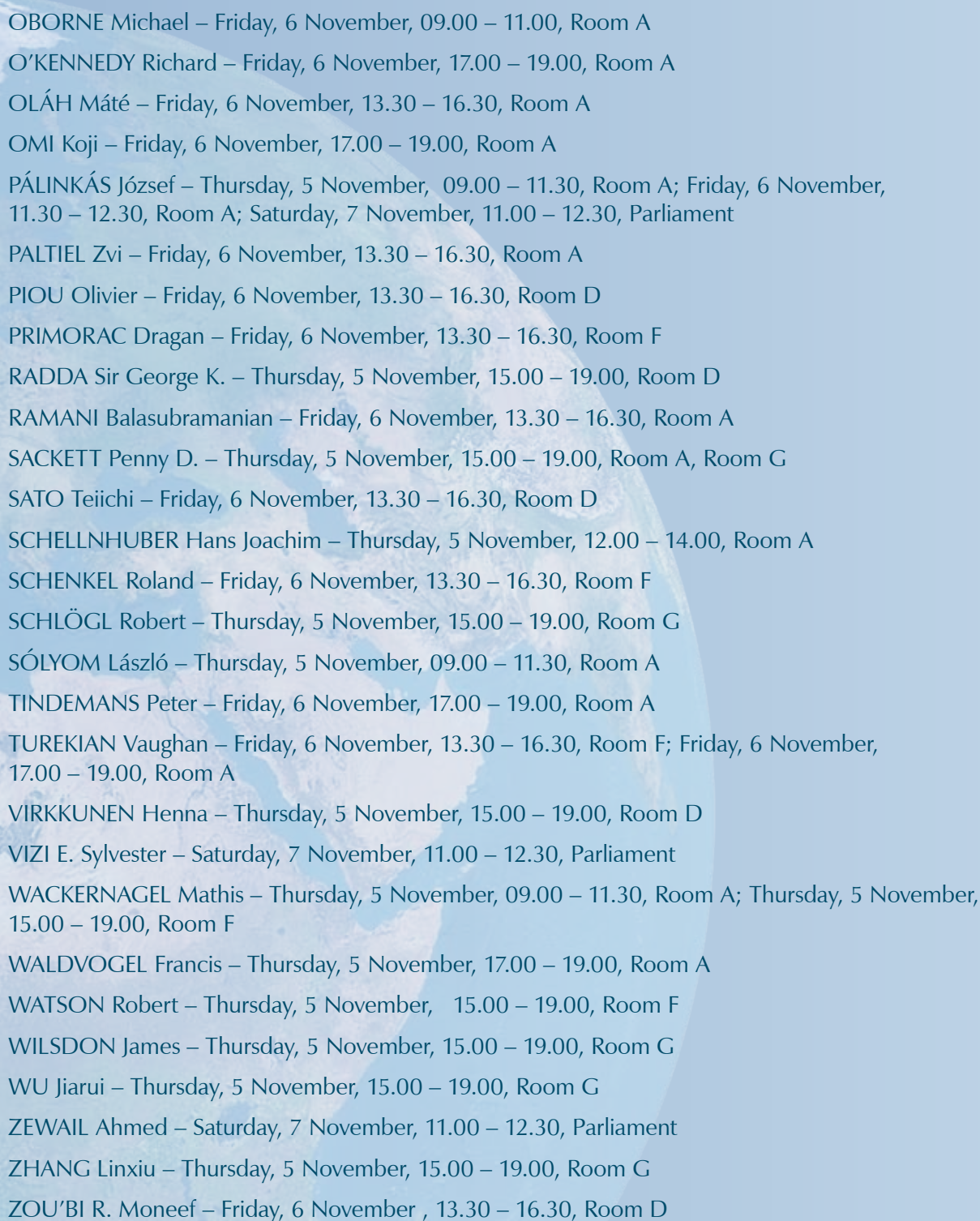
GURRY Francis – Friday, 6 November, 09.00 – 11.00, Room A

JONES Kerri-Ann – Friday, 6 November, 09.00 – 11.00, Room A



HACKMANN Heide – Friday, 6 November, 17.00 – 19.00, Room A  
HALL Wendy – Thursday, 5 November, 15.00 – 19.00, Room A  
HASSAN Mohamed – Friday, 6 November, 13.30 – 16.30, Room D  
HÁMORI József – Thursday, 5 November, 12.00 – 14.00, Room A  
HERNES Gudmund – Thursday, 5 November, 12.00 – 14.00, Room A  
HICKS Juan Carlos Romero – Friday, 6 November, 13.30 – 16.30, Room D  
KANAZAWA Ichiro – Friday, 6 November, 09.00 – 11.00, Room A  
KATONA Béla – Saturday, 7 November, 09.00 – 10.30, Parliament  
KATORI Yoshinori – Friday, 6 November, 13.30 – 16.30, Room F  
KIAMBA Crispus M. – Friday, 6 November, 13.30 – 16.30, Room D  
KING Julia – Thursday, 5 November, 15.00 – 19.00, Room A  
KRULL Wilhelm – Thursday, 5 November, 15.00 – 19.00, Room D  
KURODA Reiko – Thursday, 5 November, 12.00 – 14.00, Room A  
LADENHEIM Ruth – Friday, 6 November, 13.30 – 16.30, Room D  
LAGO María Teresa – Thursday, 5 November, 15.00 – 19.00, Room A  
LÁNG István – Thursday, 5 November, 15.00 – 19.00, Room F  
LESHNER Alan I. – Thursday, 5 November, 12.00 – 14.00, Room A; Thursday, 5 November, 15.00 – 19.00, Room D  
LIM Chuan Poh – Thursday, 5 November, 15.00 – 19.00, Room D  
LÜ Yonglong – Thursday, 5 November, 15.00 – 19.00, Room G  
LU Yongxiang – Friday, 6 November, 09.00 – 11.00, Room A; Friday, 6 November, 13.30 – 16.30, Room D  
LUKINA Natalia – Thursday, 5 November, 15.00 – 19.00, Room F  
MACKEY Brendan – Thursday, 5 November, 15.00 – 19.00, Room F  
MAINGUY Gaell – Friday, 6 November, 13.30 – 16.30, Room A  
MAKAROW Marja – Thursday, 5 November, 15.00 – 19.00, Room D  
MALPEDE Diana – Friday, 6 November, 13.30 – 16.30, Room D  
MANDELL Joshua - Friday, 6 November, 17.00 – 19.00, Room A  
MARTON-LEFEVRE Julia – Thursday, 5 November, 15.00 – 19.00, Room F  
MATSUURA Koïchiro – Thursday, 5 November, 09.00 – 11.30, Room A; Friday, 6 November, 13.30 – 16.30, Room D  
MICHALOWSKI Stefan – Friday, 6 November, 17.00 – 19.00, Room A  
MIN Dong-Pil – Thursday, 5 November, 15.00 – 19.00, Room D  
MÖNKS Franz - Friday, 6 November, 13.30 – 16.30, Room A  
NAGANO Hiroshi – Thursday, 5 November, 15.00 – 19.00, Room G  
NAIR Sudha – Thursday, 5 November, 15.00 – 19.00, Room A  
NIJKAMP Peter – Thursday, 5 November, 15.00 – 19.00, Room D  
NEUREITER Norman – Friday, 6 November, 13.30 – 16.30, Room F  
OBOI Patrick Amuriat – Friday, 6 November, 13.30 – 16.30, Room D





