



cg ee



A drylands call for action

Declaration of Fortaleza

Centro de Gestão e Estudos Estratégicos  
*Ciência, Tecnologia e Inovação*

Center for Strategic Studies and Management  
*Science, Technology & Innovation*





# A drylands call for action

---

Declaration of Fortaleza



cgée

Brasília – DF  
2011

ISBN 978-85-60755-41-7

© Center for Strategic Studies and Management (CGEE)

---

*Social organization supervised by the Brazilian Ministry of Science, Technology and Innovation - MCTI*

**President**

*Mariano Francisco Laplane*

**Executive Director**

*Marcio de Miranda Santos*

**Directors**

*Antonio Carlos Filgueira Galvão*

*Fernando Cosme Rizzo Assunção*

*Gerson Gomes*

**Edition** / *Tatiana de Carvalho Pires*

**Front cover** / *Anna Carolina*

**Diagramation** / *Marjorie Amy Yamada*

**Graphic Designer** / *Eduardo Oliveira*

P474

A DRYLANDS CALL FOR ACTION: The Declaration of Fortaleza. 2011.  
Brasília: Center for Strategic Studies and Management-CGEE.

190 p: il. ; 24 cm.  
ISBN 978-85-60755-41-7

1. Climate and drylands. Sustainable Development of Drylands. Semi-arid. Desertification. Adaptation to Climate Change. ICID+ 18. DRYLANDS CALL FOR ACTION: The Declaration of Fortaleza. Centro de Gestão e Estudos Estratégicos. Ministério da Ciência, Tecnologia e Inovação.

CDU 323.6(81)(05)

Center for Strategic Studies and Management (CGEE)  
SCN Qd 2, Bl. A, Ed. Corporate Financial Center, Room 1102  
70712-900, Brasília, DF

This publication is part of the activities carried out under the CGEE Management Agreement - 17 Addendum / Action: Support to II ICID 2010 - International Conference - Climate, Sustainability and Development in Semi-arid Regions - 52.8.1/MCT/2010.

The content of this publication may be copied, distributed, stored, or transferred in any form provided the source is appropriately cited as Center for Strategic Studies and Management (CGEE).  
Print in 2011.



# A drylands call for action

---

## Declaration of Fortaleza

### **Supervision**

Antonio Carlos Filgueira Galvão

### **Director of ICID+18**

Antonio Rocha Magalhães

### **Technical team**

Betina Ferraz

Carmem Silvia Corrêa Bueno

José Roberto de Lima

Luis Eduardo Montenegro Castelo

### **Support**

Amanda Caldas Porto

### **Declaration working group**

John Redwood, coordinator

## Superior Council

Cid Ferreira Gomes, Governor of Ceará, Brazil  
Ahmed Djoghlaif, Executive Secretary, UNCBD, Canada  
Enrique Iglesias, Secretary General, Ibero-American Secretariat, Spain  
Eduardo Henrique Accioly Campos, Governor of Pernambuco, Brazil  
Francisco José Pinheiro, Vice Governor of Ceará, Brazil  
Gilberto Câmara, Director, INPE, Brazil  
José Machado, Executive Secretary, Ministry of Environment, Brazil  
Luc Gnacadja, Executive Secretary, UNCCD,  
Lúcia Carvalho Pinto de Melo, President, CGEE, Brazil  
Luis Antônio Elias, Executive Secretary, MCT, Brazil  
Marco Farani, Director, ABC, Brazil  
Marcio Pochman, President, IPEA, Brazil  
Michel Laurent, President, IRD, France  
Roberto Macedo, President, FIEC, Brazil  
Roberto Smith, President, BNB, Brazil  
Vicente Andreu, President, ANA, Brazil  
Wellington Dias, Governor of Piauí, Brazil

## Scientific Committee

Jesse Ribot, SDEP, University of Illinois, USA  
Antonio Carlos Filgueira Galvão, CGEE, Brazil  
Antonio Divino Moura, INMET, Brazil  
Antonio Rocha Magalhães, ICID+18, Brazil  
Arun Agrawal, University of Michigan, USA  
Carlos Fernandez-Jauregui, WASA-GN, Spain  
Carlos Nobre, INPE, Climate Network, Brazil  
Cynthia Rosensweig, NASA, USA  
Dalvino Trocoli Franca, ANA, Brazil  
Daniel Bradley, DfID, Brazil  
Dirceu Silveira Reis Jr, FUNCEME, Brazil  
Donald Nelson, University of Georgia, USA  
Donald Wilhite, Nebraska University, USA  
Eduardo Sávio Martins, FUNCEME, Brazil  
Edward Bresnayan, World Bank, Brazil  
Elisio Contini, Embrapa, Brazil  
Francisco de Assis Melo Lima, CETREDE, Brazil  
Graham Haylor, DfID/DewPoint, UK  
Jean Loup Guyot, IRD, Brazil  
José Almir Cirilo, Secretariat of Water Resource Pernambuco, Brazil  
José Aroudo Mota, IPEA, Brazil  
José Sydrião Alencar, BNB, Brazil  
Jurgen Schmandt, HARC, USA  
Lisa Schipper, SEI, Thailand  
Liana Caleial, IPEA, Brazil  
Maria Carmem Lemos, University of Michigan, USA  
Marcel Bursztyn, CDS-UNB, Brazil  
Martin Parry, Imperial College, UK

Meiry Sayuri Sakamoto, FUNCEME, Brazil  
Michael Glantz, INSTAAR, University of Colorado, USA  
Monirul Mirza, Env. Canada and University of Toronto, Canada  
Neil Adger, Tyndal Centre, UK  
Tânia Bacelar, CEPLAN, Brazil  
Tim Finam, University of Arizona, USA

## Organisation Committee

Antonio Rocha Magalhães, Director of ICID, Brazil  
Renê Teixeira Barreira, Secretary of Science and Technology, Ceara, Brazil  
Adriana M. Moura, IPEA, Brazil  
Aidil de Carvalho M. B. Borges, Ministry of Education and Sport, Cape Verde  
Albert Brasil Gradvohl, DNOCS, Brazil  
Betina Ferraz, ICID/CGEE, Brazil  
Bruno Pagnoccheschi, ANA, Brazil  
Carmen Sílvia Corrêa Bueno, CGEE, Brazil  
Daniel Bradley, DFID, Brazil  
Eduardo Sávio Martins, FUNCEME, Brazil  
Edward Bresnayan, World Bank, Brazil  
Egon Krakhecke, Ministry of Environment, Brazil  
Habib Jorge Fraxe Neto, IPEA, Brazil  
Heitor Matallo, UNCCD, México  
Jean-Loup Guyot, IRD - Institute of Research for Development, Brazil  
Jesse Ribot, SDEP, University of Illinois, USA  
José Narciso Sobrinho, BNB/ETENE, Brazil  
José Roberto de Lima, Ministry of the Environment, Brazil  
Meiry Sayuri Sakamoto, FUNCEME, Brazil  
Ricardo Correia, CETREDE/UFC, Brazil  
Roberto Germano Costa, INSA, Brazil  
Rogério Barros, Unifor, Brazil

## Secretariat

Antonio Rocha Magalhães, Director of ICID  
Carmen Sílvia Corrêa Bueno, CGEE  
Betina Ferraz, Technical Advisor  
Amanda Caldas Porto, Assistant  
José Roberto de Lima, Ministry of the Environment  
Luis Eduardo Montenegro Castelo, Advisor

## IT Team

Robson Franklin, Website manager  
Aurélio Wildson, Developer  
Ramon Siebra, Developer  
Alex Araujo, CGEE

## Events Company

Micheline Carmarço, Director *IKONE*

## Preface

---

In 1992, I had the opportunity to participate in the first ICID, the International Conference on Impacts of Climate Variation and Sustainable Development in Semi-arid Regions, which took place in Fortaleza. The Brazilian sponsors and organizers intended that Conference to be a contribution to the Rio 92 Summit. I was impressed by the scientific level of the discussions that involved participants from all over the world and the major international organizations. That Conference confirmed my sentiment that it was necessary to pay more attention to the special conditions of the drylands of Brazil and of the world. I had already devoted part of my time as a researcher in the climate arena doing work in Northeast Brazil, which contains a large semi-arid region. I helped in the development of the first seasonal forecasts for rainfall in NE Brazil and could witness its initial uses to guide rainfed, subsistence agriculture in the drylands. The ICID 92 Conference helped me to understand that climate is only one of the variables that affect the lives of people living in the drylands. In fact, as was one of the conclusions of ICID 92, the drylands should be looked from a perspective of sustainable development that included the social, environmental and economic dimensions.

Since then, I have followed up more closely on the discussions that involved the drylands, including Brazilian and international initiatives, like the creation of the United Nations Convention to Combat Desertification, the UNCCD. Then, in 2010, I was glad to participate in the Second ICID, the International Conference on Climate, Sustainability and Development in Semi-arid Regions, known as ICID + 18, because it happened 18 years after the first ICID. I was again impressed by the level and quality of attendance of the Conference. Considering that it was not an official UN Conference, I thought of what drivers pushed such a wide and committed group of scientists and policy makers to go to Fortaleza again and to try to update the discussions on the drylands and to offer a contribution to the Rio + 20 Conference.

In fact, as this volume documents, the drylands are important in all aspects: land area, population, social, economic and environmental dimensions. Most of the world poverty is concentrated in the drylands. The social impacts of climate change will be more serious in the drylands, because that is where social vulnerability is highest. However, in comparison with other areas of the world, they lack attention from international and even national policymakers. That is why, in the Ministry of Science, Technology and Innovation of Brazil, we want to strengthen research and knowledge

about the drylands, including the development of new networks of scientists and policymakers and international south-south and tri-partite cooperation. The needed transition to a green economy is an additional driver to search for new development paradigms for the drylands. This volume is an important contribution to the objective of raising the stakes in regard to the drylands.

**Carlos Afonso Nobre**  
Research Secretary  
Ministry of Science, Technology and Innovation  
Brasilia, Brazil

# Index

---

Presentation	9
Acknowledgements	12
Message from Ban Ki-Moon, United Nations Secretary General	15
Launch of the decade of deserts and fight against desertification	17
<b>Part I. A Drylands Call for Action</b>	<b>23</b>
1. Executive summary	25
2. Declaration of Fortaleza	28
<b>Part II. Opening Ceremony</b>	<b>35</b>
1. Antonio Rocha Magalhães, Director of ICID+18	37
2. Luc Ganadja, Executive Secretary of the Convention to Combat Desertification (UNCCD)	40
3. Message from Christiana Figueres, Executive Secretary of the Convention on Climate Change (UNFCCC)	44
4. Message from Ahmed Djoghlaif, Executive Secretary of the Convention on Biological Diversity (UNCBD)	47
5. Alan Charlton, Ambassador of the United Kingdom	49
6. Michel Laurent, President of the Institute of Research for Development, France (IRD)	52
7. José Machado, Vice Minister of Environment, Brazil	55
8. Cid Ferreira Gomes, Governor of the State of Ceará, Brazil	58
<b>Part III. Keynote Presentations</b>	<b>61</b>
1. Jeffrey Sachs, Earth Institute, University of Columbia, USA	63
2. Ignacy Sachs, Research Center on Contemporary Brazil, France	80
3. Jesse Ribot, SDEP, University of Illinois, USA	87

<b>Part IV. Summary Reports of Selected Sessions</b>	<b>97</b>
1. Synergies among the Rio conventions	99
2. Latin American and the Caribbean dialogue table: sustainable development in drylands	103
3. África: climate, sustainability and development in semi-arid regions	108
4. Parliamentary dialogue – ICID+18	112
5. Platform on social technologies	119
<b>Part V. Concluding Remarks: the Drylands and the Rio+20</b>	<b>125</b>
<b>Annexes</b>	
1. List of Acronyms	133
2. Conference Program	137
1. Plenaries	139
2. Panels and Roundtables	142
3. Poster sessions	177
4. Dialogue tables	188



## Presentation

---

The **Second International Conference on Climate, Sustainability and Development in Semi-arid Regions, the ICID+18**, was held in Fortaleza, state of Ceará, Brazil, from 16th to 20th August, 2010. It was organized by the Center for Strategic Studies and Management (CGEE), a social organization linked to the Brazilian Ministry of Science and Technology, at that time presided by Mrs. Lucia Carvalho Pinto de Melo, who supervised CGEE's initiative. ICID resulted from an ample effort that involved the sponsorship of the Government of the State of Ceará, the Ministry of Environment, the Ministry of Science and Technology, the Ministry of National Integration and the Bank of the Northeast of Brazil, and the support from numerous organizations, national and international, such as the DfID, the IRD, the World Bank, the IADB, the National Confederation of Industries (CNI/FIEC), the University of Illinois (SDEP) and many others.

ICID+18 involved the participation of scientists and policymakers from governments, international organizations, civil society, academia and the private sector from 80 countries representing all continents and dryland regions of the world. It took two years for its organization and involved the partnership of many institutions, government and non-government, around the world.

Why to do such an effort? The Drylands of the world represent 40% of the planet's land surface and 30% of the world's population, about 2 billion people. Most of the poverty of the world is concentrated in the dryland regions of Africa, Asia and Latin America. To tackle the problems of the drylands is directly related to a commitment with the Millennium Development Goals (MDG), especially in regard to reducing poverty, illiteracy and environmental degradation. And, according to the IPCC and other studies, these are the regions that will be most adversely affected by climate change.

In 1992, the first ICID was instrumental to support the creation of the United Nations Convention to Combat Desertification and Mitigate the Effects of Droughts, the UNCCD. During the last 18 years, there was important institutional improvement, both at the international and national levels. We have now the UNCCD and the two other Rio Conventions, the UNFCCC and the UNCBD, and certainly there is more awareness in regard to the environmental problems of degradation and desertification, as well as with the impacts of climate variability and change. Notwithstanding these improvements, these regions still lack priority, investments and support to their sustainable development. The peoples

that inhabit these regions lack voice and means to promote their development in a sustainable way. The UNCCD, the Convention to Combat Desertification, is the UN Convention that attracts the least support from governments and international organizations.

The decision to hold another ICID and convene peoples and institutions concerned with the fate of the drylands was again an attempt to call the attention of the decision and opinion makers of the world to the challenges and potentialities of these regions. A new world summit, the *UN Conference on Sustainable Development (UNCSD)* known as the *Rio+20*, will be held in Rio de Janeiro in June 2012. The ICID+18 is a contribution of its participants and its promoters to the Rio+20, and a clear objective of ICID is to contribute to strengthen the agenda of the Rio+20 in regard to issues concerning the drylands. The participants in the ICID + 18 expect that not only there will be more space in the Rio+20 agenda devoted to the drylands, but also there will be more commitment from governments and organizations to create and strengthen instruments to effectively support sustainable development in these regions.

In this publication, CGEE is proud to bring to a broader audience of policy makers, scientists, government and non-government representatives, a selection of key documents presented at the ICID or prepared by its participants. Together with the Declaration of Fortaleza, which brings a call for action in the drylands, we have included the statements made by the UN Secretary General, Ban Ki-moon, the Executive Secretary of the UNFCCC, Christiana Figueres, the Executive Secretary of the UNCBD, Ahmed Djoghlaif, and the statement of the Executive Secretary of the UNCCD, Luc Gnacadja. We also include the keynote speech by Professor Jeffrey Sachs, and special presentations by Professors Ignacy Sachs and Jesse Ribot. The booklet also includes words from the Governor of the host state, Mr. Cid Gomes and other authorities that participated in the Conference.

We hope that this publication, containing highlights of the ICID+18 and specially the Declaration of Fortaleza, will be useful to all of us who have a commitment with the well-being of the peoples that inhabit the arid, semi-arid and subhumid lands of the world. The messages contained in the documents published here may inspire decisions and concrete actions that in the end will help to reduce social, environmental and economic vulnerability in the drylands, and to increase prospects for sustainable development for the benefit of their populations.

**Antonio Carlos Filgueira Galvão**  
Director, CGEE

**Mariano Francisco Laplane**  
President, CGEE



**ICID** <sup>+18</sup>  
2 0 1 0

## Acknowledgements

---

Many individuals and organizations contributed to make this book happen, In the first place, I want to thank the promoters and supporters of the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions (ICID+18), which took place in Fortaleza, Brazil, from 16th to 20th August, 2010. They were many, but here I want to highlight the enthusiastic contribution of the Governor of the State of Ceará, Cid Ferreira Gomes; the Minister of Environment of Brazil, Izabella Teixeira; the then Minister of Science and Technology of Brazil, Sérgio Rezende; the then President of the Bank of Northeast of Brazil, Roberto Smith; the former President of CGEE – Center for Management and Strategic Studies, Lúcia Carvalho Pinto de Melo; the President of FIEC – Federation of Industries of Ceará, Roberto Proença de Macedo; the President of IRD – Institute of Research of France, Michel Laurent; and the Executive Secretary of UNCCD – United Nations Convention to Combat Desertification, Luc Gnacadja.

Many other persons and institutions were active contributors to ICID+18, including the Ministry of Integration of Brazil, the DfID – Department for International Development, of the United Kingdom, the World Bank, the Inter-American Development Bank, several organizations of the United Nations System, including the UNFCCC, UNCBD, ECLA, UNEP and UNDP; the IISD – International Institute of Sustainable Development; the IICA – Inter-American Institute of Cooperation for Agriculture; the INSA – Institute of the Semi-arid; the Embrapa – Agricultural Research Company of Brazil; the Academy, including several universities and research centers in Brazil and in other countries, and many others. A complete list can be seen in the conference program, included as an annex to this volume.

