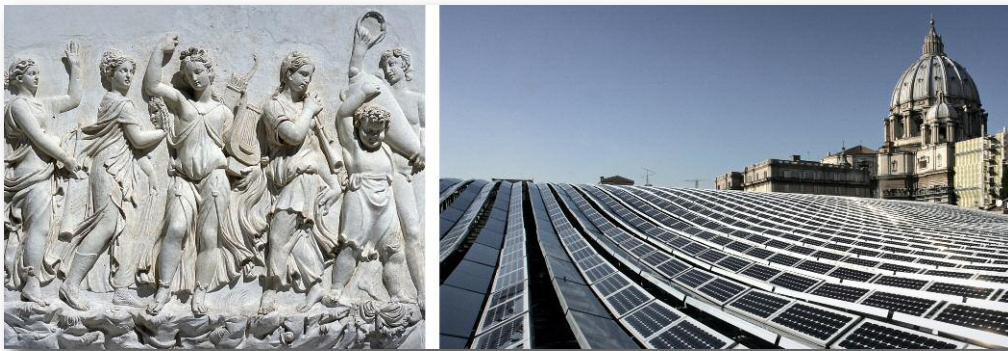


THE PONTIFICAL ACADEMY OF SCIENCES
THE PONTIFICAL ACADEMY OF SOCIAL SCIENCES

Joint Workshop

Sustainable Humanity Sustainable Nature Our Responsibility

2-6 May 2014 • Casina Pio IV



VATICAN CITY 2014



Today no one in our world feels responsible; we have lost a sense of responsibility for our brothers and sisters. We have fallen into the hypocrisy of the priest and the levite whom Jesus described in the parable of the Good Samaritan: we see our brother half dead on the side of the road, and perhaps we say to ourselves: "poor soul...!", and then go on our way. It's not our responsibility, and with that we feel reassured, assuaged. The culture of comfort, which makes us think only of ourselves, makes us insensitive to the cries of other people, makes us live in soap bubbles which, however lovely, are insubstantial; they offer a fleeting and empty illusion which results in indifference to others; indeed, it even leads to the globalization of indifference. ... "Adam, where are you?" "Where is your brother?" These are the two questions which God asks at the dawn of human history, and which he also asks each man and woman in our own day. Today too, Lord, we hear you asking: "Adam, where are you?" "Where is the blood of your brother?"

Homily of Holy Father Francis during his visit to Lampedusa, "Arena" sports camp, Salina Quarter, Monday, 8 July 2013.

Sustainable Humanity
Sustainable Nature
Our Responsibility

INTRODUCTION

Are Humanity's dealings with Nature sustainable? What is the status of the Human Person in a world where science predominates? How should we perceive Nature and what is a good relationship between Humanity and Nature? Should one expect the global economic growth that has been experienced over the past six decades to continue for the foreseeable future? Should we be confident that knowledge and skills will increase in such ways as to lessen Humanity's reliance on Nature despite our increasing economic activity and growing numbers? Is the growing gap between the world's rich and world's poor in their reliance on natural resources a consequence of those growths?

Human-Nature Interchanges

Contemporary discussions on the questions are now several decades old. If they have remained alive and are frequently shrill, it is because two opposing empirical perspectives shape them. On the one hand, if we look at specific examples of what one may call natural capital (aquifers; ocean fisheries; tropical forests; estuaries; wetlands; the atmosphere as a sink for carbon, brown clouds, and other pollutants), there is convincing evidence that at the rates at which we currently exploit them, they are very likely to change character dramatically for the worse with little advance notice. The melting of glaciers and sea-ice are recent symptoms, but the Millennium Ecosystem Assessment reported in 2005 that 15 of the 24 ecosystem services that the Assessment had investigated world-wide were either degraded or being exploited at unsustainable rates (MEA, 2005a-d).

On the other hand, if we study trends in food consumption, life expectancy, and recorded incomes in regions that are currently rich and in those that are on the way to becoming rich, resource scarcities wouldn't appear to have bitten so far.

Those conflicting intuitions are also not unrelated to an intellectual tension between the concerns people share about carbon emissions and biodiversity loss that sweep across regions, nations and continents; and about declines in the availability of firewood, fresh water, coastal resources, and forest products in as small a locality as a village. That is why "environmental prob-

lems" and "future prospects" present themselves in different ways to different people. Some identify environmental problems with population growth, while others identify them with wrong sorts of economic growth, involving, for example, excessive consumption in rich countries. There are those who see environmental problems as urban pollution in emerging economies, while others view them through the spectacle of poverty in the world's poorest countries. Some allude to "sustainable development" only when considering economic development in the global economy, while others see it in terms of the development prospects of villages in sub-Saharan Africa.

Each of the visions is correct. We now know, for example, that what begins as urban pollution becomes in time layers of atmospheric brown clouds (ABCs), containing black carbon particles and ozone, that annually destroy some 2 million lives and over 100 million tons of crops, disrupts the Monsoon circulation and contributes to the melting of arctic ice and the Himalayan snow. There is no single environmental problem, there is a large collection of interrelated problems. Some are presenting themselves today, while others are threats to the future. And they manifest themselves at different spatial scales and operate at different speed. Although growth in industrial and agricultural pollutants has accompanied economic development, neither preventive nor curative measures have kept pace with their production in industrialized countries. That neglect is now prominent in the rapidly growing regions in Brazil, Russia, India, China, and South Africa (BRICS). Moreover, the scale of the human enterprise, both by virtue of unprecedented increases in the size of the world's population and the level of economic activity, has so stretched the capabilities of ecosystems, that Humanity is today Earth's dominant species. During the 20th century world population grew by a factor of four (to more than 6 billion) and world output by 14, industrial output increased by a multiple of 40 and the use of energy by 16, methane-producing cattle population grew in pace with human population, fish catch increased by a multiple of 35, and carbon and sulfur dioxide emissions by more than 10. The application of nitrogen to the terrestrial environment from the



use of fertilizers, fossil fuels, and leguminous crops is now at least as great as that from all natural sources combined. About 45 per cent of the 45-60 billion metric tons of carbon that are harnessed annually by terrestrial photosynthesis (net primary production of the biosphere) is currently being appropriated for human use. These are rough estimates, but the figures do put the scale of the human presence on the planet in perspective. Humanity is hitting against Nature's constraints both locally and globally. It is not without cause that our current era, starting some 200 years ago, has been named the Anthropocene.

On the other hand, economic growth has brought with it improvements in the quality of a number of environmental resources. The large-scale availability of potable water and the increased protection of human populations against both water- and air-borne diseases in advanced industrial countries have come allied to the economic growth those countries have enjoyed over the past 200 years. Moreover, the physical environment inside the home has improved beyond measure (cooking in Asia and Africa, involving the burning of solid biomass and coal, continues to be a central cause of respiratory illnesses among women). Increases in scientific knowledge, investment in public infrastructure, and universal education in advanced industrial countries have meant that citizens there have far greater knowledge of environmental hazards than their counterparts in poor regions. They also have resources to avoid them. These examples reflect positive links between economic growth and environmental quality.

Despite the conflicting intuitions, many people are convinced that scientific and technological advances, the accumulation of reproducible capital (machinery, equipments, buildings, roads), growth in human capital (education, skills), and improvements in the economy's institutions can overcome diminutions in natural capital. Otherwise it is hard to explain why so much of the social sciences in the twentieth century has been detached from the environmental sciences. Nature is all too often seen as a backdrop from which resources and services can be drawn in isolation. Macroeconomic forecasts routinely exclude natural capital. Accounting for Nature, if it comes into the calculus at all, is usually an afterthought. The rhetoric has been so successful, that if someone exclaims, "Economic growth!", one does not need to ask, "Growth in what?" – we all know they mean growth in gross domestic product (GDP).

The rogue word in GDP is "gross". GDP, being the market value of all final goods and services, ignores the degradation of natural capital. If fish harvests rise, GDP increases even if the stock declines. If logging intensifies, GDP increases even if the forests are denuded. And so on. The moral is significant though banal: GDP is impervious to Nature's constraints. There should be no question that Humanity needs urgently to redirect our relationship with Nature so as to promote a sustainable pattern of economic and social development.

A proposal

Rio+20 Summit on biodiversity preservation was convened to provide a resolution to the problems Humanity faces in our interchanges with Nature. In practical terms though, it is widely acknowledged to have been a failure. Nevertheless, the occasion provided an opportunity for concerned people to air their views on the various types of biodiversity losses the world has been experiencing in recent decades. Concomitantly, the Summit offered a platform for people to review the character of both global and local resource stresses.