OBORNE Michael – Friday, 6 November, 09.00 – 11.00, Room A  
O’KENNEDY Richard – Friday, 6 November, 17.00 – 19.00, Room A  
OLÁH Máté – Friday, 6 November, 13.30 – 16.30, Room A  
OMI Koji – Friday, 6 November, 17.00 – 19.00, Room A  
PÁLINKÁS József – Thursday, 5 November, 09.00 – 11.30, Room A; Friday, 6 November, 11.30 – 12.30, Room A; Saturday, 7 November, 11.00 – 12.30, Parliament  
PALTIEL Zvi – Friday, 6 November, 13.30 – 16.30, Room A  
PIOU Olivier – Friday, 6 November, 13.30 – 16.30, Room D  
PRIMORAC Dragan – Friday, 6 November, 13.30 – 16.30, Room F  
RADDA Sir George K. – Thursday, 5 November, 15.00 – 19.00, Room D  
RAMANI Balasubramanian – Friday, 6 November, 13.30 – 16.30, Room A  
SACKETT Penny D. – Thursday, 5 November, 15.00 – 19.00, Room A, Room G  
SATO Teiichi – Friday, 6 November, 13.30 – 16.30, Room D  
SCHELLNHUBER Hans Joachim – Thursday, 5 November, 12.00 – 14.00, Room A  
SCHENKEL Roland – Friday, 6 November, 13.30 – 16.30, Room F  
SCHLÖGL Robert – Thursday, 5 November, 15.00 – 19.00, Room G  
SÓLYOM László – Thursday, 5 November, 09.00 – 11.30, Room A  
TINDEMANS Peter – Friday, 6 November, 17.00 – 19.00, Room A  
TUREKIAN Vaughan – Friday, 6 November, 13.30 – 16.30, Room F; Friday, 6 November, 17.00 – 19.00, Room A  
VIRKKUNEN Henna – Thursday, 5 November, 15.00 – 19.00, Room D  
VIZI E. Sylvester – Saturday, 7 November, 11.00 – 12.30, Parliament  
WACKERNAGEL Mathis – Thursday, 5 November, 09.00 – 11.30, Room A; Thursday, 5 November, 15.00 – 19.00, Room F  
WALDVOGEL Francis – Thursday, 5 November, 17.00 – 19.00, Room A  
WATSON Robert – Thursday, 5 November, 15.00 – 19.00, Room F  
WILSDON James – Thursday, 5 November, 15.00 – 19.00, Room G  
WU Jiarui – Thursday, 5 November, 15.00 – 19.00, Room G  
ZEWAIL Ahmed – Saturday, 7 November, 11.00 – 12.30, Parliament  
ZHANG Linxiu – Thursday, 5 November, 15.00 – 19.00, Room G  
ZOU’BI R. Moneef – Friday, 6 November, 13.30 – 16.30, Room D

# Abstracts

received from the speakers of the thematic sessions by 18 October, 2009 – alphabetical order by authors

## Prioritizing science for Nigeria's development

**Raphael ADESIYAN**

Editor-in-chief, Science Times, Nigeria

We are no doubt in a knowledge based society, where everyone is fighting the clichè 'brain drain'. Whenever you hear any news about African science, it is likely to be about disease, AIDS prevalence, poor government funding, hunger and the likes. The AIDS pandemic affects more than 34 million Africans and has killed an estimated 3.2 million people in the immediate past few years in sub-saharan Africa. Life expectancy in some nations has fallen to less than 50 years.

The next generation is turning its back on science because they feel its exploits are no longer heroic. This is sad for Nigeria. Empowering the youths by making them work with the established science, policy makers will surely make one of the recommendations which offer real solutions to our problems.

## Shaping the Future of Polar Research

**Jenny BAESEMAN**

Director, Association of Early Career Scientists (APECS)

The Association of Polar Early Career Scientists (APECS) is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early faculty members, educators and others with interests in Polar Regions and the wider cryosphere. Our aims are to stimulate interdisciplinary and international research collaborations, and develop effective future leaders in polar research, education and outreach. We work to achieve these goals by:

- Facilitating international and interdisciplinary networking;
- Providing opportunities for professional career development; and
- Promoting education and outreach.