A special thanks to the authors who took their precious time to come to ICID+18 and share their thoughts, concerns, hopes and recommendations with all participants. Together, their contribution represents an important resource for all countries and international and national institutions which have a stake on the sustainable development of the drylands of the world, especially in this moment where our hopes are targeting the Rio+20 Summit in June 2012.

I also want to thank my colleagues at the ICID+18 Secretariat for their dedications and hard work: Betina Ferraz, José Roberto de Lima, Carmem Bueno, Luis Eduardo Castelo, Eduardo Martins (Funceme) and Jesse Ribot (University of Illinois-SDEP); my colleagues at the CGEE, especially Tatiana



Pires and Eduardo Oliveira, for helping with the preparation of this volume; and, last but not least, my wife Fatima for her patience, enthusiasm and continuous support.

It is my sincere hope that this book will inspire decision makers of the Rio+20 to make the right decisions for benefiting the sustainable development of the drylands of the world.

**Antonio Rocha Magalhães**  
Director of ICID+18, CGEE





## Ban Ki-Moon, United Nations Secretary General

Message to the Second International Conference on Climate, Sustainability and Development in Semi-Arid Regions on the Launch of the UN Decade for Deserts and the Fight against Desertification

Ban Ki-Moon



It gives me great pleasure to send greetings to the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions.

More than 2 billion people live in the world's drylands. The vast majority live on less than one dollar a day and without adequate access to freshwater. Almost three-quarters of rangelands show various symptoms of desertification. Continued land degradation — whether from climate change, unsustainable agriculture or poor management of water resources — is a threat to food security, leading to starvation among the most acutely affected communities and robbing the world of productive land.

Land degradation also poses growing social costs. Increased competition for depleted dryland resources can generate localized conflict and broader tensions. The forced migration of millions of people creates the risk of social breakdown in the traditional lands they leave behind and instability in the increasingly crowded urban areas to which they go in search of jobs, shelter and services.

These are formidable challenges. But they are not intractable. Across the globe, efforts to rehabilitate drylands are showing results. By providing sustained assistance to local communities, we can preserve or recover millions of hectares of land, reduce vulnerability to climate change and alleviate hunger and poverty for one-third of humanity.

Desertification and land degradation are global problems that require a global response. As we begin the Decade for Deserts and the Fight Against Desertification, let us pledge to intensify our efforts to nurture the land we need for achieving the Millennium Development Goals and guaranteeing human well-being. Please accept my best wishes for a successful conference.



## Launch of Decade for Deserts and the Fight against Desertification

August, Fortaleza, Brazil, 16 August 2010



Foto: ICID+18

The **United Nations Decade for Deserts and Desertification** was launched in Fortaleza, Brazil, during the Second International Conference: Climate, Variability, Sustainability and Development, ICID+18. In 2007, the United Nations General Assembly declared 2010-2020 the UN Decade for Deserts and the Fight against Desertification. The Decade is designed to heighten public awareness about the threat desertification, land degradation and drought pose to sustainable development and ways leading to their alleviation.

Speaking during the ceremony in Fortaleza, Luc Gnacadja, Executive Secretary of the Convention said the international community is at a cross-roads. “The path of business-as-usual will worsen the speed of degradation with devastating impacts on livelihoods, families and communities,” adding that the alternative path “is the one that will embrace and undertake the formidable challenges of sustainability implying that we choose to channel our collective action towards it.”

Highlighting the special history between the Convention and the ICID Conferences, which in the 1990s contributed to the creation of the Convention and was now the launching pad of the Decade, Mr. Gnacadja called on the participants, as stakeholders to the issue, to take the vision of the Decade and lead so that by 2020, land issues move “higher on national and global development agendas; with drylands viewed as assets and not liabilities in the global vision of sustainability, and a prerequisite for achieving the Millennium Development Goals (MDGs).”

## Signing of the Record Marking the Event

Present to witness the event were the over 2,500 participants drawn from 100 countries participating at the ICID+18 Conference taking place from 16-20 August 2010. The dignitaries who signed the Decade’s Record of the Launch included several ministers from Brazil, as well as ministers from Niger, Senegal and Ethiopia, governors and high-ranking officials from various institutions.

In addition, the Ministers from Argentina, Germany, Algeria and Bhutan also sent messages to the launch and in support of the Decade campaign, as did the heads of UN agencies and the UNCCD’s Greening Ambassador Byong Hyon Kwon.

## UN Secretary General’s Message

Mr. Gnacadja also presented the message of the UN Secretary-General Ban Ki-moon to the Conference. In his message, Secretary-General Ban drew attention to the challenges faced by the



poor in the drylands and the costs of the land degradation to society, and stated that while the challenges are formidable, they are not intractable.

“As we begin the Decade for Deserts and the Fight against Desertification, let us pledge to intensify our efforts to nurture the land we need for achieving the Millennium Development Goals and guaranteeing human well-being,” the Secretary-General advocated.

## Keynote Statements

Speaking at the opening ceremony, a child Mayor from Ceará, David Santos, said “even though I am a child, I have a message for the adults. I am concerned about the world, especially my country Brazil.” He expressed concern about the environmental situation in Brazil, and globally, and expressed the hope that today’s adults would not damage the planet, but it should be sound for the next generations. “I would like my children and grand children to have a better environment and conditions than those that I have,” he said.

Vice-Minister of Environment José Machado highlighted various initiatives undertaken by the Government of Brazil to combat desertification. The Vice-minister highlighted the challenges faced in the drylands in Brazil, and said there is a need to strengthen the institutional framework to address the problems.



- I. A drylands call for action
- II. Opening ceremony
- III. Keynote presentations
- IV. Summary report of selected sessions
- V. Concluding remarks:  
the drylands and the Rio+20



## **Part I. A drylands call for action**





## A drylands call for action



Foto: I CID+18

### Executive Summary

The foremost objective of local, national and international action in the world's Drylands is sustainable development, constituted of improved governance and enhanced livelihoods achieved through greater voice, empowerment, and political representation of their populations (especially the poor). Emerging climate and sustainable development challenges and opportunities in the Drylands must not be understated. The current plight of the Drylands includes risks to global security associated with the deepening poverty, food insecurity, and vulnerability in the face of natural disasters and climate change, and increasing conflicts and violence. The Declaration of Fortaleza calls for:

- **Immediate decisive international community action** for human and ecosystems well-being in Drylands.
- **Climate-sensitive Drylands development interventions** with special attention to the needs of women, children and the elderly.

- **Climate adaptation “win-win” tactics and strategies** to reduce local vulnerability, increase resilience and build assets of the poor.
- **Greater institutional capacity** for managing climate variability and projected climate change.
- **Stronger mechanisms to arrest and avoid land degradation through integrated action** to mitigate the effects of droughts, fires and floods, to conserve soil and water resources and biodiversity, and to resiliently adapt to climate stress.
- **Development of financial mechanisms to compensate local communities** for the environmental protection services they provide.
- **Exploiting of investment opportunities through comparative advantages** of Drylands such as solar, wind, biomass and hydropower.
- **Enhanced energy and food security** by the improved efficient management of demand for water through pricing and other means.
- **Greater political representation of Drylands people in local, national and global policy making** to bring local knowledge, cultural values, needs and aspirations into all development policies.
- **A “Drylands Summit on Sustainable Development”** to refine policy options for Drylands worldwide. Collectively, Drylands countries should become treated as equal partners in the global environment & development agenda.
- **Equal attention to sustainable Drylands development issues** at the Rio+20 Conference agenda by full consideration of ICID+18 inputs and those of the above-proposed Drylands Summit.
- **A strategic geo-political “Drylands Initiative”** or alliance, to coordinate responses to common climate and development problems and opportunities.
- **Support for community-level knowledge-based strategies** to educate children, adults, policy and decision makers, parliamentarians, and media, about the obvious as well as hidden implications of climate and environmental change.
- **Strengthening of management to prevent environmental deterioration** of existing and newly protected areas and to rehabilitate degraded areas.
- **Cataloguing of the sustainable uses and conservation techniques** of biodiversity in Dryland regions.
- **Strengthening of synergies among global, national, regional and local interventions** to mitigate and adapt to climate change, conserve biodiversity, and to curb desertification.
- **Accelerated disbursement of concessionary resources** from recently established Climate Investment and Adaptation Funds, while reinforcing national institutional absorptive capacities to effectively utilize these resources. Industrialized countries should meet their previous financial pledges in support of climate-sensitive development activities.



- **Holding greenhouse gas emitters accountable to generate additional finances for adaptation measures.** Climate-related damage compensation and insurance instruments should also be developed.
- **Financial innovations under climate change conditions** that include: (i) funds to finance adaptation and associated sustainable development activities in Drylands; (ii) payment for ecological and other environmental services, including establishment of a fund for reduction of emissions from land degradation and desertification, as has been done for tropical forests.
- **Recognition of quality education at all levels as a high-return investment in human capital** to raise awareness of local populations about the linkages among climate change, poverty and sustainability. The priority focus should be on youth.
- **Ensuring effective voice, empowerment and representation** in public decision-making regarding the future of Dryland regions through the development of Drylands-specific education policies.
- **An integrated multi-disciplinary climate research, observation, modeling and applications program** to inform resource managers, policy makers, planners, educators and local populations.
- **Significantly greater social sciences inputs** that focus on the societal causes of vulnerability and resilience as well as the societal impacts of climate variability and change.
- **Bridging the gap** between scientific Drylands research and its uptake in environmental decision-making and governance.
- **Respect for the cultures of indigenous, traditional and other local populations** that have inhabited these regions for centuries.
- **Strengthening of Drylands knowledge networks:** (i) for scientific and applied research and information exchange; and (ii) to foster exchange of experiences among specialists, government authorities and civil society.
- **Measures to facilitate appropriate technology transfer,** including the fostering of south-south and tripartite cooperation and the establishment of local laboratories and observatories (**collaboratories**).
- **Improved development coordination** in such areas as education, land, water and forest resource management, the combating of desertification, adapting to climate change, protecting biodiversity, improving food security, and poverty reduction.
- **Keeping “Food Security for Sustainable Development” a priority area** since food insecurity remains a fundamental obstacle to reducing vulnerability and promoting resilient adaptation.

## A Drylands call for action: Declaration of Fortaleza

**The Drylands worldwide contain the largest concentrations of poverty and suffer the greatest pressures on their natural resources such as water, soils, and biodiversity.** Their populations are extremely vulnerable to the adverse consequences of environmental changes related to climate variability and change, and are among the least able to cope effectively with them. Desertification alone, as a symbol of environmental threats in the Drylands, adversely affects the livelihoods of one billion (1,000,000,000!) people.

A gathering of 2,350 participants from 80 countries, including public officials, natural and social scientists, representatives of the private sector and international agencies, and members of non-governmental and other civil-society organizations, met in Fortaleza, state of Ceará, Brazil, from August 16th to 20th, 2010, in the *Second International Conference on Climate, Sustainability and Development in Semi-arid Regions (ICID+18)*. They exchanged information and lessons of the past two decades about sustainable development in Drylands around the globe and offered policy recommendations for consideration at the Rio+20 summit in 2012.

**Since the first ICID was held in 1992, human-induced global warming and environmental changes and their consequences for human and ecosystems well-being are now widely accepted as fundamental development issues.** Although significant advances continue to be made in scientific knowledge and public understanding concerning the interactions among climate, environmental sustainability and socio-economic development and despite progress and the best of government intentions, the challenges continue to increase and constrain efforts to effectively reduce poverty, mitigate and adapt to climate change and achieve sustainable development and the Millennium Development Goals (MDGs).

**Political resolve, sustained commitment to action and to provide additional resources are urgently needed to realize these objectives.** These challenges are critical but surmountable in the underrepresented arid, semi-arid and dry sub-humid regions, collectively called “Drylands”.



**Past errors, poorly conceived policies, and exploitative practices have resulted in environmental and social conditions that are not easily reversed without substantial and sustained development efforts** that require increased national and international financial support. Declining productivity in the Drylands of their natural resources, the prevalence of poverty and significant inequities as well as institutional weaknesses are expected to be worsened by climate variability and change.

**Drylands regions contribute much less to global climate change** (ie, as sources of greenhouse gas emissions) than other biomes, but are likely to be much more adversely affected by it.

**Extreme weather and climate events around the globe** — most recently floods in Pakistan and forest and peat fires in Russia and Indonesia, dust storms in China, erratic monsoon behavior in India, droughts and food shortages in sub-Saharan Africa, severe prolonged droughts and water shortages in northern Mexico and Northeast Brazil among other disastrous events elsewhere — **underscore the urgency for governments to prepare for an uncertain climate future.**

**The economic and social impacts of such high-impact climate, water and weather events** include sharply reduced agricultural output and productivity, damages to infrastructure, disruption or loss of basic services, massive dislocation of population, and increasing frequency of conflict, violence, and misery in the poorest parts of the developing world. Industrialized countries are not immune from adverse climate-related changes and are also increasingly susceptible to the similar high impact phenomena. Yet, the world's Drylands possess many important assets, including rich social, cultural and biological diversity. They are responsible for more than 20% of food production around the globe.

**Drylands present many opportunities for sustainable development**, especially renewable solar, wind and biomass energy. Many of the actions required to address climate challenges are of benefit now as well for long-term economic growth, sustainable development and poverty alleviation in future decades. They require a high priority consideration from governments, national and regional, from the international community and from the private sector.

**Deliberations during the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions (ICID+18) resulted in a call for the following action:**

## Climate Change and Sustainable Development: Challenges and Opportunities for the Drylands

1. The sustainable development of Drylands, through improved governance, enhanced livelihoods and greater voice, empowerment, and political representation of their populations (especially the poor), should be the foremost objective of local to international action.
2. Climate-sensitive development interventions from local to global must be substantially increased paying special attention to the needs of women, children and the elderly, throughout the Drylands.
3. “Win-Win” opportunities to cope with global warming must be identified and pursued, especially climate adaptation tactics and strategies that reduce local vulnerability, increase resilience and build assets of the poor. Efforts are needed to develop greater institutional capacity for managing climate variability today in the context of projected climate changes (e.g., greater emphasis on improved climate and environmental monitoring networks, drought preparedness planning based on a risk-based management approach, development of appropriate decision-support tools, and improved information delivery systems to aid decision making). Efforts must promote access to land and to markets, as well as effective civil-society grassroots participation in decision-making, implementation, and evaluation of development activities.
4. Mechanisms should be strengthened through integrated action to arrest and avoid land degradation, to mitigate the effects of droughts, fires and floods, to conserve soil and water resources and biodiversity, and to resiliently adapt to climate change and its consequences. In addition, mechanisms to financially compensate local communities for the environmental protection services they provide must be identified and implemented. Multilateral and bilateral development agencies can play an important role.
5. Investment opportunities should exploit the comparative advantages of dryland areas such as solar power generation, as well as other alternative and renewable energy sources (including hydropower, wind, and biomass). They should also support techniques for rainwater capture, improved sanitation, wastewater reuse in irrigation and low carbon, resource saving and environmentally-friendly activities. Such investment would enhance energy and food security by the improved efficient management of demand for water through adequate pricing and other means. The integration of water basins should also be considered.



## Political Representation from local to international

6. The concerns of Drylands peoples are often poorly represented in international, national and local policy processes. Good governance of the Drylands will also bring knowledge, cultural values, needs and aspirations of local inhabitants into multi-level policy and decision-making.
7. To promote the recognition and well-being of Drylands, second and third-order implications of the climate-poverty-sustainability interface should be widely acknowledged, and Drylands countries should become equal partners in the global environment and development agenda.
8. The United Nations should urgently consider the current plight of the Drylands, including the risks to global security associated with the growing impoverishment and food insecurity, increasing vulnerability to natural disasters and climate change, and rising conflicts and violence in Dryland regions.
9. Convene a “Drylands Summit on Sustainable Development” to refine policy options for Drylands worldwide. Inputs from ICID+18 and those of the proposed Drylands Summit would enhance discussion of the importance of Drylands issues in the Rio+20 Conference agenda. Summits for other eco-regions should also be identified and convened.
10. A new strategic geo-political Drylands Initiative, if not alliance, can be developed to coordinate efforts to address common climate, development and sustainability related problems, prospects and opportunities.
11. Generate support for development and implementation of community-level knowledge-based strategies to educate children, adults, policy and decision makers, including parliamentarians, and the media, about the obvious as well as hidden implications of climate and environmental changes in the Drylands.

## Biodiversity Protection

12. There is also the need to recover degraded areas, strengthen the management and sustainability of existing and newly protected areas and to prevent environmental deterioration of those that are as yet well preserved. Dryland regions should catalogue and prioritize the various sustainable uses and conservation of biodiversity.

## Synergies Among Global Environment and Development Initiatives

13. Synergies among global, national, regional and local interventions to mitigate and adapt to climate change, conserve biodiversity, and curb desertification should be maximized. Interactions among and with the three Rio Conventions (UNCCD, UNCBD, UNFCCC) should be integrated with broader domestic and international efforts to foster quality of basic education, combat poverty and promote sustainability.