Looking through the Summit's programme of events, however, it is hard to detect an overarching intellectual framework that was used to identify Nature's constraints. The lacuna was inevitable. The engagements that took place alongside the Summit were ones where citizens brought their particular concerns to the table; they weren't an occasion for a collective endeavour among natural and social scientists. That is why we are proposing a joint PAS-PASS workshop on Sustainable Humanity, Sustainable Nature.

Our idea is not to catalogue environmental problems. That has been done at many other gatherings. We propose instead to view Humanity's interchanges with Nature through a triplet of fundamental, but inter-related Human needs – Food, Health, and Energy – and ask our respective Academies to work together to invite experts to speak to the various pathways that both serve those needs and reveal constraints on Nature's ability to meet them. That requires a collaborative effort of natural and social scientists. We would hope some of the sessions would consist of presentations by a pair of experts from the natural and social sciences, respectively.

Umanità sostenibile
Natura sostenibile
La nostra responsabilità

INTRODUZIONE

I rapporti che l'Umanità intrattiene con la Natura sono sostenibili? Qual è lo status della Persona Umana in un mondo in cui predomina la scienza? Come va intesa la Natura e come si valuta se il rapporto che l'Uomo ha con essa è buono? Possiamo attenderci che, anche in un prossimo futuro, continui la crescita economica globale che si è avuta negli ultimi sei decenni? Possiamo contare sul fatto che le conoscenze e le competenze aumentino in modo tale da ridurre la dipendenza dell'Uomo sulla Natura, nonostante la crescita esponenziale delle nostre attività economiche e della popolazione? Il divario sempre maggiore tra i ricchi e i poveri del mondo, in termini di dipendenza dalle risorse naturali, è la conseguenza di questo sviluppo?

Il dibattito contemporaneo su tali questioni dura ormai da decenni. Se va avanti, spesso in modo dissonante, è perché è plasmato da due punti di vista opposti ed empirici. Da una parte, se consideriamo gli esempi specifici di ciò che si può chiamare capitale naturale (falde acquifere; zone di pesca oceaniche; foreste tropicali; estuari; acquitrini; l'atmosfera come luogo di smaltimento del carbonio; le nuvole marroni e altri inquinanti), vi sono prove convincenti che, ai tassi di sfruttamento attuali, le caratteristiche di questo capitale molto probabilmente muteranno in peggio con poco preavviso. Lo scioglimento dei ghiacciai e del ghiaccio marino sono sintomi recenti, ma già nel 2005 il Millennium Ecosystem Assessment aveva rilevato che 15 dei 24 ecosistemi che aveva valutato nel mondo erano degradati o venivano sfruttati a tassi insostenibili (MEA, 2005a-d).

D'altra parte, se studiamo le tendenze del consumo di cibo, dell'aspettativa di vita, e del reddito registrato nelle regioni attualmente ricche e in quelle che stanno per diventarlo, la scarsità di risorse non sembra ancora aver colpito.

Queste intuizioni contrastanti non sono scollegate da una certa tensione intellettuale prodotta dalle preoccupazioni condivise dalla gente riguardo alle emissioni di carbonio e alla perdita di biodiversità che coinvolgono regioni, nazioni e continenti; e anche riguardo alla riduzione della disponibilità di legna da ardere, acqua potabile, risorse costiere e prodotti boschivi, persino in località molto piccole, a livello di singoli villaggi. Ecco

perché "i problemi ambientali" e "le prospettive future" vengono intesi in maniera diversa a seconda delle persone. Alcuni identificano i problemi ambientali con la crescita della popolazione, altri con forme errate di crescita economica. Ci sono coloro che ritengono un problema ambientale l'inquinamento urbano nelle economie emergenti; altri si riferiscono alle condizioni di povertà in cui si vive nei paesi più poveri del mondo. Alcuni parlano di "sviluppo sostenibile" solo quando alludono allo sviluppo economico dell'economia globale, mentre altri lo considerano in termini di prospettive di sviluppo dei villaggi nell'Africa subsahariana.

Ognuno di questi punti di vista è corretto. Sappiamo che ciò che inizia come inquinamento urbano si andrà a stratificare formando le Atmospheric Brown Cloud (ABC), nuvole marroni contenenti particelle di carbonio nero e ozono, che ogni anno distruggono circa 2 milioni di vite umane e oltre 100 milioni di tonnellate di colture, perturbano la circolazione dei monsoni e contribuiscono allo scioglimento dei ghiacci e della neve dell'Himalaya. Non esistono problemi ambientali individuali, ma una vasta serie di problemi interconnessi. Alcuni si stanno presentando oggi, mentre altri sono potenziali rischi per il futuro. Si manifestano su diverse scale e procedono a velocità diverse. Sebbene lo sviluppo economico sia andato di pari passo con la crescita degli inquinanti industriali e agricoli, né le misure preventive né quelle curative hanno tenuto il passo con la loro produzione nei paesi industrializzati. Questa negligenza è diventata evidente nelle regioni in rapida crescita quali Brasile, Russia, India, Cina e Sud Africa (BRICS). L'entità dell'impresa umana ha inoltre messo a dura prova le capacità degli ecosistemi, cosicché l'Uomo è arrivato ad essere la specie dominante sulla Terra. Nel ventesimo secolo la popolazione mondiale è cresciuta di 4 volte (raggiungendo gli oltre 6 miliardi), la produzione mondiale di 14 volte, la produzione industriale è aumentata di 40 volte e l'utilizzo dell'energia di 16, la popolazione bovina che produce metano è cresciuta di pari passo con la popolazione umana, la quantità di pesce pescato è aumentata di 35 volte, le emissioni di carbonio e biossido di zolfo di 10 volte.



L'apporto di azoto nell'ambiente terrestre derivato dall'impiego di fertilizzanti, combustibili fossili e piantagioni di leguminose è grande almeno quanto quello derivante dalla somma di tutte le fonti naturali. Il 45% circa delle 45-60 tonnellate di carbonio che sono trattenute annualmente dalla fotosintesi terrestre (produzione primaria netta della biosfera) vengono attualmente destinate ad uso umano. Sono stime approssimative, ma questi numeri fanno comprendere le proporzioni della presenza umana sulla terra. L'umanità si scontra contro i vincoli della Natura sia localmente, che a livello globale. Non è un caso che la nostra epoca attuale sia stata denominata *Antropocene*.

D'altra parte, la crescita economica ha portato al miglioramento di un certo numero di risorse ambientali in termini di qualità. La disponibilità capillare di acqua potabile e la maggiore protezione delle popolazioni umane dei paesi industriali avanzati nei confronti delle malattie trasmesse via acqua e via aria hanno permesso la crescita economica di cui questi paesi hanno beneficiato nel corso degli ultimi 200 anni. Anche l'ambiente fisico all'interno delle abitazioni è oltremodo migliorato (in Asia e in Africa i metodi tradizionali di cuocere il cibo bruciando biomassa solida e carbone continuano a essere la causa principale delle malattie respiratorie tra le donne). Il miglioramento delle conoscenze scientifiche, gli investimenti in infrastrutture pubbliche e l'istruzione universale nei paesi industriali avanzati hanno fatto sì che i loro cittadini siano molto più consapevoli dei rischi ambientali rispetto alle loro controparti nelle regioni povere, avendo inoltre le risorse per evitarli. Questi esempi riflettono legami positivi tra crescita economica e qualità ambientale.

Nonostante le intuizioni contraddittorie, molti sono convinti che i progressi scientifici e tecnologici, l'accumulazione di capitale riproducibile (macchinari, attrezzatura, palazzi, strade), la crescita del capitale umano (istruzione, competenze), e il miglioramento delle istituzioni dell'economia possano supplire alle minusvalenze del capitale naturale. Altrimenti è difficile spiegare il motivo per cui le scienze sociali nel ventesimo secolo si siano in gran parte distaccate dalle scienze ambientali. La Natura è vista troppo spesso come un contesto dal quale ricavare servizi e risorse in isolamento. Le previsioni macroeconomiche solitamente escludono il capitale naturale. In quei rari casi in cui la Natura viene tenuta in conto e inserita nell'equazione, si tratta di solito di una considerazione dell'ultimo minuto. Questa retorica ha avuto tanto successo che quando si parla di "crescita economica", non c'è bisogno di chiedere, "crescita di

che cosa?" Lo sappiamo tutti che si intende la crescita del prodotto interno lordo (PIL).

Tuttavia, la parola trabocchetto all'interno del PIL è l'aggettivo "lordo". Il PIL, essendo il valore di mercato di tutti i beni e servizi finali, ignora il degrado del capitale naturale. Se aumenta la pesca, aumenta il PIL, anche se le riserve di pesce diminuiscono. Se si intensifica l'abbattimento di legname, il PIL aumenta, anche se le foreste vengono disboscate. E così via. La morale è significativa anche se banale: il PIL è indifferente ai vincoli della Natura, mentre non si dovrebbe assolutamente mettere in dubbio l'urgente bisogno che l'Umanità ha di reimpostare il proprio rapporto con essa per promuovere un modello sostenibile di sviluppo economico e sociale.