APECS is recognized as one of the major legacies of the International Polar Year for its contributions to fostering the careers of young researchers and its activities to create a continuum of leadership and knowledge in polar research.

## Spectroscopy of the oldest stars

**Beatriz BARBUY**

University of Sao Paulo, Brazil

I will describe the derivation of abundances from spectra obtained in large telescopes, and the impact of the results on our knowledge on the formation of our Galaxy. I will also describe the development of this field in Brazil, and situation of women scientists in Brazil.

## Advancing the role of women in science: work in progress?

**Ana María CETTO**

Deputy Director-General, IAEA

The promises and commitments made at the WCS ten years ago were considered at that moment a bold step forward in the promotion of women in science. How far have we gone in realizing them?

The author offers a response to this question from the perspective of a research professor heavily engaged in international cooperation for development, and provides a personal account of her current experience as the first woman Deputy-Director General of the International Atomic Energy Agency.

Advancing the role of science is, optimistically speaking, work in progress. In order to understand the reasons for this state of affairs it is necessary to look at the issue from a broader perspective and consider the socio-cultural context in which the scientific activity takes place. Equally important, however, is to view the science as we know it today, as a result of a historical process of evolution.

Against this background, the author proposes elements for a renewed 'WCS+10' commitment in support of the role of women in science.

## Networking possibilities to promote science recruitment of talented students

**Peter CSERMELY**

Chairman, Hungarian National Talent Support Council

**Máté OLÁH**

Secretary, Network of Youth Excellence

Virtus Unita Fortior (virtue united is stronger) sounds the ancient Latin proverb. For the talented people networks play a cardinal role in exchanging novel ideas. Environment and has a decisive role in talent support.

In Hungary both talent support and network science enjoy a great tradition. This is how the idea of the National Talent Support Council, a networking umbrella organization of all Hungarian talent-support NGO-s in Hungary, Romania, Slovakia, Serbia and Ukraine arose. The Hungarian Parliament came to the conclusion that talent support is a valid, long term response to crisis, so a 20 year-long commitment was declared as priority in national budget, where more than 100 million EUR will be set aside as a National Talent Fund. The Hungarian citizens contributed 2 million EUR in 2009 alone for this noble purpose. The National Talent Support Council has 27 member organizations, and more than 150 partners and 800 collaborators. Within a year over 150 Talent Points have been established, which serve as information points, giving help, and organizing the local, talent-friendly society.

A member association of the National Talent Support Council, the Hungarian Research Student Association (founded in 1996) is a world-wide unique initiative that gives research opportunities to motivated high school students in the age of 14 to 19 at the best Hungarian research institutions. Several programs contribute to team formation and those weak links create an effective interface for communication between young researchers. International networking opportunities are ensured by our international summer camps and the Network of Youth Excellence ([www.nyex.info](http://www.nyex.info)).

Members of the Network of Youth Excellence completed an international survey in cooperation with the Hungarian Academy of Sciences. We organized live- and net-conferences, made discussion forums, and a directed information spread. A few of the most often questions: "Which activities motivate the students best? How can we recognize gifted, talented students? How can we expand these programs? All these projects made a supporting background of young scientists to the WSF. This activity can be regarded as a small-scale model of the future outreach programs promoting further public recognition of the WSF.

# Neuroscience in education – Research in service of future generations

**Valéria CSÉPE**

Deputy Secretary General, HAS, Hungary

The recent years of professional research have seen the emergence of a new synthesis between different disciplines. It seems that a growing number of studies gave rise to a higher level of knowledge integration on many fields. A very new subfield of neuroscience, called “neuroscience in education” started to contribute to a different view on the human brain’s maturation- and development-related changes occurring as a result of learning and learning instructions. It is well known now that many different factors may contribute to the brain’s state and its receptivity to learning. The presentation will highlight recent results of the cognitive neuroscience providing a deeper insight into brain changes accompanying lifelong learning and especially those in the most sensitive period of our life that is childhood.

As women are engaged the most in bringing up the future generation, the presentation will also focus on how our motivation and special view on many issues may contribute to those changes that are crucial for behavioral changes in our societies. It seems that neuroscience giving impetus to changes in the 21st century education has already transcended the borders between disciplines and a new collaboration should not only be started between neuroscientists and educators. A cautious interpretation of our newest knowledge on changes in the learning brain as well as the avoidance of misconceptions arising from ill-interpreted data of neuroscience in education could and should insemminate educational practice and policy. I will illustrate my talk with examples of how I try to apply my studies on the developing brain in practice and how I try to encourage others on this research field to do the same.

## Towards a Science of the Web: the Power of Networks

**Dame Wendy HALL CBE**

Member of the Royal Society, UK

Long before the Web existed hypertext visionaries foresaw a richly inter-linked global information network. The Web provided the infrastructure to enable those ideas to become reality but is strangely devoid of links. The development of the Semantic Web, or the Web of Linked Data, promises to take us much closer to achieving the original vision. However, there is a growing realization among many researchers that if we want to model the Web and understand its future trajectory; if we want to understand the architectural principles that have provided for its growth; and if we want to be sure that it supports the basic social values of trustworthiness, privacy, and respect for social boundaries, then we must chart out a research agenda that targets the Web as a primary focus of attention. The emergence of this exciting new discipline, which we call Web Science, will be a focal part of this talk.

As we design and build complex knowledge-based systems to help us make sense of the vast amounts of information available to us on an everyday basis via the Web, I am constantly aware of how we use networks of machines, systems and people to solve our problems. I have found in my career that the power of networks is the best way to overcome some of the issues that arise from the still overwhelming gender imbalance in SET. I will interweave my talk with illustrations of how I have used networks to help me in my career and how I try to encourage others to do the same. I’m very hopeful that women will be as eager to study Web Science as men, if not more so.