## Financing Climate-Sensitive Sustainable Development

14. Enhancing climate-sensitive sustainable development activities will require additional financial resources. Part of these costs should be absorbed by national economies, but, because of the global public goods nature of these issues, a larger share of the needed incremental financing should come from industrialized countries.
15. Previous financial pledges by industrialized countries to support sustainable development efforts must be met. Existing institutional arrangements and financial instruments must not only be strengthened but must become more efficient. Disbursement of concessionary resources from recently established Climate Investment and Adaptation Funds, for example, should be accelerated, and local and national institutional absorptive capacities strengthened to effectively utilize these resource.
16. Holding emitters of greenhouse gases accountable by applying the “Polluter Pays” principle, and other such measures, should generate additional sources of financial resources to support new investments in adaptation measures. Financial innovations to advance sustainable development under climate change conditions should also include: (i) funds to finance adaptation and associated sustainable development activities in Dryland subregions, such as the proposed Fund for the Caatinga ecosystem in Brazil; (ii) payment for ecological and other 5 environmental services, including establishment of a fund for reduction of emissions from land degradation and desertification, along the lines of existing ones for reduction of emissions from deforestation and forest degradation in tropical forest areas (REDD); and (iii) climate-related damage compensation and insurance instruments.

## Education and Food Security for Sustainable Development

17. Contextualized quality education at all levels should be a priority, cooperatively supported by all agencies involved. In addition to a high-return investment in human capital, this should be viewed as the need to raise the awareness of local populations about the linkages among climate change, poverty and sustainability. This will ensure an effective



voice, empowerment and representation in public decision-making regarding the future of Dryland regions. Specific Drylands education policies should be developed. The priority focus should be on the youth of both genders beginning with early childhood development. They have the most at stake and will become the next wave of policy and decision makers.

18. Food Security for Sustainable Development must be a key area of concern among civil society, NGOs, international agencies, government institutions and other forms of organization, as food security remains a fundamental need for reducing vulnerability and promoting resilient adaptation.

## Knowledge and Information Exchange

19. An integrated multidisciplinary climate research, observation, modeling and applications program should be implemented to inform resource managers, policy makers, planners, educators and local populations about adaptation to the consequences of a changing climate.
20. While information technology and knowledge based on the complex causes and effects of climate variability, extremes and change have advanced significantly during the past two decades, significantly greater inputs from the social sciences are needed, especially to focus on the social and political causes of vulnerability and resilience as well as the societal impacts of climate variability and climate change.
21. The gap caused by a mismatch between scientific and technological investigation related to the Drylands along with knowledge about production systems on the one hand, and the prevailing system of decision-making and environmental and local governance, on the other, should be eliminated. New Science and Technology (S&T) knowledge must be developed in existing and new Drylands institutions. Sustainable development efforts must respect the cultures of indigenous, traditional and other local populations that have inhabited these regions for centuries.
22. Drylands knowledge networks should be enhanced with twobasic objectives:
  - i) scientific and applied research: exchange of information, discussion of methodologies, communication of scientific discoveries and joint development of research activities; and
  - ii) participatory planning and action: create a forum for exchanging experiences among specialists, government authorities and civil society.

## International Cooperation

23. Strengthen measures to facilitate international cooperation and appropriate technology transfer, including the fostering of south-south and tripartite cooperation and the establishment of local laboratories and observatories.
24. Efforts to improve coordination and reduce the existing compartmentalization of development programs should be promoted at all levels, especially in areas such as education, land, water and forest resource management, the combating of desertification, adapting to climate change, protecting biodiversity, improving food security, and poverty reduction.

## A Sense of Urgency

25. The urgency to respond to current and emerging climate, development and sustainability challenges and opportunities in drylands must not be understated. The international community has shown its intention to place drylands development on the international agenda by the launching at ICID+18 of the '**United Nations Decade of Deserts and the Fight Against Desertification 2010-2020**'. In light of ICID+18's findings and in view of global climate change scenarios that intensify the drylands development imperative, the dawn of this new UN Decade is a welcome recognition that decisive action for human and ecosystems well-being in the world's drylands is needed now!

## Part II. Opening ceremony





## Opening ceremony

### 1. Director ICID+18

Antônio Rocha Magalhães



Foto: ICID+18

*Ladies and Gentlemen,*

I welcome the governor of Ceará, Dr. Cid Gomes, and in his name I want to greet all authorities that are present here in the opening of the ICID+18. Otherwise I do not think I would have time to make my statement, which will be very short.

Let me begin by thanking all those who came from afar, from very far away or from not so very far away, in order to be here today and throughout this week, to look at the problems and potentialities of the dry regions of the planet: the arid, semi-arid and dry sub-humid, which we summarize here in this conference as semi-arid regions. This is an important subject for us, here in Brazil, because we're in one of these major regions of the world, which is the Brazilian semi-arid Northeast.

During the week, we'll be working with about 80 panels and roundtables, from a technical-scientific and policy perspective. These sessions will happen simultaneously in six different auditoriums and will cover all topics of ICID. We will also have a few moments, sitting here in this room in plenary sessions. Tomorrow morning, Aug. 17, we will have a very important meeting, to which we expect

the participation of all, to discuss the synergies between the three UN environmental conventions, the so-called Rio Conventions: Climate Change (UNFCCC), Combat Desertification (UNCCD), and Biological Diversity (UNCBD).

We will have a keynote speech by Professor Jeffrey Sachs, on Wednesday at the end of the day, to which I wish to invite all participants. Professor Jeffrey Sachs is Special Adviser to the Secretary General of the United Nations, Ban Ki-Moon, and President of the Earth Institute at Columbia University. And on Friday, Dec. 20, the entire space will be dedicated to the discussion and adoption of the Declaration of Fortaleza.

In addition to this lineup of panels and roundtables, we will also have a set of dialogue tables, which are parallel events that will take place during the week, right here within the Convention Center, where groups of people and institutions interested in specific issues seek to define and strengthen their discussions and their cooperation agendas.

Several other parallel events will be happening, including a cultural program at the end of each day. The goal of our work during these five days will be mainly to arrive at a set of strategic recommendations that can be taken by the scientists and policy makers that are present here. Our first objective is to influence the agenda of Rio+20, which is the United Nations Conference on Sustainable Development, bringing together heads of states. The Rio+20 will take place in Rio de Janeiro in 2012, 20 years after Rio 1992. We want the Rio+20 to strongly consider the agenda of development and sustainability of dryland regions of the planet. That would fix a feature that we have seen today, which is the insufficient priority given to issues related to these regions. These are exactly the regions where poverty is concentrated in the world, where degradation problems are felt most and where the effects of climate change may be more severe from an economic, social and environmental perspective.

So we have much work, we have a long agenda, we will have many scientific contributions, but especially there will be opportunities for dialogue between scientists, decision makers, politicians, and representatives of international institutions. This work is extremely important for us to effectively identify what is strategic, what should be done and can be done to change the fate of the dry regions of the planet.



I would like to thank, from the heart, all institutions that are here and which made this conference happen, through your sponsorship, your support, your encouragement and your help in consolidating our conference program. In particular, I wish to record our thanks to our sponsors, who are the Government of Ceará, the Ministry of Environment, the Ministry of Science and Technology, the Ministry of National Integration, the Bank of Northeast Brazil and the Federation of Industries of Ceará. I would also like to thank the Institute of Development Research (IRD), France, the UK Department for International Development (DfID), UK and the Interamerican Development Bank (IDB), for the sponsorship and collaboration. And other institutions that helped us identify and bring experts and policymakers from various regions of the planet, including the World Bank, the United Nations Commission for Latin America (ECLAC), the National Water Agency (ANA), the National Space Research Institute (INPE), the National Institute of the Semi-arid (INSA) and the Ceará State Foundation for Meteorology (FUNCEME). Finally, I want to record a special thanks to the Executive Secretariat of the UNCCD, which has supported and encouraged us in the preparation of this conference, and that decided to use the opportunity of ICID to make the launching, right from here, of the United Nations Decade of Deserts and Desertification (UNDDD).

Thank you.

## 2. Executive Secretary of the Convention to Combat Desertification – UNCCD

Luc Gnacadja



Foto: ICID+18

*Excellencies, Ladies and Gentlemen,*

This is a memorable day. As you know, the United Nations Convention to Combat Desertification and this Conference share a unique history. The first ICID in 1992 was instrumental to the outcomes of the Rio Earth Summit. It provided the building blocks for the negotiations that led to the Desertification Convention. Now as then, the second ICID is preparing the input on drylands issues for the Rio plus 20 Summit to be held in 2012. And today, this conference will also be the launching pad for a decade to highlight the critical role that the drylands play on our planet. So what, in concrete terms, will be the legacy of ICID+18?

In his message to this Conference the UN Secretary General has set for us a vivid picture of where the global community stands: at a cross-road with two paths. The path of business-as-usual will worsen the speed of degradation with devastating impacts on livelihoods families and communities, and will further cause more extinction of life and jeopardize the future of Humanity. The alternative path is the one that will embrace and undertake the formidable challenges of sustainability implying that we choose to channel our collective action towards it.

By organizing the ICID, Brazil is setting an example.



Although re-known for its tropical forests, close to 16% of Brazil is drylands, which is home to 19% of the country's population. By hosting ICID conferences and the launch of the Decade, Brazil is making the point that the drylands matter too and are important global assets for human well-being and security.

As you know, the world's drylands cover over 40% of the Earth's land surface. With more lands around the world facing increasing degradation, the United Nations General Assembly considered it crucial to mount a Decade-long campaign for Deserts and the Fight against Desertification so that their value becomes embedded in our psyche.

So what if drylands did not exist; would it matter?

This is a provocative question that I hear often. So let me give a straight forward answer. Without the drylands, the global food situation would be very different. Imagine a world without 50% of the world's livestock, and its wildlife. Imagine that 44% of all the world's cultivated systems no longer existed or existed in some other location. Where might that location be, and what would be the effect? Now imagine that common foods such as bread that come from wheat, which is indigenous to drylands, did not exist. Stretch this thought further because it is not just bread that we would miss. At least one third of the crops under cultivation today would not exist. Now picture further what this would mean by 2050 when the world's population is over 9 billion. That would be part of the scenario without drylands. What is significant is that it is the scenario we are willingly unfolding as we degrade and abandon the drylands. Land degradation is a global phenomenon, but is known as desertification, when it takes place in the drylands. It is reflected in a deterioration of the soil's quality.

Land is a finite resource but its degradation is tolerated because we do not know for sure how fast it is occurring and where, we underestimate it greatly, and ignorance and misperceptions about drylands persist. This is where conferences such as this one and the Decade campaign come in. Scientists and experts must provide the data and information that will also serve as ammunition for all arid land stakeholders to campaign in order to generate a paradigm shift, to change the hearts and minds of the public, the policy and decision makers.

A key focus of the Decade campaign, then, must be getting rid of prevailing misperceptions and ignorance about drylands, at all levels. The ignorance that takes drylands to be wastelands, marginal areas or liabilities. And the misperception of desertification as a merely local, not global, concern.

Among this Conference participants are prominent stakeholders of drylands issues. So, let me pose the question again: What will be the legacy of ICID+18?

In my view, we should be measured by the extent to which we will contribute to the building of a new global paradigm. One that repositions “land issues” where they belong: higher on national and global development agendas; and drylands as assets and not liabilities for the global vision of sustainability, and a prerequisite for achieving the Millennium Development Goals (MDGs).

The convergence of ICID+18 and launch of the 2010-2020 Decade for Deserts and the Fight against Desertification is not just another ‘happy coincidence’. “Our aim is to forge a global partnership to reverse and prevent desertification and land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability”. The Decade is an opportunity to foster policies and actions that will improve the livelihoods of affected populations and the conditions of their ecosystems and to generate global benefits. But the vision will remain words on paper without effective and concrete financial assistance, capacity building and technology transfer. These are the pillars of international cooperation.

In this regard and on behalf of the five United Nations agencies spearheading the events of the Decade, allow me to thank the Government of Brazil and its various agencies for the financial and in-kind contributions they have provided, which have made ICID+18 and the Decade launch successes and to particularly acknowledge the contribution of the Governor and people of the State of Ceará.

Allow me also to recognize the importance of the contributions of individuals in creating partnerships, through the example of Professor Antonio Magalhães, the Director of the ICID+18. His dedication to a successful conference and outcome is commendable and deserve our gratitude. I also wish to thank Bank Nordeste for its support in publishing the awareness raising materials that will be used for the launches here and elsewhere in other regions of the world. The role of the private sector for progress in the drylands cannot to be overemphasized.



Excellencies, distinguished delegates, ladies and gentlemen, as lesson learnt from the fight against the Dust Bowl, a severe dust storm phenomenon caused by severe drought coupled with decades of failing farming practices that caused major and durable ecological damages to the US and Canadian grasslands during the 1930s, President F. D. Roosevelt once said: “A nation that destroys its soils destroys itself”. History has thought us that this is true not only for nations but also for civilizations.

Let us not be the generation that jeopardizes the heritage of future generations by degrading any land.

The Decade is an occasion for all stakeholders to take the mantle of its vision and walk the talk. It begins with those of us gathered here today to carry the message globally. So allow me now to hand the floor back to the Master of Ceremony to guide us in a participatory ceremony to launch the UN Decade for Deserts and the Fight Against Desertification.

I thank you.

### 3. Message from the Executive Secretary of the Convention to Climate Change – UNFCCC

Christiana Figueres



Foto: www.unfccc.int

*Excellencies, ladies and gentlemen,*

I am honoured to address you at this important conference. No doubt, ICID+18 provides a major opportunity for the international community to advance many of the critical issues that semi-arid and arid regions face.

In this session, the conference also provides an opportunity to further explore synergies among the Rio Conventions, specifically as they relate to dry areas.

That semi-arid and arid regions are highly vulnerable to climate change is beyond doubt. Impacts include a decrease in water resources and reduced crop yields - in other words, impacts that affect the very core of the human existence: water and food.

Recent research indicates that even if basic adaptive measures are taken, global agricultural production is likely to decline by 3% by 2080. The demand for water, especially for crop water, generally increases as temperatures increase. This means that, while climate change is expected to reduce the supply of water, demand for water will increase.

This clearly points to the need for comprehensive adaptation measures that go beyond “the basic”. This need is perhaps made all the more urgent given that more than 2 billion people across the world live in semi-arid and arid regions.



Encouragingly, initial adaptation initiatives in some of these areas are beginning to show results and could serve as important pointers for future action.

The main emphasis of most of these initiatives is on improving information, strengthening institutions and developing strategies for reducing impacts on vulnerable population groups. One such example is the Kenya Adaptation to Climate Change in Arid Lands programme, which, in addition, also provides technical assistance at the local level.

What has become clear is that improved access to climate data both on a national and on a local level is critical for proper adaptation planning. The need for detailed climate information and related capacity-building is especially apparent in developing countries. In this regard, I thank the World Meteorological Organisation and its partners for developing the Global Framework for Climate Services.

What has also become clear from initial adaptation interventions is that switching to drought, heat or salt resistant crops can only be one part of the approach. A key element of successful interventions centres on improved water and water infrastructure management.

Finally, adaptation measures in semi-arid and arid regions can have a large mitigation potential, as well as contribute to the reduction of threats to biodiversity and the prevention of land degradation. These synergies should be fully exploited.

One example is agriculture. Good practices in the agricultural sector can increase the ability of soils to absorb greenhouse gases, improve water management, lessen the impact on biodiversity and have the additional effect of preventing land degradation.

Under the UNFCCC negotiations, Governments are steadily working towards a strengthened response to climate change. The next UN Climate Change Conference is set to be held in Cancun, Mexico at the end of this year.

There seems to be convergence, that Cancun should produce a balanced package of decisions that would operationalise the key elements of the Bali Action Plan. This would mean increased action on

adaptation and mitigation supported by adequate and new finance, technology cooperation and capacity building.

Through increased action in these areas, some of the key vulnerabilities of semi-arid and arid regions could be addressed in a more thorough way, while picking up synergies along the way. But that is for Cancun to bring to full fruition.

For now, your deliberations will contribute to strengthening the ability of countries to manage their lands sustainably. No doubt, they will also support countries in their ability to halt land degradation and desertification, which have the potential to also yield benefits for the climate.

Thank you.



#### 4. Message from Executive Secretary of the Convention on Biological Diversity – UNCDB

Ahmed Djoghlaif

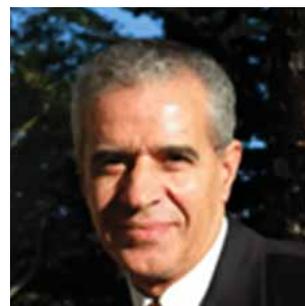


Foto: www.uncdb.int

*Ladies and Gentlemen,*

Biodiversity, climate change and development are strongly linked in drylands. Biodiversity in drylands, and the traditional knowledge associated with livelihoods in drylands, is critical for sustainable development. Unfortunately, the biodiversity of dry and sub-humid lands is facing a number of threats from human activities. Already 2,311 species are threatened or endangered in drylands while at least 15 species have disappeared completely from the wild. This trend shows no sign of reversing as drylands are among the most vulnerable regions to the negative impacts of climate change. Climate change negatively affects biodiversity, with serious consequences on biodiversity-based livelihoods. Desertification and biodiversity loss are exacerbated by climate change, which is threatening the delicate climatic balance under which dryland species have evolved.