Una proposta

Il vertice Rio+20 sulla conservazione della biodiversità è stato convocato per fornire una soluzione ai problemi che l'Umanità si trova ad affrontare nei suoi interscambi con la Natura: nella pratica, tuttavia, è stato ritenuto, in generale, un fallimento. Ciononostante è stata un'occasione per dare l'opportunità alle persone interessate di esprimere le proprie opinioni sui vari tipi di perdite che il mondo subisce negli ultimi decenni a livello di biodiversità.

Il vertice ha inoltre offerto una piattaforma per esaminare le caratteristiche delle pressioni sulle risorse sia a livello globale che locale.

Analizzandone il programma è difficile rilevare il quadro complessivo utilizzato per individuare i vincoli della natura. La lacuna era inevitabile. Gli appuntamenti che hanno avuto luogo a margine del vertice hanno permesso ai cittadini di mettere a tavolino specifiche preoccupazioni; non sono stati un'occasione di sforzo collettivo tra scienziati naturali e sociali. È proprio per questo che abbiamo proposto questo gruppo di lavoro congiunto PAS-PASS su *Umanità sostenibile, natura sostenibile*.

Il nostro obiettivo non è quello di presentare un catalogo di problemi ambientali. Questo è già avvenuto in altri incontri. Ci proponiamo invece di rapportare gli interscambi dell'Umanità con la Natura a tre bisogni umani fondamentali tra loro collegati – alimentazione, salute e energia – e chiediamo alle nostre rispettive Accademie di collaborare, invitando esperti delle scienze naturali e delle scienze sociali a parlare dei vari percorsi che possano soddisfare queste esigenze, sottolineando gli ostacoli che la Natura si trova ad affrontare. Tutto ciò richiede lo sforzo collaborativo degli scienziati, sia delle scienze naturali che delle scienze sociali.



PROGRAMME

Friday 2 May 2014

- 9:00 *Word of Welcome*
PASS President Margaret Archer and PAS President Werner Arber
- 9:15 *Opening Address*
H.Em. Cardinal Oscar Andrés Rodríguez Maradiaga

I. THE BROADER CONTEXT

Chair: Margaret Archer

- 9:50 *Human-Nature Co-evolution*
Werner Arber
- 10:10 Discussion
- 10:30 *The Emergence of Humans: Brains (Bodies and Hands), Mind and Soul*
Yves Coppens
- 10:50 Discussion
- 11:10 Coffee Break
- 11:40 General Discussion

THE NEW ERA OF HUMAN-NATURE INTERACTIONS

Chair: Paul J. Crutzen

II. FUNDAMENTAL DRIVERS OF FOOD, HEALTH, AND ENERGY NEEDS

- 12:10 *Externalities, or the Unaccounted for Consequences of Our Actions that Undermine Nature*
Partha Dasgupta
- 12:30 Discussion
- 12:50 Lunch at the Casina Pio IV
- 15:00 *Population*
Gérard-François Dumont
- 15:20 Discussion
- 15:40 *Food Demand*
Joachim von Braun
- 16:00 Discussion
- 16:20 Coffee Break
- 16:50 *The World's Quest for Sustainable Development Goals*
Jeffrey Sachs
- 17:10 Discussion
- 17:30 General Discussion

III. ANTHROPOCENE: GLOBAL CLIMATE CHANGE

Chair: Walter H. Munk

- 18:00 *Food Production in the Anthropocene*
Paul Crutzen
- 18:20 Discussion
- 18:40 Dinner at the Casina Pio IV



Saturday 3 May 2014

- 8:30 *Tipping Points and Extreme Weather Events*
Hans Joachim Schellnhuber
- 8:50 Discussion
- 9:10 *Ocean Climate: Changes in the North Atlantic Circulation*
Walter H. Munk
- 9:30 Discussion
- 9:50 General Discussion
- 10:20 Coffee Break

IV. COMPETING DEMANDS ON NATURE AS A SOURCE

Chair: Partha S. Dasgupta

- 10:50 *The Oceans*
Nancy Knowlton
- 11:10 Discussion
- 11:30 *Tropical Forests*
Jeff Vincent
- 11:50 Discussion
- 12:10 Lunch at the Casina Pio IV
- 14:10 *The Mega-Cities Challenge*
Janice E. Perlman
- 14:30 Discussion
- 14:50 General Discussion

V. COMPETING DEMANDS ON THE CRYOSPHERE

Chair: Hans Joachim Schellnhuber

- 15:20 *Glaciers as Sources of Water*
Anil Kulkarni
- 15:40 Discussion
- 16:00 *The Polar Regions*
Peter Wadhams
- 16:20 Discussion
- 16:40 General Discussion
- 17:10 Coffee Break

VI. COMPETING DEMANDS ON THE BIOSPHERE

Chair: Naomi Oreskes

- 17:40 *Green Fields: Feeding the Hungry, Raising the Poor and Protecting Nature in Africa*
Robert Scholes
- 18:00 Discussion
- 18:20 *Stability of Coastal Zones*
Marcia McNutt
- 18:40 Discussion
- 19:00 General Discussion
- 19:30 Dinner at the Casina Pio IV

Sunday 4 May 2014

**SPECIAL SESSION FOR THE 20TH ANNIVERSARY
OF THE PONTIFICAL ACADEMY OF SOCIAL SCIENCES**

- 16:00 Holy Mass in the Casina's Chapel
16:45 Closed Session of the Pontifical Academy of Social Sciences
18:15 Coffee Break
18:45 *History of the PASS*
Herbert Schambeck
19:30 Dinner at the Casina Pio IV

In the interest of sustainability and the environment, instead of printing each paper we have stored them in this shared folder:

<http://goo.gl/UjppTJ>

A limited number of copies will be printed and made available in the conference hall just for those who prefer a hard copy.



Monday 5 May 2014

VII. SOCIETY'S RESPONSE TO CURRENT UNSUSTAINABLE GROWTH

Chair: Timothy E. Wirth

- 9:00 *Why Have Climate Negotiations Proved So Disappointing?*
Scott Barrett
- 9:20 Discussion
- 9:40 *Transitions Towards an Inclusive "Green Economy": Achieving Food and Energy Security in a World of Growing Demand*
Achim Steiner
- 10:00 Discussion
- 10:20 *The Two Worlds Approach: The Top 4 Billion and the Bottom 3 Billion*
Veerabhadran Ramanathan
- 10:40 Discussion
- 11:00 Coffee Break
- 11:15 *Mainstreaming the Values of Nature into Decision-Making*
Gretchen Daily
- 11:35 Discussion
- 11:55 *Energy for Sustainable and Equitable Development*
Daniel Kammen
- 12:15 Discussion
- 12:35 *Global Knowledge Action Network for Adaption to Climate Change, 2*
Charles Kennel
- 12:55 Discussion
- 13:15 Lunch at the Casina Pio IV
- 15:00 *Valuing Nature: Getting the Trade-offs Right*
Karl-Goran Maler and Charles Perrings
- 15:20 Discussion
- 15:40 *Sustainable Transformation of Human Society in Asia*
Yuan Tseh Lee
- 16:00 Discussion
- 16:20 General Discussion
- 16:50 Coffee Break

VIII – SOCIAL INFRASTRUCTURE

Chair: Herbert Schambeck

- 17:10 *The Price of Inequality: How Today's Divided Society Endangers our Future*
Joseph E. Stiglitz
- 17:30 Discussion
- 17:50 *Human Natural Law as a Basis for the Safeguarding of Human Life and Nature in a Globalised World*
H.E. Msgr. Roland Minnerath
- 18:10 Discussion
- 18:30 *Nature and the Law: Ownership of the Global Commons*
Edith Brown Weiss
- 18:50 Discussion
- 19:10 General Discussion
- 19:40 Dinner at the Casina Pio IV



Tuesday 6 May 2014

IX – SOCIAL INCLUSION

Chair: Werner Arber

- 9:00 *Globalization: A Social Balance*
Juan José Llach
- 9:20 Discussion
- 9:40 *Ensuring Learning for All Children and Youth*
Antonio Battro
- 10:00 Discussion
- 10:20 Coffee Break
- 10:50 *Being Trafficked to Work*
Margaret S. Archer
- 11:10 Discussion
- 11:30 *Labour Precarity, Social Exclusion and People's Economy*
Juan Grabois
- 11:50 Discussion
- 12:10 *The Influence of Virtuous Human Life in Sustaining Nature*
Stefano Zamagni
- 12:30 Discussion
- 12:50 Lunch at the Casina Pio IV
- 14:30 *Good Governance, Including Peace*
Wilfrido Villacorta
- 14:50 Discussion
- 15:10 *Intergenerational Solidarity*
Pierpaolo Donati
- 15:30 Discussion
- 15:50 General Discussion