# Women and leadership, from an engineer's perspective

**Julia KING CBE FEng**

Vice-Chancellor, Aston University, Birmingham, UK

In the UK, whilst approximately 30% of the students studying maths and physics at sixth form level (aged 17 – 18) are female, only about 14% of engineering undergraduates are women, and when we get to the most senior levels in engineering and business, such as Fellowship of the Royal Academy of Engineering or executive directors of major companies, the representation of women is only 2 – 4%. We call this the 'leaking pipe'.

This leaking pipe is a serious problem for the UK, and indeed the world, at a time when we need to address major global and societal issues such as climate change. Innovative engineering and technology solutions, alongside changes in behaviour, are urgently required. A diverse workforce is now recognised as a more innovative workforce, with a visible impact on business performance – delivering more solutions and better management decisions with greater flexibility. Yet many organisations continue to recruit and promote in the image of the existing senior leadership team: white, male and able bodied.

My presentation will focus on mending the pipe. It will offer insights and experience from my career as an engineer in both academia and industry relating to ways we can better support women scientists and engineers.

## Enabling Breakthroughs – Fostering Creativity

**Wilhelm KRULL**

Secretary General, VW Foundation

At the beginning of the 21st Century Europe and with it European research systems are experiencing an unprecedented pace of social, environmental and technological change. The ongoing transition in the international division of labour from hands, tools, and machines to brains, computers, and laboratories as well as the increasing importance of electronic communication for international networking make it imperative for researchers, and policy-makers as well as for industry and politics to enter into a process of assessing strengths and weaknesses, reviewing funding modes and institutional structures, and subsequently adapt to the changing environment of knowledge production. The quality and accessibility of new knowledge as well as relevant research and technological development are decisive for the future well-being of our societies.

Europe is lagging behind in the global competition for talents and technologies. However, as the relative indicators show, the overall picture of European research and higher education is not as bleak as it is often cited by the media. Nevertheless, there are two important performance indicators which must be of concern to us all: The number of citations per publication, and the number of Nobel Prizes (and similarly prestigious awards). In both of these areas Europe is not doing as well as it should, and indeed could do. With respect to achieving major breakthroughs, to implementing radically new paradigms and basic innovations, we Europeans have reasons to think about, and indeed make use of opportunities to improve our productivity and performance by establishing new cultures of creativity.

## Searching for our origins – my (personnel) travel of three decades

**Maria Teresa LAGO**

Center for Astrophysics, University of Porto, Portugal

Being curious to understand our Universe set out my career. The path was far from smooth yet even more exciting than anticipated. I will try to convey you what is like to be an astronomer during one of the most revolutionary times for science and astronomy in particular.

## Understanding and conserving the services of forest ecosystems

**Natalia LUKINA**

Centre for Forest Ecology and Productivity, Russian Academy of Sciences (RAS)

The Millennium Ecosystem Assessment distinguishes four categories of ecosystem services: provisioning, regulating, supporting, and cultural (MEA, 2005). Despite the dramatic decline in the area and condition of the world's forests (i.e. forest loss and degradation) during the last two centuries, forest ecosystems still retain the potential to provide society with all these services. Identifying the direct and indirect factors responsible for driving the main changes in the services of forest ecosystems at different spatial and temporal scales, and understanding the links between the driving forces, ecosystem services and human well-being, are of great importance for decision-making and forest sustainable management. Of particular concern is the likelihood of amplifying the feedback loop, resulting in a further deterioration in the condition of the world's forests and progressive forest loss.

A wide range of options are available for restoring and maintaining the services of forest ecosystems. One option is to incorporate the value of ecosystems in the decision-making process. However, there are many challenges associated with the valuation of forest ecosystem services: information about the world's forests is limited (FRA 2000) and remote sensing products contain considerable uncertainties; the assessments should possess both spatial and temporal dimensions; scientific and practical knowledge is required about the use of biological, physical, economical and social indicators; risk assessment (locating thresholds, identifying the potential for irreversible change) should be developed for supporting the decision process; the mismatch between the scale at which forest ecosystem processes and phenomena occur, the scale at which decisions are made, and the scale of the institutions involved in decision making (MEA, 2005) needs to be addressed; consensus needs to be developed between the different schools and concepts involved in assessing the value of forest ecosystem services. Evaluation of the consequences of alternative forest management scenarios is one of the most promising assessment tools. Models that take into account the interactions between different drivers and services and fill up data gaps can also be utilized.

There are a number of alternative approaches to conserving forest ecosystem services, e.g. command measures and payments for ecosystem services (PES). One innovative development in ecosystem-service protection is the small-scale system of payment for ecosystem services. Scaling up payment systems for forest ecosystem services is, however, a challenge that requires a quantitative planning framework that links forest ecosystem services with biodiversity conservation (Chan et al, 2006). Cost-benefit analysis is needed in conservation planning.

The world's forests contain about 50 % of the global terrestrial organic carbon stock, and forest loss accounts for about 17 % of global greenhouse gas emissions (Rogner et al, 2007). Paying for forest conservation and carbon sequestration can be considered as one viable, cost-effective option for slowing down climate change. It is obvious from the lessons learnt in REDD (Reducing Emission from Deforestation and Forest Degradation) (Bond et al., 2009) that PES can only be effective if the up-front economic, institutional, informational and cultural conditions are met. A PES approach requires strong governance. Strengthening forest governance can, in turn, only be achieved through strong rules and rights, the involvement of institutions at all administrative levels, the participation of society at large, and the establishment and development of partnerships and collaboration between all forest-sector stakeholders.