Given the challenges faced by dryland biodiversity, it is important to take action now. *In fact, biodiversity loss, climate change and land degradation are three problems linked by common solutions.* The conservation and sustainable use of biodiversity not only reduces the vulnerability of dryland ecosystems to the negative impacts of climate change and desertification, it is also central to livelihood development and poverty alleviation. There exist a number of management options based on the conservation and sustainable use of biodiversity, including integrated land and water management, the application of the ecosystem approach, conservation and management of key natural resources, traditional knowledge, innovations and practices, and the use of agricultural

biodiversity. Sustainable land management in agricultural areas and grazing land can also increase carbon sequestration, helping mitigate climate change.

We need to learn more about this important region and the value its biodiversity has in terms of providing critical ecosystem services. We need to involve indigenous peoples and local communities in decision making and we need to address the global challenges of climate change and development. Doing so is particularly important in this 2010 International Year of Biodiversity, during which time the international community is striving to find solutions to the rapid and ongoing loss of our biological resources. On September 22nd the 65th session of UN General Assembly will for first time discuss the importance of biodiversity, its role in sustainable development and its role in the fight against climate change. And in October our tenth Conference of the Parties, to be held in Nagoya, Japan, will finalize a 2020 biodiversity target and a 2050 biodiversity vision as a part of a comprehensive post-2010 strategic plan for stopping biodiversity loss in the future.

Also in Nagoya, the Convention on Biological Diversity, in consultation with the United Nations Framework Convention on Climate Change and United Nations Convention to Combat Desertification, will convene the Rio Conventions' Ecosystems and Climate Change Pavilion. The Pavilion will also be held during the 16th Conference of the Parties to the UNFCCC in Cancun in November. The Pavilion will provide a unique opportunity for Parties and organisations to highlight activities linking biodiversity conservation, sustainable land management, and climate change mitigation and adaptation. In addition, it will be particularly important for all three Rio Conventions to work closely together toward important events such as the Rio+20 Summit in 2012 and the Millennium Development Goals Review in 2015. This important meeting in Brazil provides us with an opportunity to focus on actions to be taken to address these challenges. In this spirit, I wish you a successful meeting.

Thank you for your kind attention.



## 5. Ambassador of the United Kingdom

Alan Charlton



Foto: ICID+18

*Excellencies, Ladies and Gentlemen,*

It is a pleasure to be here today at the ICID+18 conference. This has convened an impressive range of representatives from the policy and science communities. This high level of participation is encouraging, because we are here to learn, share ideas, and draw attention to a part of the world that is very important, but frequently overlooked.

We are here to focus attention on the world's drylands – home to more than a third of the world's population. The drylands are often presented as 'marginal areas' – places that are highly vulnerable to shocks and stresses from climate and competition for scarce resources. It is true that arid and semi-arid areas face many challenges, and that these challenges are likely to increase in nearly any scenario of climate change. I hope that ICID is successful – as it was 18 years ago – in helping to highlight the vulnerability of the drylands, and ensure that they are not overlooked by policy-makers.

But there is another story about the drylands, and that is one of resilience, innovation and adaptation. And that is the story that we hope ICID will also help to uncover. This is a story about generations of adaptation to the challenges of living in conditions where resources can be scarce, variable and uncertain. Conditions of adversity have fostered widespread examples of creativity, entrepreneurship and innovation.

We do not have all the answers. But with the likelihood of a more uncertain climate in the future, we need to learn more about what has worked and what has not in making development sustainable and resilient in the world's drylands. And we need to explore how we can develop stronger partnerships to share lessons and inform policy and action.

I welcome this initiative of Brazil to convene people on this important issue. I believe that Brazil has a wealth of experience in tackling a range of development challenges. And, like many others, I believe that Brazil can draw on this experience to deliver a significant positive impact in developing countries. Brazil already has a promising cooperation programme, and we believe that this will continue to grow and deliver positive benefits.

The UK is working with Brazilian partners to support their efforts to exchange ideas, good practices and lessons learned with developing countries on a range of issues. This includes supporting initiatives like ICID + 18, which help to bring people together to identify common challenges, promising solutions and opportunities for partnership. That is why in June the UK sponsored three pre-events in West, East and Southern Africa around the themes of the ICID conference. This provided an opportunity for African experts to discuss their latest findings and to make connections amongst themselves. And it also helped to raise awareness amongst researchers, government and the NGO community in the three regions.

We are very grateful to our colleagues in the Dewpoint Centre, supported by the UK's Department for International Development, who helped to coordinate these pre-workshops in Africa. The workshops were used to run a competitive process from which 30 African experts were identified to present their findings in Fortaleza this week. This competitive process has given us the confidence that the quality of discussion at ICID will be high.

Our interest in helping to bring people together in this way is simple: the UK believes that it is in all of our interest to make the world a safer, fairer and more prosperous place. In the drylands this means making sure that investments and populations are protected against climate risks, in order to safeguard future growth, protect vulnerable people and ensure that progress on sustainable development is not reversed.



For example, one particular theme that arose in the pre-workshops was the importance of making agriculture and natural resource management resilient to pressures of climate variability and uncertainty. Agriculture remains central to the livelihoods and well-being of 70 per cent of the workforce in many African countries. Making agriculture more productive and resilient under conditions of stress and climatic variability will be central to building prosperity, equality and accelerating progress towards the Millennium Development Goals.

This is one area where Brazil's experience and expertise is well recognised. I am delighted that Brazil, through Embrapa, is seeking to strengthen its cooperation with Africa on productive and resilient agriculture, including through initiatives like the Africa-Brazil Agricultural Innovation Marketplace. The UK is proud to be a supporter of this initiative, which will take forward policy dialogue and collaborative research between Brazil and Africa.

I hope that this kind of productive collaboration between countries can be deepened. I am confident that the ICID process will help to make further connections, foster new partnerships, and help us all to progress towards a more sustainable future.

Thank you all.

## 6. President of Institut de Recherche pour le Développement, France

Michel Laurent



Foto: ICID+18

*Ladies and Gentlemen,*

It is a great pleasure for me to open with you all this International Conference devoted to sustainable development in semi-arid regions. I do so on behalf of the IRD and the Agency we represent now, which brings together major research institutions and French universities on challenges for research in developing countries. I salute here the Managing Director of CIRAD, Patrick Carron, with whom we open many projects worldwide.

Brazil and France share the same vision of the great challenges in international politics. The objective of the political dialogue is to establish regular consultations, dense and productive, on reforms of global governance as well as on preparations for major international events, particularly the fight against climate change. This common approach is concretized by the strategic partnership agreements signed in December 2008, concerning, among other things, cooperation on sustainable development of the Amazon biome. Today, we look forward to this conference in Fortaleza, preparing large decisions of Rio+20.

During the official visit of the President of the French Republic in Brazil in September 2009, Presidents Lula and Sarkozy reaffirmed, in particular, the importance of multilateralism, environmental protection and biodiversity, the fight against climate change, and promoting sustainable development and social justice. On this occasion, accompanying President Sarkozy, I was invited by the Ministry of Environment in Brasilia, on September 8, 2009. During this exchange, in the presence of Antonio Magalhães (Director of ICID), I was convinced of the need to involve



the IRD in the event, but also that of our scientific partners in arid regions, in particularly those of Africa and the Middle East.

We are honored that Mr. Amadou Tidiane Ba (Minister of Higher Education and Research of Senegal) and Mr. Abdou Kaza (Minister for Water, Environment and the fight against desertification in Niger), have accepted our invitation to come to ICID, and I am very happy about that. They demonstrate by their presence the quality of the partnership in which we have been engaged for more than half a century with their countries in the North-South dialogue.

I recall that the IRD, the French public research institution that brings together nearly 2,400 employees, operates permanently in thirty countries worldwide. We are developing research partnerships on major issues facing the developing countries today (health, environment, natural resources, pollution, migration for example).

The IRD researchers who hold positions of resident researchers in the partner institutions are recognized for their competencies and skills. In Brazil today, there are about twenty researchers developing joint research programs, and they have recently developed joint research laboratories with universities in Brazil. They train and supervise young doctoral students.

The IRD has therefore mobilized, both in Brazil within the organizing committee of the ICID, and I salute the work of Jean Loup Guyot, IRD representative in Brazil, as in our diverse teams of research units in France and abroad, with local support from representations of the IRD, especially in Africa. The President of the French Committee of fight against desertification, Richard Escafadal, has also worked extensively.

I am therefore pleased to note today that – in addition to the 15 researchers from the IRD that are present here - there are more than 50 colleagues from the South, partners of IRD and CIRAD, that are also here, coming from 18 countries of semi-arid regions, mostly from Africa. Together, researchers from North and South, they will be presenting during the week the results of their work in 8 round tables and panels.

Through their work, these researchers will demonstrate, I hope, the whole point of collaboration between Brazil, France and African countries to succeed together to meet the challenges posed by

climate change on water resources, on biodiversity, on the environment, and on the people who live in semi-arid regions. In this perspective, a first tripartite cooperation agreement was signed in Belém on July 1, 2010, involving Brazil (INPE – National Institute for Space Research - and I welcome the excellent scientific collaboration we have with this organization, and the friendship that binds us to Gilberto Câmara, its Director General), France (IRD associated with AFD and CNES) and Gabon (with AGEOS – Gabonese Agency Study and Observation Space), the agreement that has received strong support from the ABC (Brazilian Cooperation Agency). I also expect a lot from the "dialogue table" that will gather us tomorrow morning on the tripartite collaboration, tools and methods to be promoted.

To conclude, let me say that I fully share the analysis of Antonio Magalhães, who thinks that given the magnitude of the challenges, we must unite our forces. Brazil has over one hundred years experience with public policies for the development of arid Northeast, and many lessons have been or may be learned from this experience for the benefit of all. France has to its credit a vast experience of research in all regions of the world, including the dry regions. And Africa, in addition to representing the main development challenge in these arid regions, also has experiences from which lessons can be learned for the benefit of all.

The IRD research operator, and agency provider of means, will continue to engage strongly with partners here in Brazil but also in Africa on all these major issues. Our efforts will also be directed towards the mobilization of our European partners and all international institutions working in these areas. I wish you a very fruitful and very friendly conference.

Muito obrigado a todos.



## 7. Vice Minister of Environment, Brazil

José Machado



Foto:ICID+18

Ilmo. Sr. Governor Cid Gomes  
Executive Secretary of UN Convention to Combat Desertification and Mitigating the Effects of  
Drought – UNCCD, Luc Gnacadja  
Ministers of all countries present here  
Ambassadors present here,

*Ladies and Gentlemen,*

Firstly I would like to convey the best wishes of the Minister of Environment of Brazil, Izabella Teixeira, who, unfortunately, could not be present at the opening of this important Conference, as was her wish.

After months of work, under the guidance of Antonio Rocha Magalhães, who has been tireless and selfless in the defense of matters concerning the development of the semi-arid region of Brazil, with our support, with support from the federal government, with the central role of the Government of Ceará, expressed in the effort and dedication of Governor Cid Gomes and his team, here we are doing the opening of this international conference aimed at discussing the sustainable development of arid and semi-arid regions of the planet and more specifically issues relating to the advancement of desertification processes. This is happening after 18 years, counted from the first ICID in 1992 and the UN Conference on Environment and Development, the Rio 92 Summit.

This is significant and important because it is an opportunity for science, technical and political decision makers to meet and review concepts, to build new concepts, but more importantly, in addition to good technique and good science that is basic, to reaffirm and rebuild a new pact aimed at the sustainable development of the dryland regions of the globe. It is essential that science be presented and discussed at this conference, and show us what we need to do effectively in order to reach an international political pact in favor of the drylands.

We need to make a political decision beyond technical matters. Brazil, for example, has accumulated technical and scientific knowledge, since many decades, on environmental and socioeconomic issues of the Brazilian semi-arid region: but what is missing, in fact, is the political and institutional commitment that comes from the Parliament and pervades executive powers at various levels of government (federal, state and municipal). This means breaking differences, overcoming differences of all kinds, differences that enable and facilitate the fragmentation that we still have in this region, where institutions have difficulty to work together, driven by vanity or other less noble sentiments.

We need soldering institutions in the Northeast of Brazil, but particularly in the semi-arid, enabling us to overcome the limitations we have today. Brazil is an unequal country, in all respects. But the regional inequality is a trade mark of our country. We will not win if we follow the inequality reversed priorities, if we capitulate to this logic that has concentrated wealth, as well as technical and scientific knowledge in some regions of the country.

I think that, after the words of the representative of children, the little mayor of the City of Maracanaú, David Santos, our speech may be repetitive and unnecessary. Because he, with the simplicity of a child, gave us the hard way: we have to do our homework, thinking of future generations. And he, still a young boy, is already thinking about his children and grandchildren with a maturity that we have to rescue every day, at every step.

Brazil is meeting a period of excellent prospects. The country is growing economically at high rates and such growth tends to continue in the future. We are looking forward to the year 2022, when Brazil will celebrate 200 years as an independent nation. I believe more than ever, Brazilians of all places, from all corners and from all shades have to act like the owners of this country and build a pact for the sustainable development of our semi-arid.



We need to garner the expertise of several institutions that exist here, and I argue in favor of knowledge, but bringing upfront the political capital of this generation of young, modern governors that exist in this region. We really need to build a federal agreement that enables us to reverse this unacceptable situation of inequality. It is outrageous that we are losing each year, every day, millions of acres of good land because of poor practices and unsustainable land use. We must change the paradigm, but we need to talk and talk a lot. This conference is an excellent opportunity for this to occur.

My dear Luc Gnacadja, I assume here the commitment on behalf of the Ministry of Environment - but I believe I also speak on behalf of colleagues from the Ministries of Agrarian Development, Science and Technology and National Integration – to bring to the Government of Brazil a proposal for the President to issue a decree incorporating the country to the activities and commitments of the UN Decade of Deserts and Combat to Desertification, which was launched and signed here today.

I wish everyone a good conference and I want to say that the Ministry of Environment is a partner absolutely decided on this theme. We want to work incessantly to rescue our semi-arid region. Securing the population in the region to stay here, working with a dignified life. For this we need to build a sustainable pattern of development for this region and this requires, above all, political insight and foresight. I think this is what we are currently experiencing with this Conference, which has a strong partnership between the federal and the state governments in this region, besides many other institutions.

Thank you all.

## 8. Governor of the state of Ceará, Brazil

Cid Ferreira Gomes



Foto: ICID+18

*Excellencies, Ladies and Gentlemen,*

The stage is set for a crucial debate, which brings forth the question of the fate of the arid and semi-arid regions of the world in face of the threat of global warming and its social, economic and environmental impacts. By extension, we will be here to discuss the very future of the planet and the human survival.

The Second International Conference: Climate, Sustainability and Development in Semi-arid Regions, the ICID+18, that we have the honor of hosting in Fortaleza, is the most categorized forum ever assembled in recent years to address this issue. In this meeting we have luminaries of the scientific community, who sit alongside policy makers, representatives of international organizations, civil society and private sector. The expected result is a collection of contributions to the implementation of policies for the sustainable development of the arid and semi-arid regions, which account for one third of the world population and record the sharpest and unacceptable levels of poverty.

With this event, the State of Ceará adds another contribution to the global debate on environmental degradation, vulnerability of arid and semi-arid regions, the crucial need for adaptation to climate change and, above all, the right to sustainable development. The first ICID, which was preparatory to the Rio 92 Summit, happened in this city 18 years ago and had a strong impact, contributing to the creation of the United Nations Convention to Combat Desertification. Now, new developments are foreseen. We expect that this conclave will echo in the United Nations Conference on Sustainable Development, scheduled for 2012 in Rio de Janeiro.



I want here to greet the representatives of the Ministry of Environment, Science and Technology and National Integration, as well as the Bank of Northeast Brazil, representatives of international institutions, in particular the UNCCD, UNCDB, UNFCCC, ECLA, World Bank, IDB, DFID, IRD, the governments of the northeastern states and the Federation of Industries, which are aligned to the State Government of Ceará to the achievement of ICID+18.

I also want to greet all supporters to the Conference, and I welcome the organizers – the Secretary of Science, Technology and Higher Education of the State of Ceará, the Coordination to Combat Desertification in the Ministry of Environment and the Center for Management and Strategic Studies (CGEE). To Professor Antonio Rocha Magalhaes, Director of the Conference, my sincere appreciation.

To the Participants who came from all over Brazil and the representatives from 80 countries from all continents, as well as from international organizations, my message of thanks. Your presence here is a great honor for us. I'm sure there will be an extremely fruitful participation from all.

Ladies and gentlemen, I hope our land, known as the "Land of the Sun," will enlighten the debate and inspire the necessary synergy for us to invest our strength, from now on, in a campaign to combat desertification, against the various agents of global warming and in favor of biodiversity, sustainable development, empowerment of the population, food security, safeguarding water resources and, finally, in favor of life.

Thank you all.



## Part III. Keynote Presentations





## Keynote Presentations

### 1. Jeffrey Sachs, Earth Institute, University of Columbia

Jeffrey Sachs



Foto: www.grinnell.edu

#### Master of Ceremony

*Ladies and Gentlemen,*

We welcome you for this important session, when we will hear the Keynote presentation by Professor Jeffrey Sachs.