X – CLOSING SESSION: MOTIVATING SOCIETIES

Chair: Veerabhadran Ramanathan

- 16:20 *Scientific Consensus and the Role and Character of Scientific Dissent*
Naomi Oreskes
- 16:40 Discussion
- 17:00 Coffee Break
- 17:30 *Existential Risks*
Martin Rees
- 17:50 Discussion
- 18:10 *Social Ethics: Humanity's Responsibility Toward Nature*
Enrico Berti
- 18:30 Discussion
- 18:50 Conference Summary
Andy Revkin
- 19:05 Conference Statement
Marcelo Sánchez Sorondo
- 19:20 Dinner at the Casina Pio IV



LIST OF PARTICIPANTS

Speakers

	Prof. Werner Arber President of the Pontifical Academy of Sciences; Biozentrum, Department of Microbiology, University of Basel Basel (Switzerland)		Prof. Gérard-François Dumont Université de Paris-Sorbonne Paris (France)
	Prof. Margaret S. Archer President of the Pontifical Academy of Social Sciences Centre for Social Ontology University of Warwick Coventry (UK)		Juan Grabois Co-founder of the Excluded Workers Movement and Confederation of Popular Economy Workers Buenos Aires (Argentina)
	Prof. Scott Barrett Lenfest-Earth Institute Professor of Natural Resource Economics Columbia University New York, NY (USA)		Prof. Daniel M. Kammen Energy and Resources Group, Dept. of Nuclear Engineering; Founding Director of Renewable and Appropriate Energy Laboratory (RAEL) University of California, Berkeley (USA)
	Prof. Antonio M. Battro Academia Nacional de Educación Buenos Aires (Argentina)		Dr. Charles F. Kennel Chair of National Academies Space Studies Board Director and Distinguished Professor, Emeritus at Scripps Institution of Oceanography, University of California, San Diego (USA)
	Prof. Enrico Berti University of Padova Dept. of Philosophy Padova (Italy)		Dr. Nancy Knowlton Sloan Research Fellowship in Ocean Sciences Committee and the National Board the Coral Reef Alliance Aldo Leopold Leadership Fellow Washington, DC (USA)
	Prof. Joachim von Braun Director, Center for Development Research (ZEF) University of Bonn; Professor, Economics and Technological Change Bonn (Germany)		Dr. Anil V. Kulkarni Distinguished Visiting Scientist, Divecha Center for Climate Change, Center for Atmospheric & Oceanic Sciences, Indian Institute of Sciences Bangalore (India)
	Prof. Edith Brown Weiss Francis Cabell Brown Professor of International Law Georgetown University Law Center Washington, DC (USA)		Prof. Yuan-Tseh Lee President of International Council for Science President Emeritus, Academia Sinica DRF, Institute of Atomic and Molecular Sciences Taipei (Taiwan)
	Prof. Yves Coppens Collège de France Paris (France)		Prof. Juan José Llach Director, GESE (Centro de Estudios de Gobierno, Empresa, Sociedad y Economía) IAE-Universidad Austral Buenos Aires (Argentina)
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	Prof. Gretchen Daily, Ph.D. Professor of Biology, Senior Fellow, Woods Institute for the Environment, Stanford University, Stanford, CA (USA)		Prof. Karl-Göran Måler Professor Emeritus, Researcher, former Director, The Beijer Institute of Ecological Economics, The Royal Swedish Academy of Sciences Stockholm (Sweden)
	Prof. Partha S. Dasgupta Frank Ramsey Professor Emeritus of Economics University of Cambridge Cambridge (UK)		H.E. Msgr. Prof. Roland Minnerath Archbishop of Dijon Dijon (France)
	Prof. Pierpaolo Donati University of Bologna Dept. of Sociology Bologna (Italy)		Prof. Walter H. Munk Professor Emeritus, Institute of Geophysics and Planetary Physics Scripps Institution of Oceanography, UC San Diego, CA (USA)

	Prof. Naomi Oreskes Department of the History of Science Harvard University Cambridge, MA (USA)		Prof. Hans Joachim Schellnhuber Founding Director of the Potsdam Institute for Climate Impact Research (PIK) Potsdam (Germany)
	Dr. Janice E. Perlman Founder & President of the Mega-Cities Project Nyack, NY (USA)		Prof. Robert E. Scholes Brown University, Dept. of Modern Culture and Media Providence (USA)
	Prof. Charles Perrings Professor of Environmental Economics School of Life Sciences Arizona State University Tempe, AZ (USA)		Mr. Achim Steiner UNEP Executive Director and Under-Secretary-General of the United Nations Nairobi (Kenya)
	Prof. Veerabhadran Ramanathan Distinguished Professor of Climate and Atmospheric Science Scripps Institution of Oceanography, University of California San Diego, CA (USA)		Prof. Joseph Stiglitz Columbia University Graduate School of Business New York, NY (USA)
	Prof. Martin J. Rees University of Cambridge Institute of Astronomy Cambridge (UK)		Prof. Wilfrido V. Villacorta Professor Emeritus De La Salle University Manila (Philippines)
	H.E. Óscar Andrés Card. Rodríguez Maradiaga Archbishop of Tegucigalpa President of Caritas Internationalis Tegucigalpa (Honduras)		Prof. Jeffrey Vincent Korstian Professor in Forest Economics and Management, Nicholas School of the Environment and Earth Sciences, Duke University Durham, NC (USA)
	Prof. Jeffrey Sachs Director, The Earth Institute Columbia University New York, NY (USA)		Prof. Peter Wadhams Head of the Polar Ocean Physics Group Dept. of Applied Mathematics and Theoretical Physics University of Cambridge Cambridge (UK)
	H.E. Msgr. Marcelo Sánchez Sorondo Chancellor of the Pontifical Academy of Sciences and of Social Sciences (Vatican City)		Prof. Stefano Zamagni Vice director of the Bologna Center Senior adjunct Prof. of International Economics Professor of Economics, University of Bologna Bologna (Italy)
	Prof. Herbert Schambeck Professor Emeritus University of Linz Institute for Public Law and Political Sciences Linz-Auhof (Austria)		

Outside Observers

ALPIZAR Francisco	Ecological Economist from America Latina, Costa Rica
BRASESCO M. Veronica	Researcher
CASAZZA Marco	Researcher
CHITIGA Margaret	Director of the Economic Performance and Development research programme at the Human Sciences Research Council
CZERNY Michael	Office of the President, Pontifical Council for Justice and Peace
DASGUPTA Aisha	Research Student at the London School of Hygiene and Tropical Medicine
DUKE Luly	Founder and President, Fundación Amistad, NY, USA
DURAIAPPAH Anantha	International Human Dimensions Programme
GARDNER Gary T.	Senior Fellow, Worldwatch Institute
GHATAK Amrita	India, GIDR
KAPELLARI H.E. Msgr. Egon	Representative of the Holy See to the Academy
KELLY Emily	Scripps Grad Student, Nominated by Grad Dept
LIEBSCH Martina	Caritas Internationalis
McKENZIE Curtis	Intern at the Pontifical Council for Justice and Peace
MISLEH Dan	Director, Catholic Coalition on Climate Change
MUNOZ Pablo	International Human Dimensions Programme
PINHEIRO FRANCO João Luiz	
RABBANI Atonu	Bangladesh, Dhaka University
REVKIN Andy	NY Times Reporter
RICHTER Daniel	Legislative Director for the Citizens Climate Lobby (CCL). Former grad student at Scripps-UCSD
ROSS Courtney	Founder and Chair, Ross Institute, NY, USA
ROY Michel	Caritas Internationalis
SHYAMSUNDAR Priya	Executive Director Sandee Kathmandu
SIEGFRIED Matthew	Scripps-UCSD grad student, Nominated by Dept Interests: Greenland and Water Antarctic Glacier melt
TEAVAI-MURPHY Hinano	Associate Director - Administration & Outreach, UC Berkeley Gump Research Center
VERGA Daniele	Retired Ambassador
VINCIGUERRA Tebaldo	Pontifical Council for Justice and Peace
WARRIAN Peter	Chair of the Lupina Foundation
WEISS Charles	Distinguished Professor of Science, Technology and International Affairs at Georgetown University
WIRTH Timothy E.	Vice Chairman and former President, United Nations Foundation, Washington, DC, USA
WOLNICKI Mateusz	Senior Project Officer, Regional Sustainability Planning Section A, Strategic Approaches Branch, Environment Assessment & Compliance Division, Dept of the Environment, Canberra