# On the relationship between biodiversity, ecosystem services and climate change

**Brendan MACKEY**

The Australian National University

Earth system science has revealed the profound influence of the biosphere on Earth's energy balance, atmospheric and ocean chemistry, and thus the climate system. These interactions are largely the aggregate impacts of biological synthesis and decay and related exchanges of energy, carbon, water, nitrogen and other substances. In particular, these terrestrial and oceanic ecosystem-atmosphere exchanges provide rapid feedback responses that over time periods of decades to centuries help regulate global climate through being able to rapidly alter concentrations of the atmospheric greenhouse gas carbon dioxide. Furthermore, at a regional scale, ecosystems prove ecosystem services essential to human wellbeing. The Millennium Ecosystem Assessment identified four categories of ecosystem services: provisioning services (e.g. food, fresh water); support services (e.g. primary production, soil formation); regulating services (e.g. water supply, disease control); and cultural services (cultural heritage, ecotourism).

However, while the roles of ecosystems in planetary and local life support systems are well established, less well recognized are the relationships between biodiversity and the sustainability of ecosystem services. Biodiversity makes critical contributions to (a) enhancing ecosystem productivity, (b) promoting ecosystem resilience, and (c) providing adaptive capacity. Species of plants, animals, fungi and microbes affect ecosystem functions (such as seed dispersal, plant pollination) and ecosystem processes (such as nutrient cycling, carbon dynamics). Genetic, functional and taxonomic diversity therefore influence directly or indirectly the ecosystems services which are of immense value to human wellbeing. However, the relationship between species and ecosystems is complex. Species affect the system properties that govern ecosystem services. In turn, ecosystems provide the environmental conditions and habitat resources needed by individual plant and animal species. Thus, species both affect ecosystems and are impacted by changes in ecosystem properties. Humans can negatively impact upon ecosystems by (1) extracting resources at rates greater than their regenerative capacities, (2) the unintended by-product of other activities (e.g., air pollution), or (3) by causing the local extirpation of species through direct (e.g., by habitat loss) and indirect (e.g. diversion of water resources) means. In these ways, human activities can degrade ecosystem functions and alter ecosystem processes and properties, causing loss of valued ecosystem services.

In terms of solving the climate change problem, various policies and measure are being advanced to reduce emissions from human land use under the acronyms of REDD (reducing emissions from deforestation and degradation) and AFLU (agriculture, forestry and land use). However, these policies need to be framed by an understanding of how ecosystems are dynamically connected to global biogeochemical cycles. Ecosystems play a critical role in mitigation as a consequence of their function in carbon sequestration and storage. Currently, mitigation policies are focused on short-term fluxes and the erroneous view that fossil fuel emissions can be offset by protecting or planting trees. Recent modeling suggests that preventing emissions from both deforestation and fossil fuel emissions are needed to avoid dangerous climate change. In the long term, the climate change problem will be solved when the combined rates of emissions from deforestation/degradation and fossil fuel emissions are reduced to the rate of ocean carbon sedimentation. Ecosystem-based adaptation is also recognized as an important approach to helping societies respond to the negative impacts of unavoidable climate change, especially in developing countries.

# Sharing research resources for global problems

**Dong-Pil MIN**

Chairman, Korea Research Council of Fundamental Science and Technology

We encounter a wide range of global crises from the news media as well as in our daily lives. These pose a new set of problems and challenges for scientists and researchers. Also, countries worldwide need to seek ways of effectively responding to such sources of global issues. In terms of hardware, we are reasonably well prepared to exchange ideas and to share our knowledge across national borders. However, the benefits of knowledge are not readily and evenly allocated across the globe. Many countries have dragged their feet on this important issue. The rapid development of information technologies in the late 20th century has ushered in a globalized and flat world and thus, attention must be paid to developing more software (mechanism) for the flat world if we are to ensure efficient response to global crises.

One of the most important barriers against proper response is the "Matthew effect". The benefits of progress made in human knowledge are rarely disseminated to the developing countries, which thus lag behind in creating sustained economic and social advancement. Therefore, we need to fund not only transnational research collaborations but also knowledge management. This will precipitate knowledge spillover from international research programs to countries requiring such knowledge. Against this backdrop, this talk will suggest a number of general points for improving our global funding program in the future, especially in a way that the program promotes the sharing of benefits of knowledge around the world. This will undoubtedly result in sustainable socio-economic development and more fruitful utilization of resources to meet global challenges.

## Gifted Education in Europe: 1916 – 2009

**Franz J. MÖNKS**

President, European Council of High Ability  
Radboud University Nijmegen, The Netherlands

From the very beginning children are different in their behavior. Some are very curious, very active, and some are slow in their interactive behavior. Some are quick learners and some are slow learners. The social environment has an impact on the motivation and activity of each child. It is extremely important that individuals develop according to their developmental and learning needs. Optimal individual development should be the key element of education at home and in school.

How do schools in Europe meet the learning and developmental needs of gifted children, those children who learn fast and early? Are teachers prepared to meet the individual learning needs of all children?

Already since the beginning of the 20th century reform educators emphasized the necessity to make school education more child centered. But it is only since 1980 that the public concern and the interest of policymakers changed in favour of the gifted learner. Policymakers are instrumental for a balanced and appropriate education in schools.

Why was the gifted learner neglected for decades? Why did we not have a differentiated and differentiating curriculum in schools?

The presentation should make clear what giftedness is, how the concern for and help of the gifted child developed, and what the present situation is in Europe.



## Women as co-creators of the global future

**Sudha NAIR**

Programme Director, Biodiversity, MS Swaminathan Res. Foundation, India

True and sustainable development of the global knowledge society is feasible only when the tokenism through gender empowerment turns into totalism of gender parity and equity. The best way to do this is by utilizing all of our talents of women in an inclusive approach in which they are not visualized as end users but as innovators too.

The contemporary challenges being faced today in the areas of nutritional security, climate change implications; water and energy security have a very close impingement on the day-to-day life of women. It is thus important that we involve more number of women in the research and development of pathways to address these issues. The interaction will have to be a two way process to understand the needs and shaping our research agenda to find the solutions for the same. Science is a traditional role of women and she has played this in several ways from time immemorial and there is a need to have more of them and to engage them more fruitfully.