We would like to record the attendance of His Excellency the Minister of Scientific Research of Senegal, Amadou Tidiane Bâ; The Honorable Minister of Water, Environment and Fight Against Desertification of Niger, Abdou Kaza; and Honorable Minister of Water Resources of Ethiopia, Asfaw Dingamo; and other authorities from Brazil and other countries, and from international organizations.

To chair this session, we invite the President of the Federation of Industries of the State of Ceara – FIEC, Dr. Roberto Macedo.

## Dr. Roberto Macedo

Thanks to all of you who are present here today.

It is a pleasure to be here right now. I would like to congratulate all those who are here participating in this Conference. I want to greet Antonio Rocha Magalhaes, coordinator of this event, our countryman of the state of Ceará. Through him I greet everyone who is here today. My role is to try to coordinate some of the work of this day and do a short reading of the wide curriculum of Professor Jeffrey Sachs, who is our Keynote Speaker this afternoon.

Professor Sachs is an Economist and Director of Earth Institute at Columbia University. He is also Professor of Sustainable Development at the School of International Public Affairs, and Professor of Health Policy at the School of Public Health. In addition, he is a Special Adviser to the Secretary General of the United Nations, Ban Ki-Moon. He was a founder of Millennium Promise Alliance, a nonprofit organization dedicated to fighting extreme poverty and hunger in the world. Between 2002 and 2006, he coordinated the works of Millennium Development Goals. His works cover, among others, the topics of economic development, environmental sustainability, poverty reduction and globalization. His experience earned him extensive knowledge of the world. He is the author of several books including *The End of Poverty* and *Common Wealth*.

It is a pleasure to introduce to you Professor Jeffrey Sachs.

## Professor Jeffrey Sachs, Keynote Speaker<sup>1</sup>

The Drylands and Development: Raising the Political Stakes

*Dr. Macedo, Ladies and gentlemen;*

---

<sup>1</sup> Transcription not reviewed by the author.



It's a great honor and pleasure for me to be here at this important meeting. And I can tell you that this has been, I'm sure as for you, a fixed point on my calendar for a long time because of the importance of the subjects that we have in discussion this week. And giving the importance of ICID eighteen years ago and what we know will result from this meeting, the crucial role that you are playing and the deliberations this week cannot be overestimated.

I am an economist, I happen to have the pleasure of leading a scientific institution. Many of my colleagues and some of my former colleagues are here in the room. So I am an economist who spends a great deal of time worrying about how to translate this scientific knowledge into public policy. And I want to talk about that facet of the problem of the dry lands today. And I want to talk about it from a perspective of some desperation.

Because we are failing in this process right now. However much the science has advanced and however much of the practice of adaptation in many of the regions here has progressed, I think it is fair to say we are still losing the battle, globally.

As you have been discussing all week, the dry lands are the most vulnerable part of the world to climate change and the home of most of the world's very poorest people. And that's not a coincidence though, because the dry lands pose problems of survival and production, that are simply harder than in most other regions of the world. And so, even before anthropogenic climate change, these were very difficult regions.

And when countries have dry land regions and tempered regions as Brazil, it was not unusual, in fact it is the rule, that the dry land areas tend to be the poorer or the more difficult regions for human well being and often for economic development. And when looked at globally, the dry lands are also certainly the regions of the most advanced crisis in the world.

When we add the challenge of human induced climate change on top of already very serious economic and social and ecological challenges, we are pushing towards catastrophe and I think that's what ICID needs to help the world to understand. And I want to give a few minutes of thought about how, perhaps, we can make some progress on that and also to express my solidarity with you to help make that happen in the crucial two years to come. Of course the Rio+20 Conference in 2012 will be

one occasion where the important messages of this week can reach the world. But there are many occasions before that, that we should take note of. I want to show some ideas about that as well.

**A year of climate catastrophes including:**

- Record temperatures and heat waves
- Russian fires
- Pakistan, China, and Sahel floods
- Horn of Africa droughts

**Miserable policy front:**

- US Government inaction on climate
- Spreading violence in the drylands
- UNFCCC crisis of confidence
- Absence of timely delivery on promised climate financing
- The phony war on climate science

The first point I want to make is that this has been a disastrous year from the point of view of our common agenda. Disastrous not only from the physical point of view, but also from the political point of view. And I think these are only right to emphasize how we are losing ground. Not only we are losing ground biophysically, socially, economically, demographically, but we are losing ground politically as well. So we know that the first eight months of this year are already record breaking.

My colleagues at the Goddard Institute for Space Studies (GISS) together with NCAR and others have already shown for the first half of 2010, this is the warmest year on record. And we know that it is also a year of extremes in all parts of the world. We have devastation in many dryland regions or regions experiencing extreme drought and heat waves and of course the notorious ones among these are the rocking fires that have made Moscow and environs unlivable this year.

Devastation of floods at record levels in Pakistan, in China, in the Sahel of Africa and in other regions of the world. And I know because I travel with the UN Secretary General very often. When he said, as he did last week, that the floods that he saw in Pakistan were unlike anything that he's seen before, I can tell you that, first of all, it is not coming from a man who speaks in high probability. It



is coming from a man who has seen a tremendous amount of devastation before his eyes. I wasn't with him on the trip to Pakistan, but I can only imagine what he saw if he made a statement like that. An unrivaled disaster facing millions and millions of people who are standing as you can see on high level if they can reach it without food for days now, in the devastation along the Indus river basing.

And in China where I was earlier this summer and talking with the Yangtze river authority, this turned out to be one of the most disastrous years in modern Chinese history as well for flooding with many threats still to come. And once again in the Horn of Africa there are extreme droughts which are coming in greater intensity and more frequency and in places where my colleagues and I are working in the dryland parts of East Africa, I can say on behalf of the communities with which we are working that whether the downscale models have been able to prove it or not, these communities know without question that the climate has changed and changed in an enormously adverse manner for them. Often involving the disappearance of short rains, more frequent and more prolonged droughts and more famine. Now at the same time that the world record is showing these horrendous set of outcomes, the political situation vis-a-vis climate changes I think they also have to be regarded as dramatic.

First it's only about 4 weeks ago, since the US administration pulled back any attempt at climate legislation this year. And very likely it means there will be no climate change legislation during the 4 years of this Obama term. Because now it's quite likely that the US Government will lose seats in the mid-term election and they couldn't get climate change pass even with a large majority of the governing party and it will be nearly impossible for two years. And then after that of course anything goes, but here we have the second largest emitter in the world, just a small amount behind China now, and by far the world's largest emitter per capita of any major economy doing absolutely nothing, going into the eighteenth year of complete inaction.

How to imagine greater disgrace than the one the United States offers on this record? And how to imagine a collection of more ignorant people than we have in the US Senate by the way? It's not only that they represent our constituents, but they are fools many of them, absolute idiots. And I don't mind saying because they are wrecking the world and so keeping it a secret is irresponsible as well.

Now we also have geopolitically a growing crisis in the drylands. I'll show you a picture, in just a moment, of conflicts in the drylands which I regard as not a coincidence, but it's a puzzle relationship

between extreme poverty and the outbreak and persistence of violence. And it's definitely spreading. And even worse what's spreading is American throwing missiles, CIA operatives and others who think they are going to solve the problems of the drylands through heat squads and bombing. And of course this is not only absurd, it's certainly tragic, because war is spreading as it does, when you put issues like hunger and poverty in the hands of generals. And that's what the United States has done.

Wrong people, wrong diagnosis, wrong model, wrong tools. But it sure is a bold load of money going into this. Think about 100 billion dollars being invested in the drylands of Afghanistan in the form of troops and bombing. 100 billion per year being invested. With that amount of money we may be able to solve some problems in the drylands, but they are not digging anyways, and they are not tending to the live stock, they're bombing. And that's where the money is going right now.

Thirdly, the Framework Convention on Climate Change is definitely in an existential crisis. Because Copenhagen was disastrous in my opinion. However it's painted, it was a disaster. Four pages of a non binding document after two years of work! I often say that if any of my graduate students ever shows up, after two years with a four page paper and says "Professor, it's not complete, but we wanted to hand in something", that's absolutely a failing performance. And that's what the world did. And I would put the US as the lead fail and I would put China and a number of other countries close behind. Though I think the US bore the legal responsibility and moral responsibility. It is not the only one that was derelicting in its attention to the world.

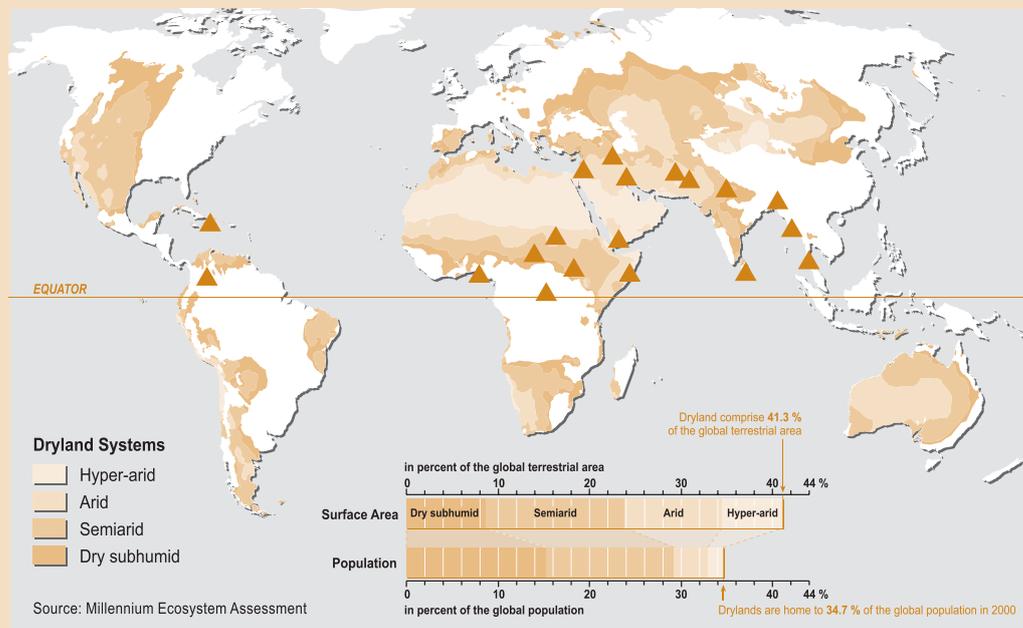
The next problem, to give this neatly, this year, is that at Copenhagen, one of the few things that supposedly came out of it, was a commitment for an emergency financing on climate change of 10 billion dollars a year, from 2010 to 2012. If anybody has found any of that, please let me know. I chase money for a living. I can't find it. Of course it's promised. But promises are very cheap. And actual delivery to people who need the help is lagging .

And then finally, I think it's no secret that climate science took a serious hit this past year. Not because of anything wrong with the science, but because of once again another demonstration of the power of propaganda in the world. There's just a lot more money behind anti-science than there is behind science. Let's face it. And it's all a game. It's all public relations. This climate gate business was nothing but propaganda game. A powerful entrance. At least say it. And I have a couple of ideas about it. We don't need to be defensive.



The people that lead this campaign and publicize it starting with the auditorium board of the Wall Street Journal are a disgrace. And they need to be called out on it. The procedures of science are more meticulous than of any other human endeavor and with more checks and more control. And there are no controls on the auditorium page of the Wall Street Journal. It's driven purely by meanness, ignorance and greed. And they have the audacity to attack the scientific community. And we need to have more effective response. And the effective response needs to understand more clearly what's really going on. And what's really going on is a game of public relations, funded by major industries and their interests.

Drylands include all terrestrial regions where the production of crops, forage, wood and other ecosystem services are limited by water. Formally, the definition encompasses all lands where the climate is classified as dry subhumid, semiarid, arid or hyper-arid. This classification is based on Aridity Index values



The long-term mean of the ratio of an area's mean annual precipitation to its mean annual potential evapotranspiration is the Aridity Index (AI).

**Notes:** The map is based on data from UNEP Geo Data Portal (<http://geodata.grid.unep.ch/>). Global area based on Digital Chart of the World data (147,573,196.6 square km); Data presented in the graph are from the MA core database for the year 2000.

▲ Major episodes of political violence, defined as political violence involving the systematic use of lethal violence and terror by groups and/or states that substantially affect the society or societies that directly experience the armed conflict (resulting in at least 500 directly related fatalities, substantial destruction of infrastructure and population displacements) Episodes may involve states, a state and no-state group, or non-state groups only, including inter-state and independence war, ethnic and revolutionary (civil) war, inter-communal warfare, genocide and communal massacres. Each episode is rated on a ten-point scale according to its total impact on the societies that are directly affected by the violence (Center for Systemic Peace, 2007)

This is a map we all know well, of course the map of the dry land regions. But the red triangles on the map are zones of conflict. The map is two years out of date. I took the conflict zones. It comes from SIPRI, the Stockholm International Peace Research Institute. And I mapped them onto the world map. And what you see is that there is a high and unsettling fact that the dry lands have a huge disproportion of the world's conflicts. And this I think is a pertinent fact and not a coincidence at all. Why is it?

Because conflicts with frequency hit the poor in most vulnerable places in the world. Conflicts right out in impoverished countries and the hungry places. More and more research has confirmed in recent years, including research done at the Earth Institute, that when the rains fail in Africa, the probability of civil conflicts breaking out increases multiply. That's startling, but obviously a reality of the region we are dealing with. Because failed rains are not an inconvenience, they are a matter of life and death. And conflict is a matter of hunger and disarray.

I'm working a lot in Sub-Saharan Africa. There is a scratch of instability across the entire drylands of Africa. From northern Senegal to northern Mali, desert regions through Niger, Chad, Sudan, Somalia, parts of Ethiopia, Eritrea, right across the Red Sea in the Yemen, Iran, Iraq, the dry lands of Pakistan and Afghanistan. One continuous swap of drylands eco-system stretches about 10000 miles and accounts for a huge proportion of those red triangles.

And that area is also the area now of US military intervention spreading. In the Sahel it is the CIA and the new African command. In the Horn of Africa it is the spread of war around Somalia. And the heavy engagement of US supporting the Ethiopian troops and others in Somalia. Across the Red Sea there is a secret not so secret war under way in the Yemen, a country that is in profound ecological stress, that America interprets as Al Qaeda crisis, because they don't understand what a hunger crisis is in the White House and in the Pentagon and the Congress.

So everything is viewed through a military lens. And into Pakistan and Afghanistan. And so I mentioned all of this for the obvious reason that what we are talking about here is of course human well being. It is of course survival of very poor people. It's about economic development. It's about eco-system functioning. But it's also about war and peace. And one of the messages that need to go out from this community is that there is a more reliable way to peace than sending the military. And there is a more systematic reason for conflict than ideology. And that would be drought, famine, hunger, disease and poverty.



And there's no solution that the Pentagon is going to offer to any of that except going home. And if we are going to send anything from the army, let it be the corps of engineers to drill some wells. Because that's really what is missing. It is basic viability and livelihoods.

I think what's so important about ICID in addition to all the science that is been brought today here is the capacity to mobilize global action. That's what we did eighteen years ago. That's what we hope we will do again now. And I want to mention some of the things that are on the way in other dryland parts of the world, that I think can be brought into the umbrella you are creating here.

First, on my own account, I can tell you, within a span of about 8 weeks, I'll be at three regional drylands Conferences. Each one undertaking independently, but undertaking for the reasons that bring us together globally. So next week, actually in New Orleans, the Mayor of New Orleans and several Prime Ministers of the Caribbean Islands and the lead climate negotiator of Mexico and the head of the Environmental Protection Agency of the United States, I'm happy to say, will be meeting to talk about climate risk in the Caribbean basin. We just completed at the Institute an overview, an analytical overview of climate change in the Caribbean. And one of the overpowering results was the likelihood of continuing drying in the Caribbean Island economies. They are already dry, but they are likely to become a lot drier and there's overwhelming consistency of the climate models on that point. And of course this is one of the major things that we'll talk about, the other being the hazards of more intense hurricanes. The evidence seems to be fewer hurricanes perhaps because of changes in wind, but more extreme hurricanes. There is a lot of uncertainty about that, but there is a lot of reason to worry as well.

#### **Some New Regional Initiatives in Semi-Arid Lands:**

Gulf Coast and Caribbean Basin: Earth Institute, UNDP, New Orleans

Mediterranean Basin: Government of Greece

Horn of Africa "Drylands Initiative": COMESA, Earth Institute, Seven Governments

In October Prime Minister George Papandreou of Greece will host a Mediterranean basin Conference and I hope there can be some representation from here to that meeting. He is calling the leaders of the whole Mediterranean community, southern Europe and north Africa and the Levant, to a meeting to talk about the overwhelming evidence of drying, more heat waves and more record

of wild fires and the likes that are hitting the Mediterranean. And I think that this is extremely important because the leadership of the Mediterranean is a powerful political leadership and knows that their region of the world is also in extreme duress and in extreme cross fire of long term climate change. And it's also an important region from the point of view of ICID because it's a developed country region by large.

Then I'll mention third a meeting that the Earth Institute sponsored together with COMESA, the community of Eastern Southern Africa in Nairobi last month. We are proposing with 7 governments in the Horn of Africa and in East Africa, so it's Kenya, Northern Kenya, Northern Uganda, the two dry land regions of those two countries. Somalia, Ethiopia, Djibouti, Eritrea and Sudan. Not an easy part of the world. A group effort to address the growing crisis of pastoralism. Because there are about 30 million people who are essentially pastoralists and they're facing havoc in their lives. And they are the marginal parts of their societies which are marginal societies in the world. And so the pastoralist crisis in my view is the single most intense climate crisis on the planet right now.