Academicians Participants

BUTTIGLIONE Rocco	LÉNA Pierre	SUCHOCKA Hanna
FUMAGALLI CARULLI Ombretta	MATLARY Janne	TIETMEYER Hans
GLENDON Mary Ann	MITTELSTRASS Jürgen	VICUÑA Rafael
HERTZKE Allen	MLČOCH Lubomír	ZACHER Hans
HÖSLE Vittorio	POSSENTI Vittorio	ZULU Paulus
KUAN Hsin-Chi	RAGA José T.	
LE DOUARIN Nicole	RAMIREZ Mina	



BIOGRAPHIES OF PARTICIPANTS

Scott Barrett is the Lenfest-Earth Institute Professor of Natural Resource Economics at Columbia University in New York City, where he holds a joint appointment in the School of International and Public Affairs and the Earth Institute. He is also a research fellow with the Beijer Institute (Stockholm), CESifo (Munich), and the Institute of World Economics (Kiel). He is currently chairman of the advisory board to the Beijer Institute and a member of the Scientific Council of the Institut du Développement Durable et des Relations Internationales (Paris). He was previously on the faculties of the Johns Hopkins University School of Advanced International Studies in Washington, DC and the London Business School, and has also been a visiting scholar at Princeton and Yale. He received his PhD in economics from the London School of Economics. His research focuses on institutional remedies to global collective action problems such as climate change, disease eradication, and high seas overfishing. He is the author of *Environment and Statecraft: The Strategy of Environmental Treaty-Making and Why Cooperate? The Incentive to Supply Global Public Goods*, both published by Oxford University Press. For more information, see <http://www.globalpublicgoods.com>.

Edith Brown Weiss is Francis Cabell Brown Professor of International Law, Georgetown University Law, where she specializes in international environmental law. She is a Judge on the International Monetary Fund's Administrative Tribunal and member of UNEP's International Advisory Council for Advancement of Justice, Governance and Law. From 2003 – 2007, she was Chairperson (Vice President level) of the World Bank's Inspection Panel, which gives voice to poor communities, and formerly Associate General Counsel for International, U.S. Environmental Protection Agency. Prof. Brown Weiss served as President of the American Society of International Law (ASIL). She is on many international editorial boards, including American Journal International Law, Asian Journal International Law, Journal International Economic Law, and Max Planck Encyclopedia of Public International Law. She received the ASIL's Manley O. Hudson Medal, Elizabeth Haub Medal for Environmental Law (International Union for Conservation of Nature (IUCN) and Free University of Brussels), American Bar Association Award for Environmental Law and Policy, and ASIL Certificate of Merit for outstanding scholarship for her book *In Fairness to Future Generations*. Her most recent book is *International Law for a Water-Scarce World*. She will deliver the general course on public international law for The Hague Academy of International Law. She holds a B.A. degree, Stanford University, with Great Distinction, LL.B. (J.D.), Harvard Law School, Ph.D political science, University of California Berkeley, and doctorate *honoris causa*, Heidelberg University, Germany.

Yves Coppens was born in 1934 in Brittany. He has been trained in geology, zoology, botany (University of Rennes) and paleontology (doctoral degrees University of Paris, Sorbonne). His career, starting in 1956, has been conducted in different institutions, all of them in Paris, successively at the National Scientific Research Center (in the department of Vertebrate Paleontology and Human Paleontology of the Sorbonne and in the Institute of Paleontology of the National Museum of Natural History), at the Museum of Man (professor and deputy director in 1969, Director in 1979) before being appointed Chair of Anthropology of the National Museum of Natural History in 1980 and Chair of Paleoanthropology and Prehistory of the College de France in 1983. Yves Coppens is a member of many scientific institutions all over the world, the French Academy of Sciences, the French Academy of Medicine, the Royal Academy of Sciences, Literature and Fine Arts of Belgium, the Royal Academy of Medicine of Belgium, the Academia Europaea, the national Academy of Sciences of Rome, the Royal Anthropological Institute of Great

Britain and Ireland (honorary fellow), the Royal Society of South Africa (foreign associate), the Academy of Malagasy (associate) etc. Yves Coppens received numerous scientific awards from France (prix Edmond Hébert 1963 of the Academy of Sciences, prix André C. Bonnet 1969 of the Academy of Sciences, Grand prix Jaffé 1974 of the Academy of Sciences, Grand prix scientifique 1975 of the Foundation of France, silver medal 1982 of the Scientific Research Center, André Duveyrier medal 1989 of the society of Geography, prix 2008 of the Georges Pompidou Foundation, prix Agrippa d'Aubigné 2010), from Belgium (the Fourmarier medal 1975 of the Geological Society of Belgium, the Vandembroeck medal 1987 of the Belgian society of geology, paleontology and hydrology, the Chaos award 2009 of the University of Liege), from Italy (the Fabio Frassetto prize 2005 of the Academia dei Lincei, the Nonino prize 2007, the Andersen prize 2008), from Sweden (the Carl Gustaf Bernhard medal 1997 of the royal Academy of Sciences), from UNESCO (the Kalinga prize 1984) and so on. He received honorary doctorates from the Universities of Chicago, Bologne, Liège, Mons, and honorary citizenships of 29 towns (France and Marocco). His name has been given to an asteroid, and to institutions, universities, colleges, school, libraries, labs, promotion, streets and a Chair at the University of Recife (Brazil). He is Commandeur de la Légion d'Honneur, Grand Officier du Mérite, Commandeur des Palmes Académiques, Commandeur des Arts et des Lettres, Commandeur de l'Ordre du Mérite de la Principauté de Monaco, Officier de l'Ordre National du Tchad, etc. Yves Coppens is a field paleontologist; he has organized, led or co-lead many expeditions in tropical Africa (4 campaigns in Chad, 1960-1966, 10 campaigns in the lower Omo valley in Ethiopia, 1967-1976, 5 campaigns in the Afar desert in Ethiopia, 1972-1977), in Asia (Indonesia, the Philippines, China, Siberia, Mongolia), and many surveys in north and south Africa, the Middle East, south America as well as excavations in France etc. As a result of this field research, he collected tons of fossil vertebrates, hundreds of Hominids (he signed or co-signed 6 new Hominid taxa) and of course an impressive amount of data. His research focused on Vertebrate Paleontology (Proboscidiens, Hippos), their assemblages and their meaning in paleoenvironments, climates and biochronology, as well as on Paleoanthropology. He is renowned for his hypotheses showing the correlations between hominid evolution and the evolution of the environments (the *East side story* 10 million years ago was not geographically confirmed but the *(H) Omo event*, 2.7 million years ago was adopted worldwide). His lab has also pioneered important research on the functional anatomy of early hominid (demonstration of early double locomotion, bipedal and arboreal, of some of them, *Australopithecus afarensis* and *Orrorin tugenensis*). He authored or co-authored over a thousand of scientific papers and books. Professor Yves Coppens took part in workshops at the PAS in 1981 and 2010.

Gretchen Daily is Bing Professor of Environmental Science at Stanford University, where she also serves as Senior Fellow in the Woods Institute; Director of the Center for Conservation Biology; and co-founder and faculty director of The Natural Capital Project, an international partnership whose goal is to improve the well-being of people and the environment by mainstreaming the values of nature into important resource decisions globally. An ecologist by training, Daily's scientific research is on harmonizing biodiversity conservation, agriculture, and livelihoods; quantifying the production and value of ecosystem services; and new policy and finance mechanisms for integrating conservation and human development. Her efforts span fundamental research and policy-oriented demonstrations in over 30 nations worldwide. Daily currently serves on the boards of the Stockholm Resilience Centre and The Nature Conservancy. Her recent books include *The Power of Trees* (2012), *Natural Capital: Theory & Practice of Mapping*

Ecosystem Services (2011), and *The New Economy of Nature: The Quest to Make Conservation Profitable* (2002). For more information, please see www.naturalcapitalproject.org.

Juan Grabois, co-founder of the Excluded Workers Movement and Confederation of Popular Economy Workers. Graduated both as lawyer (UBA) and as social scientist (UNQ). Teaches State Theory at Buenos Aires University (UBA) and Professional Practice at the Argentine Catholic University (UCA). He serves on a voluntary basis as advocate and counsellor for labour cooperatives, waste picker organizations, recovered factories, street vendor associations, slum dwellers, peasant communities, social movements and workers' unions. He is married with three children.