As a member of the first ever comprehensive assessment of resources, best practices and gaps in Gender, Science and Technology which was undertaken between 2000 – 2001 with support from UNDP and UNESCO in 11 countries of the Asia Pacific Region, I had the opportunity to understand how affirmative policies and innovative programs help in bringing about changes which enhances the participation of women in science and taking the benefits of science to women and thereby bridging the gender divide.

Policies and programs which address the following will have to be constantly assessed and readdressed: (i) Education – addressing the leaky pipeline thereby by retaining as many girls as possible up to the tertiary level with opportunities to move on to professional degrees; (ii) Employment – equal opportunities at recruitment level and clear affirmative actions facilitating career development which will require re-entry options too, good recognition and reward systems for work done and attractive remuneration packages; (iii) Empowerment – enhancing research skills through fellowship support for better knowledge through sabbatical options, leadership and managerial skills, participation on decision making bodies etc and (iv) Entrepreneurship – opportunities built in their career path to nurture innovation and sharpen their entrepreneurial skills with support from Universities, R&D Institutions and Financial Institutions.

Finally, as a person who has been associated with setting up the first biotechnology park for women between 1997 and 2000 and in my current capacity of working in the area of technology transfers for rural India, I find that mentoring is the most important factor which makes the change. Given ample opportunities they can play a better role in shaping a global future which is more sustainable and equitable.

## Japanese Foresight Activity and its Implication for Future

**Hiroshi NAGANO**

Former Director-General of National Institute of Science and Technology Policy;  
Ministry of Education, Culture, Sports, Science and Technology, Japan

Future oriented science and technology policy requires foresight into our future. It is imperative that we think about our local, regional and global societies, twenty or more years into the future. To this end, we might want to have foresight not only in terms of science and technology, but also in terms of broader perspectives ranging from the environment, energy, economy, and population to geopolitics, and draw scenarios from foresight outcomes. It would be extremely important to make reflections, discuss pertinent scenarios, and create mid- to long-term comprehensive policies, not based on a silo-structure. Policies created will domestically require substantial system reforms, as well as challenging strategies focused on global sustainability.

What are we doing in Japan? Japanese people are fond of thinking about the future. This leads to the fact that the government has continued to consider science and technology foresight for over 35 years. Recently, this undertaking has been coupled with the government's policy making in innovation. These activities would further materialize, if combined with visionary insights of Japanese leaders. The noble vision of the newly appointed Prime Minister Hatoyama - to reduce carbon dioxide emissions by 25% from emission levels of 1990 - is waiting to find feasible technical and societal solutions based on foresight.

Since 1990, Japanese people have been subject to rather passively facing the radical changes of the world. However, a country could serve itself well if it possessed good vision and a strong aspiration to turn the vision into reality. To achieve this aim, education is most important. Based on the movement of Japanese non-profit organizations, Japan proposed the Decade of Education for Sustainable Development (DESD) at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. This concept was finally accepted by UNESCO and the UN in 2005. Japan is now making efforts to increase the number of UNESCO schools in primary and secondary education, which pursue the realization of the spirit of sustainability in their teaching. With this kind of movement both domestically and globally, we would like to achieve a world with good conscience.

## **Inspire Youth? Engage them in Contemporary Scientific Research**

**Zvi PALTIEL**

Chairman, Network of Youth Excellence  
The Davidson Institute of Science Education,  
The Weizmann Institute of Science, Rehovot, Israel

Whether a scientist, a technical expert or any citizen in a present-day liberal society one has to understand scientific logic, use scientific information and make decisions on the basis of scientific reasoning. Issues requiring certain understanding of scientific content, such as GMO food, abortion, car accident statistics, global warming, stem cell research and other, are all of major concern to our society. It is therefore essential to expose youth, our future generation, to science, scientific approach and the validity and meaning of scientific findings. The most appropriate way is to inspire them by the recent, often surprising and fascinating, scientific findings. In many European, North American and other institutions such inspiration is achieved by engaging youth in contemporary, often cutting-edge, scientific research.

Bridging the knowledge gap between a high school student and a modern-day researcher is not a trivial task for scientists who admit such a student to her or his research group. Nevertheless the number of students engaged in contemporary scientific research is increasing. Examples of some NYEX institutions' programs will be presented.

Some of these students are probably leading future scientists, some will become experts in certain technical fields, but they all will eventually be citizens of our future society. These citizens will be confronted by many more intricate, controversial issues. Thus, inspiring them today by engagement in contemporary scientific research is an essential contribution not only to their own personal development but to our future society at large.

## **Women in Science in Australia: Picking up the pace**

**Penny D. SACKETT**

Chief Scientist, Australia

In 1995 the Australian government commissioned a report on women in science, engineering and technology in Australia. The report was groundbreaking for its time. However since then the progress of Australian women hoping to make careers in science, engineering or technology related fields has stalled. The Office of the Chief Scientist in conjunction with the Federation of Australian Scientific and Technological Societies (FASTS) is looking at the place and progress of women in science in Australia. A report Women in science: why waste productivity, diversity and innovation? has been initiated and funded by FASTS. Written by Professor Sharon Bell, it makes for sobering reading.

Although roughly equal numbers of men and women are attaining science degrees at university this is mainly in the “soft sciences”. In the more gender segregated fields, such as IT and engineering, an increase in involvement by women of between only 1% and 3% has been observed over the period 1995 to the present. That is, the statistics are “flatlining”. Furthermore the numbers of women being promoted to higher positions in academia or private enterprise diminishes the higher up they progress in these hierarchies. Academic statistics also show that in Australian science faculties (as in most countries around the world) women are paid less, promoted more slowly, receive fewer honours and hold fewer leadership positions than men.