We are working in one pastoralist region in northeast Kenya, a place called Garissa District. It's the hardest part of all our work across Africa, because of the extreme dry lands conditions and one disaster after another. Frequent drought, and when it's not drought, intense floods. And it's one or the other. And it's just been a series of devastations for the last five years during our work there. And that's representative of what's happening throughout the region.

And then the US sends in troops on top of all of this. Because the US cannot see poverty for what it is. It's just a blind spot. And so this is a third initiative that is starting. Now these initiatives are not linked together right now, but they need to be linked together. Because dry land regions all over the world are coming to understand their extreme vulnerability, and political leaders are coming. We hosted the meeting and we had 22 ministers from those 7 countries show up and that showed a high level of determination to do something about this crisis. And so we're launching a ground based program of integrated development in the pastoralists regions as a result of the meeting. But I would say that there's growing political understanding of this issue that can be tapped at this point and very important to tap.

One thing I wanted to mention quickly is what we are doing in that dry land region, because I think that there are probably some useful lessons and I will be very happy to exchange notes and ideas



with any of you here. We have been tearing out for the last five years an initiative which we call the Millennium Villages Project, based on works that I was lucky to lead for Kofi Anan and now continue for Ban Ki-moon, called the Millennium Project, which is identifying ways to achieve the Millennium Development Goals in impoverished regions.

### **The Millennium Villages Approach for Impoverished Dryland Communities:**

Holistic rural development strategy

Focus on:

- Agriculture (crops, animal husbandry, agroforestry)
- Primary Health care
- Education (primary and secondary)
- Infrastructure (water, sanitation, connectivity, transport, electricity)
- Business development, especially farmer cooperatives

Will be implemented in: Somalia, Kenya, Uganda, Ethiopia, Sudan, Djibouti, and possibly Eritrea  
Interested in expanding to other regions (e.g. Haiti, Afghanistan)

We established community based development programs, all over Africa and all ecological zones from the rain forests to the area of pastoral regions. And I can tell you as a witness to this working in twelve agroecological zones, the drylands are by far the hardest of the entire program.

So what you are battling with is simply, objectively harder than any place else. We are feeling it everyday. What is like to be a pastoralist in the twenty first century? What is like to live in the drylands? One can almost grade our sights, by how much rainfall they get per year and how reliable the rainfall is in terms of the results in the progress in the escape from poverty. The drier and more erratic the harder it is. And so these ecological factors are extremely powerful barriers to successful development. But the point of Millennium Villages is to bring in resources in a science face manner and in a highly efficient enclosed monitored systems basis to address in an integrated way the ground level difficulties of the impoverished villages in different ecological zones.

There are five areas of focus. Agriculture, obviously including pastoralism, health, education, basic Infrastructure and business development. And the idea of the approach is an integrated community led systems basis that addresses all of those elements in an integrated manner. And while the

dry lands have been the hardest part of this project, there has been a lot of progress, even in the pastoralist area. In Northeast Kenya, we have at least a zone of stability and a zone of some human progress in health and in livelihoods, compared to a sea of instability all around this site, because it's right near the Somalia border. And so it does give evidence that there are ways with added resources to do integrated science based development in this case in arid not only semi arid, but in the arid pastoralist zone. And we are going to expand that project into Southern countries that I mentioned.

So let me end, by doing a few recommendations. I hope that it might be useful as you move to the final declaration of this week and I think that the important point is to make clear to the world the states of climate change in the dry lands, and to help globally to understand them, and mobilize the growing number of leaders in dry land countries that understand themselves and are ready to help lead globally on this issue.

#### Political Actions and Recommendations for the Final Declaration:

1. The Climate Crisis in the Semi-Arid Lands is a Growing Global Security and a direct threat to fulfillment of the MDGs. Threat, with risks of famine, flooding, mass migration, disease, and violence
2. The UN Security Council should convene a special session on violence, security, and the semi-arid lands
3. A new political Alliance of Semi-Arid Countries (ASAC) should be convened at the MDG Summit in September, and at the COP-16 negotiations in Cancun. Founding members would include: Brazil, Mexico, Greece, Spain, Kenya, Mali, Pakistan, Afghanistan, Yemen, among others
4. The ASAC should call for:
  - timely disbursement of adaptation funding, with priority to hard-hit ASAC countries
  - faster progress in global mitigation
  - implementation of a global "Polluter-Pays" greenhouse gas levy to finance adaptation and mitigation efforts
  - initiation of large-scale solar power programs in appropriate ASAC venues, with a focus on regions trapped in energy poverty and where large-scale solar power has obvious commercial feasibility (e.g. the DESERTEC project)



So, very quickly, my first point is simply to convey the message powerfully and clearly that the climate crisis in the semi-arid and arid lands is a growing global security challenge and a direct threat also to be achieved in the Millennium Development Goals. Now next month a hundred and fifty world leaders will meet at the United Nations for the tenth year of the fifteen year Millennium Development Goals process. And I am the main advisor to the UN Secretary General on the Millennium Development Goals. If you send a message about this, I will make sure it is heard. The relevance of your agenda to Millennium development Goals in my opinion could not be stronger. It is no accident that the dry lands are the most impoverished and desperate part of the world and need help. And that needs to be brought to the attention of the world and next month you'll have a hundred fifty world leaders that are there that can hear that message. And I will do whatever I can to help convey the message that comes from here.

Second, I think we should try together to have a security council meeting on the dry lands. To take the reality of that map. The fact that the dry lands are the home to a disproportioned share of the world's conflicts and have the security council consider the implications of that, because the world's diplomats have to understand that not everything is politics. Some things are ecology. And some things have biophysical base. And then there are conflicts that may mean hunger, not extremism or extremism as a result of hunger or an exploitation of hunger. And I think if we could get a UN Security Council meeting, even one day on that, it could help understanding and opening minds. And perhaps someday, somehow the United States will be less eager to sending the military to the next dry lands conflicts and instead sending the development effort which is the one that's really needed.

Third, I would like to suggest — I don't know if it is a redundant suggestion or not. I don't think it is, but I don't want to be presumptuous here — that we work together to try to form an alliance of political leadership in the drylands.

I wrote it as in the spirit of this Conference an alliance of semi-arid countries - ASAC, but it could be an alliance of the dryland countries. And I do believe that alliance can be formed. It could make a very powerful difference. We need not only the voice of science but the voice of political leaders in the world. And I think there are political leaders that can be brought into the leadership on this issue. Starting with President Lula, starting with President Calderon of Mexico, who's got a large dry land region in Mexico in his home stove, the COP 16. Other names that come to mind quickly

are Prime Minister George Papandreou, Prime Minister Zapatero, Prime Minister Raila Odinga, President Amadou Toumani Touré, Presidents of Pakistan, Afghanistan, Yemen and others. They all know what's really at stake in their countries, even if they can't make that heard with their individual voices. But if instead of each region focusing on its regional problems, we got the world's dry land leaders together to understand that this is common challenge world wide, of water stress, climate change, growing dryness, more instability of rainfall, more frequent droughts, more risk of famine, more risk of wild fires and the like.

I think this can be very powerful and again I certainly am at your service if you would like to help to organize that. I know most of those leaders, I think they would be receptive to joining together in a new grouping that talked about climate change, not only by region but by ecological zone, where they share the deeper characteristics. What would a such group actually do? First it would try to help itself. It would call for timely disbursement of the promised adaptation funding, giving priorities to hard hit countries in the dryland region. It would of course demand faster progress on mitigation actions, including letting the dryland regions focusing on their own countries as well as countries as the United States, which has a significant dryland region, of course specially in the west.

Fourth, I think that it should call and I should say for all of us, we should understand that the money question in climate change is a game. And when Secretary of State Hillary Clinton came at the last minute to Copenhagen, and said "oh we will support 100 billion dollars by 2020 from somehow, somewhere, someway", that means nothing. No applause. We should just put our heads in our hands. Now, what would be something if we had a specific mechanism and we should be done in my view with this cap and trade nonsense. It was all an elaborate way for politicians to avoid the word tax, which would be far more straight forward and far more powerful in transformation and would collect revenues and be a lot more transparent. And the whole cap and trade thing started because Bill Clinton did not want to say carbon tax. And then Europe adopted it and the United States abandoned it. And Europe has got a system which is cumbersome and it tries to paddle it to the world and the world did not want it. And the democrats in the US Congress tried to cap and trade again and it failed miserably, because it is actually an extremely cumbersome, not useful system compared to simply putting a carbon tax on it.



But the point I want to make here is that if we are ever going to collect real money for international public goods for climate, both adaptation and mitigation, there should just be a carbon levee by country. Pure and simple. Very transparent. Let polluters pay. It could be a greenhouse gas levee expanded to cover methane and nitrous oxide, but it should be simple, straightforward, not razzle dazzle from our Secretary of State, but money on the table and I think this is something that we should be advocating. Pure, simple. No gimmicks anymore.

And then fifth point I would mention, but I could mention ten, it is that many of the dryland sites have a lot of potential for renewable energy. In fact some of them are the world's best places for solar power. Because its sun shines all day long. And solar initiatives in a large scale would be excellent for development, excellent for sustainability. Excellent, by the way, for global economic recovery. And something I think we should be pushing for the dry lands a much expanded, it doesn't exist yet, but a coherent global effort to bring solar power and other renewable energy to the dry lands and specially to energy poor regions of the world. So those are some of the things this new alliance could usefully call for that would be good for each of the members and good for the world.

Finally let me say we need to get better at global public awareness. We are losing, but not because we are not so good at it, but because we don't have billions and billions of dollars behind us, like the oil companies do. And we are not so good at propaganda because we have the bad habit of telling the truth for a living. Whereas the opponents have a real habit of lying day in and day out, and everything sells in this world. No matter how egregious are the lies. And so this is tough. I don't want us to abandon our commitment to the truth, ultimately will be the key to solution, but I do want us to get better at public awareness.

#### **Global Public Awareness Campaign, including:**

- Target the information to national and local political leaders in the Dryland countries
- Appeal for national efforts in the ASAC countries, especially for marginalized areas
- Build an active clearinghouse for adaptation best practices
- Call out Rupert Murdoch and News Corporation for the massive global damage caused by the WSJ, Fox Television, and others involved in climate-science bashing
- Mobilize an alliance with major industries operating the drylands, e.g. the mining and agriculture sectors

One thing is we should make and figure out how to do a very concerned effort to reach national local politicians throughout the drylands to explain to them what it means to be a political leader in the dry lands. So every Governor of the states of Brazil in the dry land regions, the Governors of the dryland states of the United States, the Prime Ministers of the Caribbean, the Presidents and District Officials in the Sahel and so forth, should understand, they are in a special place of the world. Climate change is affecting them in a special and powerful way. And they need to be agents of change and agents of global awareness as well. And of course we need the voices within countries to appeal nationwide, so the dry land parts of Brazil are making the case nationally in Brazil. The dryland parts of the United States are making the case nationally as well.

I think we need to do a better effort on building a clearing house in information and best practices in adaptation. I'm not sure, I don't want to reinvent the wheel or duplicate what has been already done, but I don't feel yet that we have a global scale clearing house of knowledge on these issues. And I don't think that it would be important to create.

I want us to have a campaign against Rupert Murdoch. What a first class jerk actually, because you know there needs to be responsibility in the world. And if you own Fox television, that is the opposite of responsibility. If you own the Wall Street Journal, that is the opposite of responsibility. And I think I want us to bring storm a little bit, maybe not at this moment, but how to address new course phenomenon.

Because it is the purveyor of the worst misinformation in the world. It's influential, at least in the United States. It does great damage. And it is entirely unaccountable, it is a machine of lies. And it is at the heart of our difficulties of getting the truth out.

And finally I'm so happy that Dr. Roberto Macedo is chairing this section from the Chamber of Industry of Ceara state. Because the last point on my side, the last point I want to make is that we need to mobilize also an alliance with major industries operating in the dry lands. Because the industrial sector knows the truth and knows the difficulties. And the industrial sector in order to pass on survive has to be operating in viable locations. And the voice of industry is powerful. Powerful politically, powerful in reaching the workforce, powerful in reaching the broader community. And so



we shouldn't shy away from that. Of course not all industrialist wants to play. Some of them create a lot of damage. Like our big oil companies, specially Exxon Mobil, which has funded a tremendous amount of the misinformation. It certainly deserves its place in the hall of fame right along side to Rudolf Murdock. But a lot of industry wants to lead responsibly. And I think this is another part of our initiative. So let me close here.

First to thank you for this important gathering. Please understand that in addition to Rio plus 20 in two years, we have an MDG summit next month. We have the COP 16. We have many regional events. We have no time to loose.

Thank you very much.

## 2. Ignacy Sachs, Research Center on Contemporary Brazil-France

### The Challenges of the 2012 United Nations Conference on Sustainable Development and the Semi-arid Regions<sup>2</sup>

Ignacy Sachs



Foto: CGEE

#### In Search of Three-win Solutions

The second Earth Summit, scheduled for 2012, will meet again in Rio de Janeiro at the threshold of the third great transition in the long co-evolution of the human species with the biosphere. The first transition, known as the 'Neolithic revolution' (Gordon Childe<sup>3</sup>) started twelve thousand years ago, was marked by the domestication of several vegetal and animal species, the sedentarisation of human populations and the emergence of the first cities. The second transition, associated with the rise of fossil fuels, began at the end of the seventeenth century and led to the industrial revolutions that changed completely the face of our civilisations.

The present transition ought to free us, as quickly as possible, from our excessive dependence on oil and coal, so as to reduce the emissions of carbon dioxide, responsible for the warming of the atmosphere and the resulting deleterious climate changes.

<sup>2</sup> Paper for the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions, (ICID+18), Fortaleza, 16th – 20th August 2010.

<sup>3</sup> Gordon Childe, *Man Makes Himself*, (London: Spokesman Books, 2003, 1st edition: 1936).



According to the Nobel Prize winner Paul Clutzen, we have entered a new geological era – the anthropocene era – in so far as human activities have grown to a point in which they have a significant impact on the Earth's ecosystems.

It is up to us, passengers of the *Spaceship Earth*, to show that we are capable of acting as true *geonauts*<sup>4</sup>, preparing an orderly exit in the twenty-first century out of the oil age and, possibly, of the fossil energy age altogether. More generally, we ought to limit the 'destructive creation' so persuasively described by Schumpeter, even though the abyssal consumption disparities between the rich minorities and all those who barely survive at subsistence levels prevent us from stopping the material growth and moving to the stationary State visualised by John Stuart Mill<sup>5</sup>, whatever the tenants of the degrowth theory may say.<sup>6</sup> The fairer the income distribution, the lower will be the level of GNP at which it will be possible to stop the growth of material output; there are no limits for immaterial growth – services, cultural activities, etc.<sup>7</sup>

The capacity to anticipate is a specificity of the human brain<sup>8</sup> and planning an important tool at the hands of modern societies that ought to be revived in the present circumstances, the more so that we have moved from the abacus age to the computer age and that planning can be conducted by means of a quadripartite democratic dialogue between the State, the entrepreneurs, the workers and the organised civil society.

As a matter of fact, we must confront in our plans two simultaneous challenges: the already mentioned **climate change**, threatening in the long run the very future of humankind, and the **poverty scandal**; how many, among the passengers of the spaceship Earth, go to bed hungry, despite the fact that the current world production could satisfy everybody's needs if the distribution of wealth were less skewed?

---

4 I borrow this neologism from Erik Orsenna, *Portrait du Gulf Stream. Éloge des courants*, Paris: Éditions du Seuil, 2005.

5 John Stuart Mill, *Principles of Political Economy*, (first published in 1848).

6 The leading French author on the subject is Serge Latouche. See also Éric Dupin, "Enquête sur la décroissance, une idée qui chemine", *Manière de Voir* n°112, *Le Monde Diplomatique*, août-septembre 2010, p.16-21.

7 See on this point the pathbreaking Barriloche model : Amilcar O. Herrera, *Un monde pour tous, le modèle mondial latino-américain* (Paris: PUF, 1977).

8 See on this point Anatol Rapoport, *Conflict in Man-made Environment*, (London: Penguin Books, 1974) and Éric Lambin, *La Terre sur un fil*, (Paris: Éditions Le Pommier, 2004).

That is why we must stick to **three-win solutions: socially inclusionary, environmentally sustainable and economically viable**. The latter is a precondition to see the other two objectives fulfilled.

A comment is in order here about the way in which the two challenges are intertwined. The poor are the first victims of climate change. Living from hand-to-mouth, they do not have the resources neither to mitigate nor to adapt to climate adversity. The Dutch may envisage costly public works to strengthen and raise the dikes that protect them from the sea but the same cannot be said about the Bangladeshi, not to mention the inhabitants of the Maldives Islands.

## From Stockholm to Rio de Janeiro

The 2012 meeting ought to be put in the historical perspective. It will meet forty years after the seminal Stockholm conference, which succeeded in putting environment on the UN agenda and was followed by the creation of the UNEP. Many countries set up ministries of Environment, some even changed their constitution. The World Commission on Environment and Development, presided by former Norwegian Prime Minister, Gro Harlem Brundtland, made an important contribution to the definition of sustainable development and set the stage for the 1992 Earth Summit, which met in Rio de Janeiro with the presence of 110 heads of State and an impressive parallel forum organised by the civil society. The Rio meeting prepared an impressive Agenda 21.