Daniel Kammen is the Class of 1935 Distinguished Professor of Energy with appointments in the Energy and Resources Group, The Goldman School of Public Policy, and the Department of Nuclear Engineering at the University of California, Berkeley. Kammen directs the Renewable and Appropriate Energy Laboratory (RAEL) and the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley. During 2010–2011 Kammen served as the first Chief Technical Specialist for Renewable Energy and Energy Efficiency. Kammen is the author of over 300 peer-reviewed papers, 50 government reports, and has testified in front of the US House and Senate more than 40 times. He now serves as a Fellow of the U. S. State Department's Energy and Climate Partnership for the Americas (ECPA) and the Lead Scholar for the Fulbright NEXUS Program. Kammen is a coordinating lead author for the Intergovernmental Panel on Climate Change (IPCC) that shared the 2007 Nobel Peace Prize. Kammen's work is focused on developing the tools and implementing projects to design low-carbon energy, food, and land-use systems globally. He conducts field research on sustainable energy systems with Native American/First Peoples in North America, in East Africa, Central America, and in Southeast Asia. URL: <http://rael.berkeley.edu> & <http://kammen.berkeley.edu>

Charles F. Kennel is Distinguished Professor, Vice-Chancellor, and Director *emeritus* at the Scripps Institution of Oceanography at the University of California, San Diego. He was educated in astronomy and astrophysics at Harvard and Princeton. After a year at the International Centre for Theoretical Physics, Trieste, he joined UCLA's Department of Physics and its Institute for Geophysics and Planetary Physics. There he pursued research and teaching in theoretical space plasma physics and astrophysics, eventually chairing the Physics Department. He served as UCLA's Executive Vice Chancellor, its chief academic officer, from 1996 to 1998. From 1994 to 1996, Kennel was Associate Administrator at NASA and Director of its global Earth science satellite program. Kennel's experiences at NASA influenced him to go into Earth science, and he became the ninth Director of Scripps Institution of Oceanography, serving from 1998 to 2006. During winter terms 2007, 2010, 2012, and 2014, he was a Distinguished Visiting Fellow at Christ's College, Cambridge. He had visiting appointments with the Cambridge Department of Engineering in 2007, the Centre for Energy Studies of the Judge Business School in 2010, and with the Centre for Science and Policy in 2014.

Nancy Knowlton holds the Sant Chair in Marine Science at the Smithsonian's National Museum of Natural History. Her research centers on the diversity and conservation of life in the ocean, with a special focus on coral reefs. She received her BA at Harvard University *summa cum laude*, her PhD at the University of California at Berkeley, and was a NATO postdoctoral fellow at the University of Liverpool and Cambridge University. Later, she was a professor at Yale University, a scientist at the Smithsonian Tropical Research Institute in Panama, and Professor and founding Director of the Center for Marine Biodiversity and Conservation at the Scripps Institution of Oceanography. Past service included advisory positions with the National Geographic Society, the World Bank, the Cosmos Prize, and the Census of Marine Life. She was a past member of the editorial board of the Annual

Review of Marine Science, the National Board of the American Association for the Advancement of Science, the Pew Marine Fellows Advisory Committee, and the Savannah Ocean Exchange Board of Governors. She currently serves on the Sloan Research Fellowship in Ocean Sciences committee and the national board of the Coral Reef Alliance. She is an Aldo Leopold Leadership Fellow, winner of the Peter Benchley Prize and the Heinz Award, and author of *Citizens of the Sea*. In 2013 she was elected to the American Academy of Arts and Sciences and to the U.S. National Academy of Sciences.

Anil V. Kulkarni is working as Distinguished Visiting Scientist at Divecha Centre for Climate Change, Indian Institute of Science, Bangalore. He received his M. Tech. in Applied Geology from Indian Institute of Technology-Roorkee, MS in Geography from McGill University, Montreal, Canada and Ph. D. from Shivaji University, Kolhapur, India. He has worked for 30 years at Space Applications Center, Ahmedabad. His research interest are Snow and glacier investigations using remote sensing methods, glacier mass balance modeling, modeling influence of climate change on distribution of Himalayan snow and glacier extent and snow and glacier melt runoff modeling. Dr. Kulkarni has authored more than 130 peer-reviewed papers and scientific reports on reflectance of snow and ice, glacier inventory, mass balance, snow cover monitoring and runoff modeling. Dr. Kulkarni lead numerous expeditions to Himalayan glaciers and used modern techniques such as Ground Penetrating Radar, Laser Range Finder, GPS and Spectral radiometer for glacial studies. He lead a major investigation to map retreat of more than 2000 glaciers in Indian Himalaya. This investigation provided, for the first time, information about fragmentation of glaciers, loss in glacial area and about the impact of climate change on Himalayan cryosphere.

Marcia McNutt is a geophysicist who became the 19th Editor-in-Chief of *Science* in June 2013. From 2009 to 2013, Dr. McNutt was the Director of the U.S. Geological Survey, which responded to a number of major disasters during her tenure, including the Deepwater Horizon oil spill. For her work to help contain that spill, Dr. McNutt was awarded the U.S. Coast Guard's Meritorious Service Medal. She is a fellow of AGU, the Geological Society of America, AAAS and the International Association of Geodesy. Her honors and awards include membership in the National Academy of Sciences, the American Philosophical Society and the American Academy of Arts and Sciences, as well as honorary doctoral degrees from Colorado College, the University of Minnesota, Monmouth University and the Colorado School of Mines. Dr. McNutt was awarded the Macelwane Medal by AGU in 1988 for research accomplishments by a young scientist and the Maurice Ewing Medal in 2007 for her significant contributions to deep-sea exploration.

Naomi Oreskes is Professor of History and Science Studies at the University of California, San Diego, Adjunct Professor of Geosciences at the Scripps Institution of Oceanography, and an internationally renowned historian of science and author. Having started her career as a geologist, received her B.S. (1st class Honours) from the Royal School of Mines, Imperial College London, and then worked for three years as an exploration geologist in the Australian outback. She returned to the United States to receive an inter-disciplinary Ph.D. in geological research and history of science from Stanford University, in 1990. Professor Oreskes has lectured widely in diverse venues ranging from the Madison, Wisconsin Civics Club to the Air Force Research Laboratory, and has won numerous prizes, including, most recently the 2011 Climate Change Communicator of the Year. Professor Oreskes has a long-standing interest in understanding the establishment of scientific consensus and the role and character of scientific dissent. Her early work examined the 20th century transformation of earth science, in *The Rejection Continental Drift: Theory and Method in American Earth Science* (Oxford, 1999) and *Plate Tectonics: An Insider's History of the Modern Theory of the*

Earth (Westview, 2001). She has also written on the under-acknowledged role of women in science, discussed in the prize-winning paper “Objectivity or heroism? On the invisibility of women in science” (OSIRIS 11 (1996): 87-113); and on the role of numerical simulation models in establishing knowledge about inaccessible natural phenomena (Verification, validation, and confirmation of numerical models in the earth sciences,” *Science* 263 (1994): 641-646). For the past decade, Professor Oreskes has primarily been interested in the problem of anthropogenic climate change. Her 2004 essay “The Scientific Consensus on Climate Change” (*Science* 306: 1686) has been widely cited, both in the United States and abroad, including in the Royal Society’s publication, “A Guide to Facts and Fictions about Climate Change,” in the Academy-award winning film, *An Inconvenient Truth*, and in Ian McEwan’s novel, *Solar*. Her opinion pieces have appeared in *The Times* (London), *The Washington Post*, *The Los Angeles Times*, *Nature*, *Science*, *The New Statesman*, *Frankfurter Allgemeine*, and elsewhere. Her 2010 book, *Merchants of Doubt, How a Handful of Scientists Obscured the Truth on Issues from Tobacco to Global Warming*, co-authored with Erik M. Conway, was shortlisted for the Los Angeles Time Book Prize. Her current research projects include completion of a book on the history of Cold War Oceanography, *Science on a Mission: American Oceanography in the Cold War and Beyond* (Chicago, forthcoming), and *Assessing Assessments: A Historical and Philosophical Study of Scientific Assessments for Environmental Policy in the Late 20th Century*, funded by the National Science Foundation.