Promoting the position of women in science is important for more than just equity reasons. Women now make up more than half the student population in the Australian higher education sector. They also make up half of the labour force. With an ageing academic workforce it is essential that we bring young researchers, both men and women into the field so they can continue the vital work our scientists and engineers do.

As Chief Scientist for Australia I am helping develop and explore options for the government to consider in addressing this problem with the aim for women not only to survive in science, engineering and technology sectors but also to excel. Women have the potential to bring new ideas and a different perspective to science. If we don't take advantage of this we are in fact wasting human capital and lowering our productivity at a time when we are in most need of it.

## **Australia's foresighting activities: Planning today for a sustainable tomorrow**

**Penny D. SACKETT**  
Chief Scientist, Australia

Now more than ever we must support scientific effort that is global, collaborative and innovative to deliver a sustainable and prosperous society. Given the complexity of challenges that we face, achieving this sustainability and prosperity is not to be underestimated. ‘Wicked’ challenges, such as mitigation and adaptation to climate change, mean that if we are to make good decisions, we must gather sufficient scientific evidence from all areas of science to inform future policies and provide effective technological and social solutions. We need to plan today to ensure a sustainable tomorrow.

The Australian Prime Minister's Science, Engineering and Innovation Council (PMSEIC) has chosen to take on this challenge through the use of foresighting in order to develop new approaches to support knowledge generation, health and wellbeing, sustainability, and economic and social development. A formal model has been adopted to “look over the horizon” in order to examine possible transformational futures (5 to 50 years hence) that Australia may face, and then identify ways in which science and innovation may assist in meeting them wisely. The goal is to support long-term, whole-of-government evidence-based policy development.

To assist in implementing this model, four groups called Thematic Foresighting Clusters (TFCs) have been established to assist PMSEIC in providing this strategic advice to Government. The groups consist of broad thinkers who take a strategic and continuous, longer-term view of the key economic and social challenges facing Australia. The four broad foresighting themes for these new clusters are:

1. Climate Change, Energy, Water and Environment: Impact on Australia;
2. Science as an Engine for Innovation in Commerce, Industry and the Arts;
3. National Health, Wellbeing and Security; and
4. Knowledge Generation, Skills and Perception in a Global World.

These themes lie at the intersection of Government portfolios and across traditional disciplines of research, and in many cases involve social challenges resistant to conventional approaches to solving them. Interdisciplinary collaboration, across scientific boundaries and including the Social Sciences, the Arts and Industry, is a natural route to identifying breakthrough solutions to challenges posed in these themes. Hence a range of expertise is sought in cluster members.

The clusters identify potential opportunities and challenges, mapping out gaps in our knowledge required to meet them to assist with supporting, mitigating or adapting to these. Specific topics generated by the gaps in knowledge identified by the clusters are chosen by PMSEIC for further assessment and complete reports. A larger team of experts then develop and suggest possible pathways to fill the gaps in knowledge, producing a scientific report that is presented to PMSEIC. The reports include recommendations for the near term future that will put Australia on the path to the preferred long-term future(s) articulated in the foresighting process.

The outcome of these efforts is the provision of timely, evidence-based advice to Government, enabling them to make decisions today that will ensure sustainable development tomorrow.

## **Biomedicine innovation for building up a sustainable development society**

**Jiarui WU**

Vice-president, Shanghai Institutes for Biological Sciences,  
Chinese Academy of Sciences (CAS)

Public health is tightly related to the national economic development and social progress, and is an important base for a sustainable society. For nearly two hundred years, most of the developed countries have witnessed a continuous increase in the age of population and economic growth. Therefore, the scope and degree of harmful to people's health caused by infectious diseases or perinatal diseases have decreased considerably, whereas chronic non-communicable diseases such as cancer, cardiovascular diseases, metabolic disorders and neural-degenerative diseases are becoming major threats to human health worldwide. Since population requires fair and generally public healthcare in a sustainable society, the best ways against chronic non-communicable diseases would be predictive and preemptive strategies. The healthcare model is now going through a strategic shift from therapeutic-centered healthcare to one focusing on healthcare management and prevention of diseases.