However, this document did not have the deserved impact. After the fall of the Berlin Wall and the implosion of the Soviet Union, the neoliberal counter-reform took the stage. The 2002 Johannesburg Conference was unable to reverse this trend. Some observers went as far as to say that Johannesburg, far from being Rio+10, was instead Rio-10.

The 2008 crisis and its aftermath changed again the setting in which the next conference will meet, once more in Rio de Janeiro. On the positive side, the myth of self-regulating markets has been seriously shaken, even though not altogether dismissed. Moreover, a crisis is always an opportunity for change. I am told that in Chinese, the word 'weiji' for crisis is built with two characters, the first meaning danger and the second opportunity.<sup>9</sup>

---

<sup>9</sup> See Éric Lambin, *op. cit.*, p.235.



On the other hand, the European Union, up to now, has not managed to assist some of its members most severely hit.

Furthermore, several countries are embarking on austerity policies, oblivious of the fundamental tenets of Keynesianism. Not speaking of the urgent need to clarify the difference between left and right wing interpretations of this doctrine: State intervention in times of crisis, financed from deficit, can pursue very different goals from funding social housing to fostering the armament race.

Above all, the scientists from the Intergovernmental Panel on Climate Change (IPCC) are adamant: the time span left to mitigate the climate change is pretty short; we ought to think in terms of decades at most.

This underlines the importance of the forthcoming Rio meeting. Without going as far as to say that it will be the conference of the last chance, we cannot afford to waste this occasion to steer a new course in world economy and polity. In order to succeed, we ought to adopt a procedure that reduces the probability of deadlocks likely to appear in the piecemeal negotiations conducted among almost two hundred countries, as it happened recently in Copenhagen.

In what follows, a three-pronged approach is suggested.

All UN member States ought to be invited to present in, say two years, comprehensive long term development strategies encapsulated in plans, making use of the following concepts:

- the ecological footprint, starting with the energy footprint;<sup>10</sup>
- the biocapacity enhancement;
- new energy paradigms characterised by greater sobriety and efficiency as well as substitution of fossil fuels by renewable energies;
- the generation of opportunities for decent work, in the ILO acceptance of the term, with special reference to such themes as food and energy security, exploring the frontiers of the green and blue revolutions as well as the prospect for agroforestry, in order to move towards an economy characterised by low carbon emissions;
- housing, urbanisation and transport systems adapted to different ecosystems.<sup>11</sup>

<sup>10</sup> For the methodology, see the Global Footprint Network, <http://www.footprintnetwork.org/en/index.php/GFN/>.

<sup>11</sup> See Benjamin Dessus, *La crise de l'énergie n'a pas de solution technique, Manière de voir – le Monde Diplomatique*, n°112, août-septembre 2010, p.34-37.

The next stage should consist in coordinating these plans so as to generate positive synergies between them.

In parallel, the United Nations should set up a well endowed UN Fund for Inclusionary and Sustainable Development to assist the less developed countries. The Fund would be financed by the proceeds of a tax on fossil fuels, supplemented by the transfer of, say, half a percent of the GNP of the developed countries to the less developed ones.

Finally networks for S&T cooperation should be organised following a new geography, using biomes as a matrix and fostering in this way the cooperation among countries situated in low latitudes.<sup>12</sup>

This brings us back to the subject of the ICID+18 Conference.

### Some research priorities for the semi-arid countries

The setting of biome-based cooperative networks among countries sharing similar climatic conditions and natural resource endowments allows for making good use of cultural differences, learning from the partners' organisational settings, managerial practices as well as technical innovations.

The following subjects figure among priorities for cooperative research and exchange of experiences:

- **Water conservation and use**

For obvious reasons, each drop of water – the very scarce resource – ought to be conserved and rationally used and reused whenever possible.

Hence the importance of equipping each household with a cistern to store rain water, side by side with the construction of water reservoirs from large ponds and açudes to subterranean installations that minimise water loss by evapotranspiration.

---

<sup>12</sup> See on this point, Francis Hallé, *La condition tropicale – une histoire naturelle, économique et sociale des basses latitudes*, (Arles : Actes Sud, 2010).



By contrast, along rivers, manmade reservoirs and canals, semi-arid regions offer exceptional conditions for highly productive and competitive orchards, vineyards, vegetable gardens, flower plantations, and such crops as the sugarcane.

The social impacts of these labour intensive productions are at the maximum when the irrigated perimeters are managed by cooperatives of small producers.

Hence the paramount importance of the land reform agenda, indispensable for the progress of the 'evergreen revolution', in M.S. Swaminathan's words, also known as the 'doubly green revolution'.

The difference between the first green revolution associated with the name of Norman Borlaugh and the evergreen revolution lies in their social impact. The original green revolution only benefited those happy few with enough capital to buy seeds and fertilisers and with access to water for irrigation. The evergreen revolution is directed to the majority of small farmers from the first wave of the green revolution.

A third wave is in the offing, associated with the use of charcoal as catalyser of the metabolic processes in the soil and renamed for the occasion 'biochar'.<sup>13</sup> Ancestral practices of some Indian tribes in the Amazon region, responsible for the emergence of fertile 'terras pretas', are being replicated now to set highly productive and less water demanding vegetable gardens.

As far as Brazil is concerned, we lack a precise estimate of the potential for irrigated agriculture in semi-arid regions. How many Petrolinas are still to come? How many small farmers can benefit from them, assuming that future irrigation perimeters will be allotted to small farmers organised in cooperatives?

---

<sup>13</sup> See on this subject, *Fighting Climate Change with Green charcoal and increasing Agricultural Productivity*, Pro-Natura Newsletter, December 2008, <http://www.pronatura.org/index.php?lang=en&page=newspage>.

- **Renewable energies and urbanisation**

Where water is not available, it is still possible to harness the abundant resource – the sun energy – and, in many places, the wind energy, putting to a productive use the vast expanses of land not suitable for agriculture and turning out vast amounts of energy far in excess of local needs.

This surplus energy might be put to good use by setting in the region industries transforming raw materials coming from the neighbouring semi-arid and rain tropical areas and by fostering the development of urban centres, concentrating side by side with those processing industries all kinds of services – health care, education, research.

Drawing lessons from the negative experience of such countries like Egypt,<sup>14</sup> special attention ought to be given to protect the scarce agricultural land from being invaded by urban sprawl. It is easier and cheaper to build cities in the desert than to transform deserts into fields.

The positive lessons coming from Egypt is that arid lands may prove rich in mineral resources and, as already mentioned, offer plenty of space to harness in favourable conditions solar and wind energy.

Urban settlements in arid and semi-arid lands raise many challenging problems to architects, urbanists and specialists in urban transportation systems, opening a vast field for the South-South exchange of experiences. Thanks to their research potential, Brazil and India stand as two potential locomotives of a network of countries with extensive semi-arid regions.<sup>14</sup>

Hopefully, the ICID Conference will make a decisive contribution to the consolidation of the network of countries confronted with the difficult challenge of fostering socially inclusionary and environmentally sustainable development strategies in the semi-arid and arid regions.

---

<sup>14</sup> See the special report on Egypt in *The Economist*, July 17th, 2010.



### 3. Jesse Ribot, SDEP, University of Illinois, USA

#### Presentation Highlights of the ICID+18 Conference

Jesse Ribot



Good morning. Ladies and gentlemen, friends and colleagues. I first want to thank Antonio Rocha Magalhães, for the opportunity to address this group and to collaborate with him to put together this Conference. It has been an extremely rich experience for me.

I will start my presentation with a few words in Portuguese. So for all of you non-Portuguese speakers, headphones might be good. This is just for a few moments.

*Somos muitos Severinos  
iguais em tudo e na sina:  
a de abrandar estas pedras  
suando-se muito em cima,  
a de tentar despertar  
terra sempre mais extinta,  
a de querer arrancar  
alguns roçados da cinza.  
Mas, para que me conheçam  
melhor Vossas Senhorias  
e melhor possam seguir  
a história de minha vida,  
passo a ser o Severino  
que em vossa presença emigra.*

This is from a poem entitled “*Morte e Vida Severina*” by João Cabral de Melo Neto. And it speaks of the difficulties, the pain, of living in a land of drought, known as Brazil. A land that’s had much suffering. The last line of the poem says “to know me better, follow me as I migrate.” I think this line speaks strongly to what it means to have knowledge of the problems we are studying? This is from the humanities. It’s about experience, it’s about the experience that we as researchers try to have. It’s the firsthand knowledge of what it means for someone to live a marginal (or severe – Severino); a severe marginalized life. Eighteen years ago here in Fortaleza I found this poem while at the first ICID, and it struck me as representing much of what we were, and still are, trying to talk about.

Eighteen years ago, the situation we were looking at was very different. Not only was climate change a speculation, not as well accepted as today, despite that there are naysayers; climate change was also the domain, squarely, of the natural sciences, and there were some social scientists involved – mostly people involved with drought and issues around that. But the social sciences were at the edge and one of the things that I want to say today, that really strikes me, is that in this meeting the social scientists not only were deeply involved, front and center, but the natural scientists as well as social scientists are calling for working together. Not all. There’s always people that don’t see the connections, but I think we are really starting to work together. I think we are –scientists, social scientists, and natural scientists. I’m trained as a physicist to begin with so, I speak a little physics. It’s a whole other language, but nonetheless together we should truly try to experience that marginality of Severino, and I think all of us will then be able to speak more clearly with each other.

Nineteen years ago the debate was about climate impact. At ICID the ‘I’ stood for *Impactos*; Impacts of climate change. But, what we saw was that the same climate event, a drought of the same meteorological magnitude, in northeast Brazil which killed millions of people, would kill nobody in the southwest of the United States. What we see in other parts of the world is that a cyclone in Bangladesh killed 500,000 people forty years ago, yet a larger storm hitting the same coastline just a few years ago killed only 3,400 people – on the order of one-hundred-and-fifty-times fewer deaths. At the time of ICID I, effects of climate were modeled as in Figure 1.

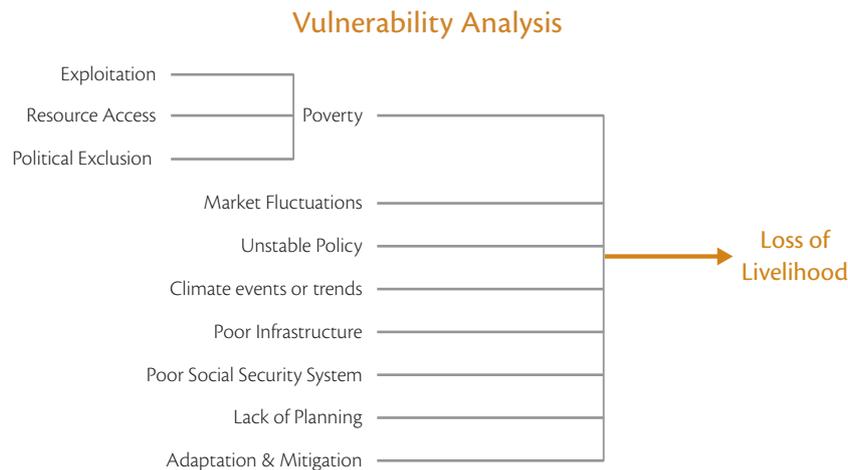


**Figure 1:** Impacts as the multiple outcomes of a single event

Clearly, these outcomes, the deaths and the sufferings associated with these events are not the outcomes of climate. They are not coming out of the sky. Vulnerability does not come from the sky. Vulnerability is on the ground. And this is what we need to understand, because part of the composition of vulnerability, part of what triggers the negative events that we see and associate with climate are climate events. We have to better understand the factors that link those climate events and outcomes. To do this, we can invert the equation: instead of looking at the multiple effects of a singular event, we look at the multiple causes of just one of those outcomes. So, we pick one outcome, and what we begin to see is that vulnerability is composed of many of the elements that we think of as the social, economic and political context in which we live – poverty and its causal structures: exploitation, resource access problems, political exclusion, market fluctuations, unstable policies. All these things we know very well. These are the things that push people to the margins so that when climate events and trends occur, and trigger outcomes that we are horrified by, we see that climate is one amongst many cause variables in that equation. I think we heard exactly that statement from my colleagues here today. It's coming from both sides – social and natural scientists. We know we still have a long way to go in understanding how to keep a dialogue going in which the social-structural, not just the proximate causes, but the distant causes that happen in boardrooms of corporations, the causes that come from government policy or international policy or trade

agreements, we need to keep those in the room when the climatological discussions are going on and the modeling efforts are going on to understand why disasters occur.

What we see is that many of those variables are the variables of development. All of these variables, in some way or another contribute to both vulnerability and security. And we need to keep them in the equation. So in Figure 2, climate is one amongst many variables. I think this was a difficult pill for many climate scientists and climate-change researchers to swallow. The issue is that this framing might marginalize climate as a problem, by making it only one amongst many. But in fact research shows that climate is one amongst many variables, and we need to address it as such because of the extraordinary interdependence and integrated nature of the problems we face. The variables that cause vulnerability are neither singular nor independent from each other.



**Figure 2: Vulnerability as outcome of many factors**

The new term on the block is ‘adaptation’. It’s taking place of what used to be called coping and resilience. I think we need to remember that there are long histories of research on coping, and even a great deal of learning on maladaptive coping situations, where people would cope, exhaust their assets, and be worse off for the next event. We studied these dynamics in the Sahel in the 1960’s and 70’s and 80’s. We are aware of these things. But today, because we’ve changed the term, we lost some of that history. Nevertheless, I saw that an enormous amount of extraordinary new research in ICID II is looking at the inter-temporal effects of policy on reducing and increasing vulnerability. I



think that's an important development. We're not just concerned with the consequences associated with climate, but also with the consequences associated with climate response.

I think that associating adaptation with development, despite that we need to question many of the old paradigms of development, is a good thing. Associating development with adaptation questions could bring some positive attention to the plights in the lands we are working in. But, 18 years ago, when we looked at this, we had to ask the question 'why is it that we have to talk about potential disasters in terms of future vulnerabilities, hunger, famine, dislocation, when, in fact, they are occurring now and nobody is addressing them'. We had to ask 'why are they being addressed only in post-shock disaster situations when they could be addressed by treating the causal structures of these very problems'.

Today we are at the same place. The IPCC's Fifth Assessment Report is currently being written. While we sit in this room there are thousands of people around the world working on this new report. The structure of that report has brought adaptation front and center. It has marginalized vulnerability. Look carefully at the outline of the report. When we look at it carefully, we see that there's no place in this report to look at causal structure, because if you look at the causal structure, you will begin to map it onto the institutions at different scales of society that have responsibility. Responsibility is associated with blame. Nobody wants that. The politics dictate that vulnerability be relegated to something that we have to consider only as an 'indicator'. We want to know where those vulnerable people are. So vulnerability is just an indicator. We don't want to know why they are vulnerable. The report obfuscates on causality. All the IPCC report wants to know is how they are going to adapt. The report is interested in how they are going to move forward from where they are. It does not ask how they got to a situation of vulnerability. Adaptation is a term that doesn't lead us to ask the questions: 'why do we need to adapt', and 'what is it that puts us in that position of necessity and dire need'?

Of course, I think the term 'adaptation' is here to stay, and I welcome it (I have little choice). But I think we have to look at it and understand its limits and understand its place and functions, and not accepted it without question. It is a term that we need to think through as social scientists. Why did it emerge as a term as part of discourse, and what effects might it have, and what kinds of knowledge this term, this discourse, includes and excludes. Why does it supplant 'vulnerability'?

We need to look at these words, because they carry knowledges shaping the way we talk and think about things within a larger collective social endeavor.

So, let's go beyond the Fifth Assessment Report – before it begins. Let's examine the active ingredients of risk and vulnerability. What are the causes – of ability and inability to change – that we need to keep in mind as we talk about adaptation? Adaptation is a term I think we need to still critique, but, since it's here to stay, what we need to do is to infuse it with meanings that make it inseparable from the analysis of vulnerability and its causes. That's how I'd like to see us move forward. What are the disabling and enabling elements that must change for there to be effective adaptation? Some I mentioned earlier, such as poverty, infrastructure, etc. But I think that it can be boiled down further based on cases I heard in discussions this week at ICID II.

What I did hear, and I was mostly attending the social science panels, boils down to issues of power and marginality in what I call multi-scale inequalities. Drylands are economically low productivity, when they lack infrastructure. I put the word 'when' in there because many people talk about carrying capacity – which is a nonsense term. Carrying capacity is meaningless. Human beings change the carrying capacity of land and landscapes all the time. People and their societies make drylands productive, and they do so using the entire social and political-economic hierarchy they live in. They do so with infrastructure, technology, access to resources, institutions, resource policy, and the ability to influence policy. They do so as social and political beings. So, drylands are not just unproductive in some absolute sense.