Janice Perlman is an independent consultant, researcher and program evaluator. Her areas of expertise include urbanization, informal communities and the inclusion of marginalized groups in the creation of diverse, vibrant and sustainable cities. Her most recent book, *Favela: Four Decades of Living on the Edge in Rio de Janeiro* (Oxford University Press, 2010; paperback, 2011) won the 2010 PROSE Award for best book of the year in two categories: “Excellence in the Social Sciences” and “Outstanding Contribution to the Field of Sociology and Social Work”. The book is based on a longitudinal panel study (1968-2008) of migrants and squatters over four generations. The Foreword is by former Brazilian President, Fernando Henrique Cardoso. For her work on this research, Dr. Perlman received a Guggenheim, two consecutive Fulbright Fellowships, and grants from The World Bank, The Tinker Foundation, The Ford Foundation and several bi-lateral agencies. Her earlier book, *The Myth of Marginality* (University of California Press, Berkeley, 1976) won the C. Wright Mills Award and changed thinking about informal communities worldwide. It was the first to show an insider’s view of life in these stigmatized communities. Published in Brazil as *O Mito da Marginalidade* (Editora Paz e Terra, 1977), it has been translated into over a dozen other languages. In 1987 Prof. Perlman founded The Mega-Cities Project; a global non-profit designed to shorten the lag time between ideas and implementation in urban problem solving. Now in its 25th year, Mega-Cities has identified, nurtured and transferred hundreds of scalable innovations among communities in the world’s largest cities. Perlman received the Global Citizens Award for this work. Its new initiative, Mega-Cities/Mega-Change (MC²) makes the transition to the next generation of urban leaders and technologies. Perlman’s interest in linking global sustainability with urban environmental regeneration, poverty alleviation and social inclusion led her to serve as Coordinator of the Neighborhoods Task Force of National Urban Policy; Director of Strategic Planning for the NYC Partnership; Director of Science, Technology and Public Policy at the New York Academy of Sciences; external evaluator for the Gates and Kellogg Foundations and board member on many organizations. She is a longstanding member of the Council on Foreign Relations and consults for the World Bank, UN-Habitat, CHF International and many foundations and non-profit organizations. In her academic career, Perlman was a tenured professor in the Department of City and Regional Planning at the University of California, Berkeley. Since then

she has taught at Columbia University, New York University, Trinity College, the University of Paris, the Federal University of Rio de Janeiro, the Getulio Vargas Foundation and the Brazilian Institute of Public Administration. Among her most quoted publications are: “Misconceptions about the Urban Poor and the Dynamics of Housing Policy Evolution” (JPER, first winner of the Chester Rapkin Award), “A Dual Strategy for Deliberate Social Change in Cities” (International Journal of Urban Policy Planning) and “Grassrooting the System” (Social Policy). Perlman holds a BA in Anthropology and Latin American Studies from Cornell University and a PhD in Political Science and Urban Studies from MIT.

Charles Perrings is a Professor of Environmental Economics at Arizona State University, where he directs the Ecoservices Group—a research (and research training) group that focuses on ecosystem services. Previous appointments include professorships at the University of York and the University of California, Riverside. He was for several years vice-chair of the international biodiversity science research program, DIVERSITAS, and more recently represented the International Council of Science in negotiations with national governments to establish the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). He was also a member of the US Presidents Council of Advisors on Science and Technology (PCAST) working group on biodiversity and ecosystem services. He was the founding editor of the Cambridge University Press journal, *Environment and Development Economics*, and is Past President of the International Society for Ecological Economics. He has published 13 books and edited volumes and around 150 scientific papers in this field.

Óscar Andrés Cardinal Rodríguez Maradiaga, SDB (born December 29, 1942) is a Honduran Cardinal of the Roman Catholic Church. He is the current Archbishop of Tegucigalpa, President of *Caritas Internationalis* and was President of the Latin American Episcopal Conference (CELAM) from 1995 to 1999. Rodríguez was elevated to the cardinalate in 2001. He entered the religious life, and joined the Salesians on May 3, 1961. He was ordained a priest on July 28, 1970. On October 28, 1978, Rodríguez was named auxiliary bishop of Tegucigalpa and titular bishop of *Pudentiana*. Archbishop Rodríguez was created Cardinal Priest of *Maria della Speranza* by Pope John Paul II in the consistory of February 21, 2001. He is the first cardinal from Honduras. He is currently the President of the Episcopal Conference of Honduras. Rodríguez was one of the cardinal electors who participated in the 2005 papal conclave that selected Pope Benedict XVI. Cardinal Rodríguez was elected on 5 June 2007 as the new *Caritas Internationalis* President by the Caritas Confederation members at their 18th General Assembly in Vatican City. As its President, he is the global representative of the Caritas Confederation for the next four years.

Jeffrey D. Sachs is the Director of The Earth Institute, Quetelet Professor of Sustainable Development, and Professor of Health Policy and Management at Columbia University. He is Special Advisor to United Nations Secretary-General Ban Ki-moon on the Millennium Development Goals, having held the same position under former UN Secretary-General Kofi Annan. He is Director of the UN Sustainable Development Solutions Network. He is co-founder and Chief Strategist of Millennium Promise Alliance, and is director of the Millennium Villages Project. Sachs is also one of the Secretary-General’s MDG Advocates, and a Commissioner of the ITU/UNESCO Broadband Commission for Development. He has been named one of *Time Magazine*’s “100 Most Influential People in the World” twice, in 2004 and 2005 and has authored three New York Times bestsellers in the past seven years: *The End of Poverty* (2005), *Common Wealth: Economics for a Crowded Planet* (2008), and *The Price of Civilization* (2011). His most recent book is *To Move the World: JFK’s Quest for Peace* (2013). Professor Sachs is widely considered to be one of the world’s leading experts on economic development and the fight against poverty. His work on ending poverty, promoting

economic growth, fighting hunger and disease, and promoting sustainable environmental practices, has taken him to more than 125 countries with more than 90 percent of the world's population. For more than a quarter century he has advised dozens of heads of state and governments on economic strategy, in the Americas, Europe, Asia, Africa, and the Middle East. Sachs is the recipient of many awards and honors, including membership in the Institute of Medicine, the American Academy of Arts and Sciences, Harvard Society of Fellows, and the Fellows of the World Econometric Society. Professor Sachs is also a frequent contributor to major publications such as the Financial Times of London, the International Herald Tribune, Scientific American, and Time magazine. Prior to joining Columbia, Sachs spent over twenty years at Harvard University, most recently as Director of the Center for International Development and the Galen L. Stone Professor of International Trade. A native of Detroit, Michigan, Sachs received his B.A., M.A., and Ph.D. degrees at Harvard.

Hans Joachim Schellnhuber is director of PIK since the institute's foundation in 1991 and Professor for Theoretical Physics at Potsdam University since 1993. He is a member of numerous national and international panels for scientific strategies and policy advice on environment & development matters like the German National Academy of Sciences (Leopoldina), the US National Academy of Sciences and the Max Planck Society and of the Editorial Boards of several scientific journals like "Proceedings of the National Academy of Sciences". Schellnhuber is Chairman of the German Advisory Council on Global Change (WBGU) and also a longstanding member of the IPCC. As a member of the High Level Expert Group he also advises the President of the European Commission, José Manuel Barroso, on energy and climate change issues. He authored and co-authored about 210 articles and more than 40 books in the fields of condensed matter physics, complex systems dynamics, climate change research, Earth System analysis, and sustainability science. In 2004, he was awarded the title 'Commander of the Most Excellent Order of the British Empire' (CBE) by Queen Elizabeth II. In 2007, he received the German Environment Prize for his scientific work in the field of climate impact research and its dissemination to politicians and the public and in 2008 he was awarded the Order of Merit of the State of Brandenburg.

Bob Scholes is a systems ecologist, employed at the Council for Scientific and Industrial Research in South Africa, where he is Research Group Leader for Global Change and Ecosystem Dynamics. He has worked on various aspects of Global Change – particularly on how African savannas interact with the global carbon cycle – for over two decades. He has been a Lead Author for the Intergovernmental Panel on Climate Change in its third, fourth and current (fifth) assessments, and was co-chair of the Conditions and Trends Working Group of the Millennium Ecosystem Assessment. He is on the board of the South African National Space Agency and is a former board member of the South African National Parks and the World Agroforestry Centre. He was one of the designers of the Global Earth Observation System of Systems, the chair of the GEO Biodiversity Observation Network, and a member of the Commission on Sustainable Agriculture and Climate Change.

Achim Steiner is Executive Director of the United Nations Environment Programme. From March 2009 to May 2011, he was also Director-General of the United Nations Office at Nairobi (UNON). Before joining UNEP, Mr. Steiner served as Director General of the International Union for Conservation of Nature

(IUCN) from 2001 to 2006, and prior to that as Secretary General of the World Commission on Dams. His professional career has included assignments with governmental, non-governmental and international organizations in different parts of the world including India, Pakistan, Germany, Zimbabwe, USA, Vietnam, South Africa, Switzerland and Kenya. He worked both at grassroots level as well as at the highest levels of international policy-making to address the interface between environmental sustainability, social equity and economic development. Mr. Steiner, a German and Brazilian national, was born in Brazil in 1961. His educational background includes a BA from the University of Oxford as well as an MA from the University of London with specialization in development economics, regional planning, and international development and environment policy. He also studied at the German Development Institute in Berlin as well as the Harvard Business School.