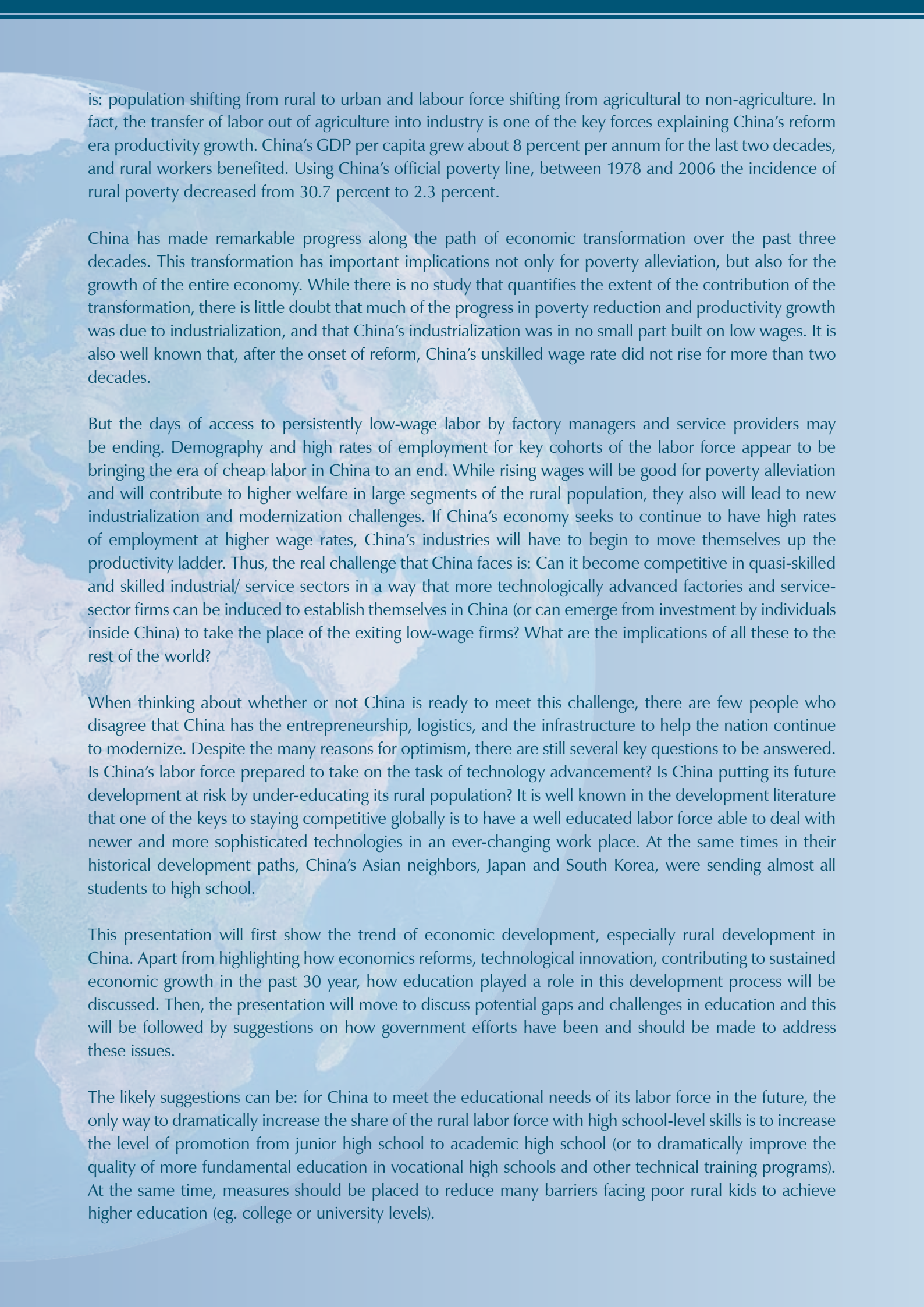
The rapid development in science and technology exerts an unprecedented influence upon the field of biomedicine. In the 21st century, life science, material science, information science, cognition science, complexity science and so on will all be integrated to breed major scientific breakthrough, thus bringing about important changes in the field of public health. Along with an increasingly closer connection between modern biology and clinical medicine, basic research, applied research and industrial R&D are combined at high speed and appear a new tendency on research styles, namely translational research. In the near future, a new biomedicine based on translational research and multi-disciplinary research will provide a powerful solution against the chronic non-communicable diseases.

## **China's Development Challenges and Role of Education**

**Linxiu ZHANG**

Center for Chinese Agricultural Policy, Institute of Geographical Sciences  
and Natural Resources Research, Chinese Academy of Sciences (CAS)

The iron law of development in the world simply reveals that if a nation needs to move up the development ladder from a developing country to a developed one, it must go through two transformation process. That



is: population shifting from rural to urban and labour force shifting from agricultural to non-agriculture. In fact, the transfer of labor out of agriculture into industry is one of the key forces explaining China's reform era productivity growth. China's GDP per capita grew about 8 percent per annum for the last two decades, and rural workers benefited. Using China's official poverty line, between 1978 and 2006 the incidence of rural poverty decreased from 30.7 percent to 2.3 percent.

China has made remarkable progress along the path of economic transformation over the past three decades. This transformation has important implications not only for poverty alleviation, but also for the growth of the entire economy. While there is no study that quantifies the extent of the contribution of the transformation, there is little doubt that much of the progress in poverty reduction and productivity growth was due to industrialization, and that China's industrialization was in no small part built on low wages. It is also well known that, after the onset of reform, China's unskilled wage rate did not rise for more than two decades.

But the days of access to persistently low-wage labor by factory managers and service providers may be ending. Demography and high rates of employment for key cohorts of the labor force appear to be bringing the era of cheap labor in China to an end. While rising wages will be good for poverty alleviation and will contribute to higher welfare in large segments of the rural population, they also will lead to new industrialization and modernization challenges. If China's economy seeks to continue to have high rates of employment at higher wage rates, China's industries will have to begin to move themselves up the productivity ladder. Thus, the real challenge that China faces is: Can it become competitive in quasi-skilled and skilled industrial/ service sectors in a way that more technologically advanced factories and service-sector firms can be induced to establish themselves in China (or can emerge from investment by individuals inside China) to take the place of the exiting low-wage firms? What are the implications of all these to the rest of the world?

When thinking about whether or not China is ready to meet this challenge, there are few people who disagree that China has the entrepreneurship, logistics, and the infrastructure to help the nation continue to modernize. Despite the many reasons for optimism, there are still several key questions to be answered. Is China's labor force prepared to take on the task of technology advancement? Is China putting its future development at risk by under-educating its rural population? It is well known in the development literature that one of the keys to staying competitive globally is to have a well educated labor force able to deal with newer and more sophisticated technologies in an ever-changing work place. At the same times in their historical development paths, China's Asian neighbors, Japan and South Korea, were sending almost all students to high school.

This presentation will first show the trend of economic development, especially rural development in China. Apart from highlighting how economics reforms, technological innovation, contributing to sustained economic growth in the past 30 year, how education played a role in this development process will be discussed. Then, the presentation will move to discuss potential gaps and challenges in education and this will be followed by suggestions on how government efforts have been and should be made to address these issues.

The likely suggestions can be: for China to meet the educational needs of its labor force in the future, the only way to dramatically increase the share of the rural labor force with high school-level skills is to increase the level of promotion from junior high school to academic high school (or to dramatically improve the quality of more fundamental education in vocational high schools and other technical training programs). At the same time, measures should be placed to reduce many barriers facing poor rural kids to achieve higher education (eg. college or university levels).