Jeffrey R. Vincent is the Clarence F. Korstian Professor of Forest Economics and Management in the Nicholas School of the Environment and Sanford School of Public Policy at Duke University. Prior to joining Duke, he held positions in the Graduate School of International Relations & Pacific Studies at the University of California, San Diego; the Institute for International Development at Harvard University; and the Department of Forestry at Michigan State University. Vincent's research focuses on the economics of natural resources and the environment in developing countries, with a primary focus on Asia. He received the 2006 Cozzarelli Prize for the best article in applied biological, agricultural, and environmental sciences published in the *Proceedings of the U.S. National Academy of Sciences* and the 2003 McKinsey Award for the most significant article published in the *Harvard Business Review*. He has a Ph.D. from Yale University, an M.S. from Michigan State University, and an A.B. from Harvard University.

Peter Wadhams is head of the Polar Ocean Physics Group and is UK's most experienced sea ice scientist, with 40 years of research in sea ice and ocean processes in the Arctic and the Antarctic. He is Professor of Ocean Physics and is the author of numerous publications on dynamics and thermodynamics of sea ice, sea ice thickness, waves in ice, icebergs, ocean convection and kindred topics. The current main topics of research in his group are sea ice properties, dynamics and distributions in thickness and concentration. He has led 462 research expeditions to the polar seas and has worked extensively from Arctic submarines, most recently, in 2007 on board of HMS Tireless, using multibeam sonar to measure ice topography. He was a pioneer in the use of autonomous underwater vehicles AUVs under sea ice, with successful missions using Maridan, Autosub II and Gavia vehicles. He was coordinator of the EU FP5 GreenICE and CONVECTION projects and is currently on the Steering Committee of EU FP7 ACCESS and a new project called ICE-ARC dealing with the economic impact of Arctic climate change. 6 DAMOCLES Until the end of 2012 he was on the Scientific Committee of the European Environment Agency. In 1990 he received the Italgas Prize for Environmental Sciences, and he has also been awarded the Polar Medal (UK) and the Bruce Prize of the Royal Society of Edinburgh. As well as being Professor at Cambridge he is an Associate Professor at the Laboratoire d'Océanographie de Villefranche, run by Université Pierre et Marie Curie, Paris.

For the biographies of the other Academicians of the PAS and PASS see www.pas.va and www.pass.va

HOLY MASSES (4-5-6 May 2014)		
Sunday 4 May 2014 h. 16:00	Monday 5 May 2014 h. 8:00 a.m.	Tuesday 6 May 2014 h. 8:00 a.m.
Casina's Chapel	Altar Tomb of St Peter	St Stephen of the Abyssinians
H.E. Msgr. Marcelo Sánchez Sorondo	Cardinal Beniamino Stella	H.E. Msgr. Egon Kapellari

MEMORANDUM

1) From 2 to 6 May the buses for the **Academicians and the Speakers** will leave the hotels as follows:

Domus Sanctae Marthae-Casina Pio IV-Domus Sanctae Marthae	
Friday 2 May	h. 8.45 a.m. h. 8.00 p.m.
Saturday 3 May	h. 8.15 a.m. h. 9.30 p.m.
Sunday 4 May	h. 3.45 p.m. h. 8.30 p.m.
Monday 5 May	h. 8.45 a.m. h. 9.30 p.m.
Tuesday 6 May	h. 8.45 a.m. h. 8.30 p.m.

Hotel Columbus-Casina Pio IV-Hotel Columbus	
Friday 2 May	h. 8.30 a.m. h. 8.00 p.m.
Saturday 3 May	h. 8.00 a.m. h. 9.30 p.m.
Sunday 4 May	h. 3.30 p.m. h. 8.30 p.m.
Monday 5 May	h. 8.30 a.m. h. 9.30 p.m.
Tuesday 6 May	h. 8.30 a.m. h. 8.30 p.m.

Casa per Ferie i Cappuccini-Casina Pio IV-Casa per Ferie i Cappuccini	
Friday 2 May	h. 8.30 a.m. h. 8.00 p.m.
Saturday 3 May	h. 8.00 a.m. h. 9.30 p.m.
Sunday 4 May	h. 3.30 p.m. h. 8.30 p.m.
Monday 5 May	h. 7.30 a.m. (for those who wish to attend the Holy Mass) h. 8.30 a.m.
Tuesday 6 May	h. 7.30 a.m. (for those who wish to attend the Holy Mass) h. 8.30 a.m. h. 8.30 p.m.

2) **Lunch and dinner for the Speakers and Academicians** will be served at the Academy. If you are a vegetarian, please let us know as soon as possible.

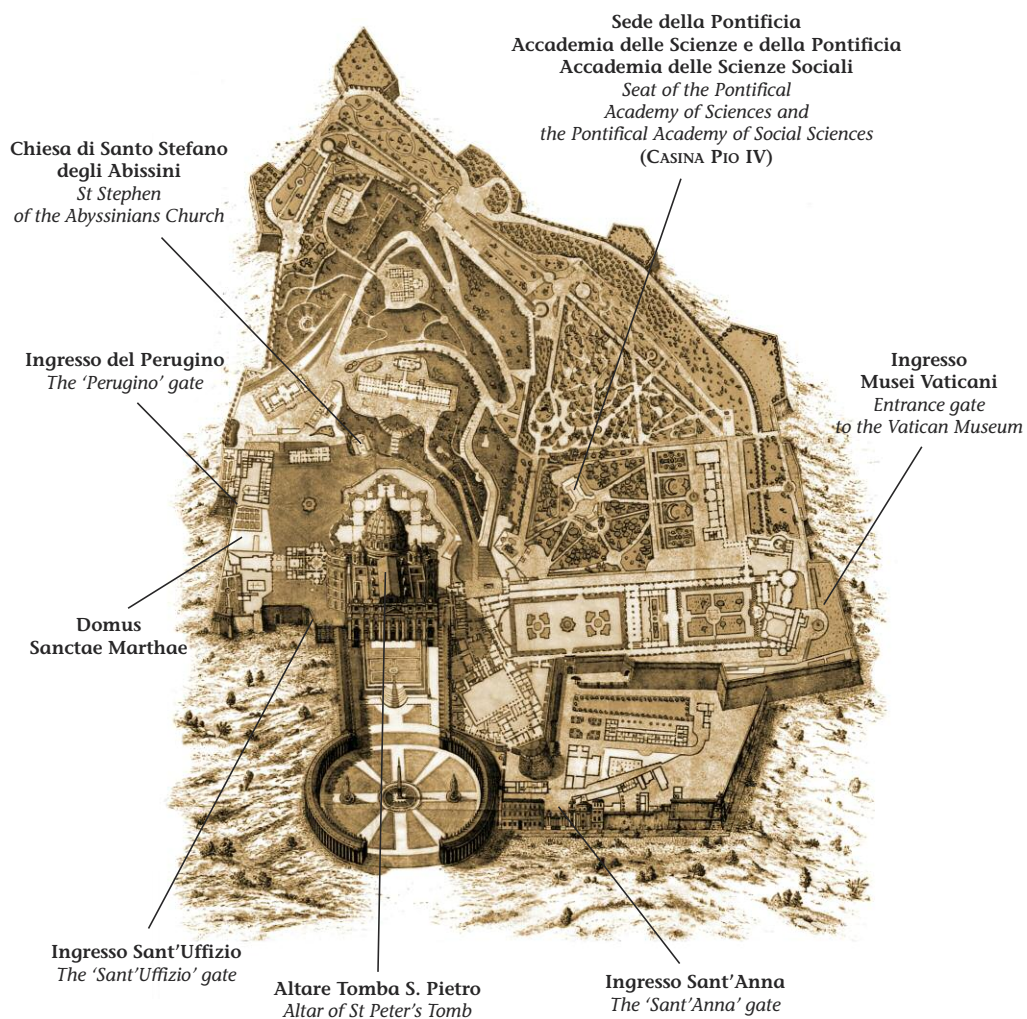
3) **Lunch for the Observers.** Observers may have lunch at the Vatican canteen, for 15 euros per meal. Those who are interested are kindly requested to purchase their tickets from the Secretariat on 2 May during the first coffee break. A bus will accompany them to the canteen and back.

4) **Wifi** is available in the Casina Pio IV's Conference Hall. Please log in to the network called WLAN_PADS using "guest" as the username and "password" as the password.

5) **Cable internet access** is available at the Domus Sanctae Marthae for 3.00 euros per day.

Note for the Speakers/Academicians:

Please give your form for the refunding of expenses to the Secretariat as soon as possible so that you can be refunded immediately.



THE PONTIFICAL ACADEMY OF SCIENCES
AND
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For further information please visit:
www.pas.va • www.pass.va

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