Drylands are also marginal, and that is partly because they are hard to govern. They are what Jim Scott calls Zomia – a place where the state is absent because of steep mountains, difficult to cross deserts, marshes or forests, and where its diffuse populations are hard to govern because they can hide or migrate. Many governments tried to solve this problem through sedentarization programs. Not because this was good for nomads or shifting cultivators, but because the government could tax them if they were sedentary. These are the kinds of things that we often see going on in the name of development. Drylands remain marginal in global climate debates dominated by sea level and forestry carbon sink discussions. Many panels at this conference have discussed how to bring drylands front and center in that global debate so that drylands are not marginalized. Economic marginality of drylands has led to underinvestment, within drylands there's also extraordinary inequality. We have to acknowledge that the internal dynamics of these zones also are extremely



problematic, with gender inequalities, ethnic tensions, migrant/settler inequalities. These all need to be taken into account.

Climate intervention takes place in an unequal world. When you throw a stone in a lake, the ripples rebound taking on the contours of the edges of that lake. The edges of the lake we are looking at, not just the drylands, but the whole world, are highly unequal. We risk reproducing and deepening the contours of inequality if we are not aware of them as we do our work. For example, years have been spent decentralizing natural resource management, and I think there is a high risk of recentralization of forest and resource management under programs like REDD [the UN Program for Reduced Emissions from Deforestation and forest Degradation]. We have to be very conscious to avoid that.

Inequalities are maintained in many ways. I'm not going to go into how they are maintained – economically or through policies. I'll just give one example: the government in Brazil systematically invested in the development of the south and not the northeast. This is partly about a history of giving priority to areas of high productivity. Southern areas were more productive, but these policies created problems within Brazil, such as northeastern populations that could not live in these drylands, due to lack of investments, and they had to migrate to various forested and urban frontiers. Things have probably improved, but this is just an example of how marginality is produced. This marginality is then maintained discursively through narratives of 'lacks of capacity' or 'backwardness' or even terms like 'adaptation' when taken uncritically.

This conference will produce a declaration. What is needed in a declaration? I don't have an answer, but I have a few thoughts. Development as an objective is important, because many of the political, social, and economic factors that cause vulnerability are associated with development. That's not necessarily a call for 'business as usual', but there's much 'business as usual' that has been positive. There are projects and programs that have had great successes. Those should be looked at, built on, and we also need to look at development as an enterprise to figure out whether and when and how it can contribute. So, we need of course 'carbon-friendly' development, but it has to be about the felt needs of drylands. These needs are also usually not about the weather, as I mentioned earlier. They are about low productivity, multiple risk, and limited opportunity. These are what have to be addressed for the security of many rural people in drylands.

How do we create more interest in and attention to power and inequality? The felt needs must be voiced, heard and represented. There is a lot of talk about consultation, participation, voice. These terms, however, are meaningless without representation, accountability and responsiveness. How do we leverage that responsiveness? Representation requires representatives to have the ability to 'respond', because you are not represented if they just listen to you. Representation means there is a response somehow linked to who and what you are. So I think that one of the big issues is going to be representation at multiple scales, national, local and global.

We'll need to have a strategy to get attention and representation for drylands. I don't think we need scare tactics, like 'invest in drylands or we'll give you the jihad of your life'. I don't agree with Jeff Sachs that this will get us very far. Or 'we'll supply your slums and favelas with new hoards', or 'we'll supply your forest frontiers with tree hungry settlers'. Those are all within the possible range of tactics. But communication, images, and suffering have also not taken us very far. These have generated emergency response. Amartya Sen observed that persistent hunger doesn't generate much of a response but famine does. We need to be able to pull back the threshold at which people perceive and understand what is going on and are drawn to respond. But, I do not think it's going to happen in an atomistic, individualistic, bleeding-heart kind of fashion. It is going to happen when governments band together to do something.

Development is occurring in drylands. We see it. There are many successful projects that have been discussed in this meeting. Cities are growing and sometimes in a very positive way and other times there are great difficulties around water supplies and effluents, but there is also economic activity. Climate action needs to build on existing efforts, not only existing efforts in development investment, but in analysis and research. The history of ideas should not be abandoned just because the problem, climate change, is ostensibly new. Climate change is unprecedented, but that doesn't mean that people haven't been experiencing fluctuation and change for the history of humanity. That's not new, and the changes we will experience, maybe at new scales, are not new. Perhaps we need a new social science to deal with that, but we also need to take with us the old social science. New strategies must enhance the typical efforts to pull people out of poverty. These are things that we do have some experience with. Many international organizations do. These efforts have been very difficult, in many ways often marginal in that effect. But we still need to be thinking about and building on those efforts.



As I went through the fifty sets of recommendations by participants in this meeting, I began regrouping them. Many things that came up on those recommendations were classic. Education; Many calls for infrastructure; Many calls to build assets and entitlements; Representation, voice, participation – local, national and global; Local government conscientização; Global coordination of drylands. So, there is a call for representation at multiple scales, including a call for a new global, political, ecological coalition of drylands – maybe not heads the states, but something parallel to international cities network or the international rivers network. People called for high-level political leverage of some sort – like what exists in some conventions, but evidently it has not been very effective. There are a number of calls for that scale of an intervention. So, voice is called for and needed at every scale, along with some mechanisms by which to hold government and representatives accountable.

Policy coordination was a frequent issue – extra-intra-sectoral cooperation came up. This issue of sectors, like forestry, and other environmental sectors, is extremely important. Sectoral ministries in most countries override other policies, ignore them because of the enormous material wealth that they control and allocate. They do need to be coordinated, subjugated to political processes, in a way that makes them serve the interest of people that they are ostensibly put in place for. And the need for research came up in almost every panel, in almost every recommendation.

So how do we make all this happen? First, we call for greater representation and empowerment. I don't think we just produce these things. We do need to call for them loud and clear. The declaration discussion this afternoon should focus on how to leverage change. We have technical solutions to most climate and developing problems. Solutions are on the shelf. The effluents from cars being driven in the United States are not a technical problem. The problem is not how to make Humvees that can go 150 miles on a gallon of gas. The problem is how to get the idiots in the Humvees to drive small cars. This is a social issue, it is not a technical one. Though there are people funding researches to make big cars more efficient—while social science research remains gravely underfunded. So we have lots of solutions to the problems we face in drylands. We need transformative pathways. I don't know how we will get to them. Calls for change are beginning. But how do we give some bite to that bark? We need to be able to give leverage to the voices. So somehow we need some sharp way of creating not just information flowing upward and evaporating, but information that has hooks on it. We need some way to pull back down material goods, services and political responses. This is the discussion I think we need today.

What we heard this morning was an extremely rich set of presentations with recommendations. What I saw in the one-pagers submitted by participants was even more in depth, with enormous numbers of great ideas. We will not see all those ideas in the declaration of Fortaleza that this conference is hammering out. It is a very general kind of document. But they will all be appended to the declaration in one way or another; they will be present on the website. Those recommendations are not going to disappear. So I just want to say that because, when we go from the specific recommendations to a broad document, it may seem like so much is lost. But, in some ways, it has to be. It's an impossible task to include it all. So with that said I think we do have a draft that is interesting and will provoke discussion in the afternoon when we'll have time to think that through and discuss it.

Thank you very much.

**Part IV.** Summary report  
of selected sessions





## Summary report of selected sessions

### 1. Synergy among the Rio Conventions

Chair: Ambassador Luiz Alberto Figueiredo

Rapporteur: Sérgio Zelaya

#### Conclusions and recommendations



Foto: ICD+18

Panelists from UNCCD, UNCBD, UNFCCC, WB, FAO and UNEP

The Plenary Session was chaired by Ambassador Luis Alberto Figueiredo Machado, of the Ministry of Foreign Affairs, Brazil. Presenters and discussants were: the Executive Secretary of the UNCCD, Luc Gnacadja, the Executive Secretary of the UNFCCC, Christiana Figueres (recorded message), a representative of the CBD (Sergio Zelaya on behalf of the Executive Secretary Ahmed Djoglaf), the Regional Director of UNEP in Latin America, Margarita Astrálag, a representative of FAO, Nora Berrahmouni, and a representative of the World Bank, Walter Vergara.

The Plenary Session was held on August 17th, 2010. Exchanges were made in plenary format, after keynote presentations by the presenters listed above. A summary of the main conclusions and recommendations is included below.

## Conclusions

1. Drylands are the LOCUS for synergy action on biodiversity conservation and climate change mitigation and adaptation.
2. Synergy in drylands must start with action aiming at the over a billion poor and vulnerable men and women living in such areas.
3. International governance requires an even stronger coordination for more coherence and effective attention on the inter-linkages within the legal mandate of each treaty. There are some complexities for national and local governments in effectively acting coordinately and complementarily on the three conventions, for example on the attendance of multiple meetings and to actively participate in each of them. Institutional issues (capacities and development) administrative costs, as well as requirements for separate reporting processes are also complicated issues for coordination.
4. The achievement of synergy action is also complex maybe due to the segmentation and compartmentalization of multiple ongoing processes, for example just within the biodiversity cluster there are more than 150 related international agreements.
5. In drylands there already are priority issues that can be highlighted under synergy action, such as poverty reduction / food security of vulnerable populations as a priority linked with ecosystem resilience (water management / droughts, urbanization, biodiversity conservation, adaptation and mitigation to climate change); these priorities include partnerships for international cooperation (local, national, regional and international). Finally, it is important to consistently address several emerging issues, among others, on capacity development, coordinated research for science, policy development, on awareness creation, financing, on regional aspects and on thematic issues such as migration and renewable energy.
6. There was agreement in the plenary session that synergy starts at the local level when local communities, accompanied by Civil Society Organisations (CSOs) and especially integrated



and coordinated action undertaken by national governments under the mandate of each convention, increase coherent decision-making, resulting in increased capacity development, identification of investment frameworks, improved networking and better positioning at the international negotiation of each agreement.

7. The coordinated implementation of the Rio conventions can strengthen the identified advantages for an in-line approach; participants highlighted the forthcoming negotiations (2010-2011) of climate change and biodiversity, focusing on the resulting schemes for adaptation, the extension of the Clean Development Mechanism (CDM), and on the biodiversity targets. Forest and forestry issues were highlighted as key themes for synergy action, especially but not only under REDD+, being negotiated within the climate change process. Other opportunities that can be harnessed are: the joint approach to institutional support at the local / national / regional levels for common or harmonized reporting and to the implementation of UNCCD NAPs and UNFCCC NAPAS as well as with UNCBD's NBSAPs, on SLM-related issues, through pilot exercises for drawing lessons that could be thereafter replicated. Some operational level mechanisms to achieve progress in delivering more effectively on common issues can be provided by, for example, the joint work programme on drylands between UNCBD and UNCCD and the work of the Joint Liaison Group (JLG) which gathers the three executive secretaries of the Rio conventions, just to mention a few of them.

## Recommendations

1. The parties to the Rio conventions, their secretariats and other bodies of such conventions could combine their efforts in the effective design and implementation of policies in common areas by addressing the vulnerability issue in drylands; the financial aspects (resource mobilization and recognition of investment opportunities that drylands offer) (for example the new financial architecture for adaptation as well as mitigation [CDM] to climate change and biodiversity targets) can help to harness synergy initiatives that support common objectives through differentiated approaches, focusing – as mentioned in the panel - in dryland areas.
2. As climate change is expected to continue exacerbating biodiversity loss and land degradation processes, thus accelerating the desertification processes, adaptation measures that address vulnerability must be at the forefront of the science-based policy decisions and implementation of the the three conventions, including information exchange, networking and knowledge management for sustainable investments in drylands.

3. Nevertheless the recognition of the priorities on climate change adaptation, in drylands there are also opportunities for climate change mitigation that could be harnessed by reducing green house gas emissions (carbon sequestration) through joint action in drylands, including the business sector, and the development of trade and market schemes that include drylands.
4. The secretariats of the Rio conventions must continue and strengthen their roadmap of common action suggested in the panel, to effectively address common issues at the respective COPs, at other international meetings, such as the MDGs in NY, and towards Rio+20 among other coming meetings.



## 2. Latin American and the Caribbean Dialogue Table

Sustainable Development in Drylands: combating Desertification and Promoting Adaptation to Climate Change



*Rapporteurs:*

Francisco Brzovic Parilo, Regional Advisor for South America, Global Mechanism of the UNCCD.  
Alexandrina Sobreira de Moura, General Coordinator of Environmental Studies, Joaquim Nabuco Foundation.

### Scope

During the ICID+18, developed in Fortaleza on 18 August 2002, government officials and international representatives of academia and civil society organizations in Latin America and the Caribbean, met in a Regional Dialogue Table convened by the Coordinating Committee of the Conference and the Facilitation of the GM-UNCCD and ECLAC. The Dialogue Table was chaired by Octavio Pérez Pardo, from the Secretariat of Environment of Argentina. Throughout the meeting, a range of topics related to sustainable development of drylands in the light of the combat of desertification, land degradation and the effects of drought and climate change adaptation were discussed. It was agreed to raise a shared vision on these issues, which were considered relevant by the Dialogue Table.

## Topics covered and recommendations

### a) Messages proposed by the Dialogue Table

In a first phase of this Regional Dialogue, participants made an initial approach to what should be the core messages that the Declaration of Fortaleza should incorporate, and these are summarized below:

- Global Change, recognizing that there is change before and beyond the climate and biophysical change.
- Land and poverty, two central elements in sustainable development of drylands.
- Food sovereignty, in promoting food security of local populations.
- Integrated local development, resting in unified development strategies of the territory.
- The UNCCD as a core strategy of governance and sustainable development, a Convention to Combat Desertification strengthened and energized through an implementation protocol, and an independent intergovernmental panel (like the IPCC).
- Convergence of trade and competitiveness with sustainable land management, in the sense that trade and competitiveness must be compatible with sustainable development of drylands.

### b) Relevant issues and recommendations

#### I. The UNCCD as a tool for sustainable development of drylands

It has been recognized that the UNCCD is probably the most effective instrument to attain sustainable development and human survival in arid, semi-arid and dry sub-humid areas, in the present and in future scenarios where, predictably, the lands under these conditions will expand as a consequence of climate change.

It has also been recognized that the Convention, in a wider perspective, beyond combating desertification and mitigating the effects of drought, and also through sustainable land management, is a tool for adaptation to climate change in the rural sector of drylands.

Finally, it was considered an imperative to accept that the current precarious living conditions that a significant fraction of the population of drylands is facing represent a major barrier to national and



global efforts to reduce poverty, food insecurity, migration processes of the rural poor, and to attain the Millennium Development Goals. Climate change will exacerbate this situation.

The UNCCD can become the main international agreement that can effectively contribute to such initiatives.

It is recommended to:

- strengthen the implementation process of the UNCCD through the implementation of a protocol setting out commitments for all Parties;
- recognize the mandate of the UNCCD as the broader international agreement to deal in an integrated way with all mentioned socio-economic and rural issues, desertification in the drylands, and the impacts of climate change.

## II. The gap between science and technology and the decisions on public policies

Weaknesses have been recognized in the communication of scientific knowledge, including traditional and local knowledge, to government decision makers. Also, there are weaknesses in the access systems and in the transfer and adoption of technologies by farmers, particularly in drylands.

Moreover, it appears that not always scientific research and technological development properly take into account local needs.

It is recommended to:

- expand and create dialogue instances directed to bring together relevant stakeholders so as to influence the prevailing decision schemes, creating appropriate mechanisms and formalizing agreements with the aim of improving the flow of communications relative to conservation and sustainable development of drylands, from the scientific community to government authorities at local, regional and global levels, incorporating locally relevant traditional knowledge and practices;
- strengthen regional proposals, including the "Latin American and Caribbean Initiative on Science and Technology (ILACT)", and promoting new networks in science and technology;
- strengthen and promote programs oriented to the access, the transfer and the adoption of technologies.

### III. The difficulties to improve synergies among related strategies and programs and its consequences

#### *The scope of multilateral environmental agreements*

Despite efforts being made to promote synergies among international multilateral environmental agreements, no significant progress has been made.

It is recommended to:

- accelerate current initiatives to promote synergies between multilateral environmental agreements, recognizing their distinct mandates;
- promote the harmonization of national action programs, particularly among the national action programs related to the implementation of the UNCCD and to the adaptation to climate change.

#### *The scope of national strategies*

Moreover, it has also been noted the insufficient integration of strategies and programs at national and sub-national levels driving to loss of synergies and to duplication of efforts, competition among programs for technical and financial resources, and weak local governance, including a lack of active participation of local governments and civil society organizations.

It is recommended to:

- promote land use planning at the national level as well as harmonization of public policies with effects on the sustainability of lands and ecosystems;
- promote, as far as possible, the unified management of programs involving the same territory and the same population.

### IV. The asymmetries between multilateral environmental agreements and international agreements on trade, and market access limitations

A dissociation has been observed between the international negotiations on trade and the commitments under MEAs, as well as between the directives issued by national and international agencies associated with such negotiations and agreements.



In particular, the existence of limitations on market access and trade in products of the dry areas of affected countries has been highlighted.

It is recommended to:

- ensure that trade negotiations consider the notion of sustainable development as reflected in the commitments made under the multilateral environmental agreements;
  - strengthen and promote the capabilities present in the affected areas as well as develop and ensure market access of products produced in these areas.
- V. Resource mobilization to combat desertification, mitigate the effects of drought and adapt to climate change

The need for mechanisms and / or protocols in the scope of the UNCCD aimed at increasing the flow of financial resources has been recognized, including new and additional resources for investment in the drylands of developing affected countries. An increased financial flow for the implementation of UNCCD national action programs would influence more effectively national and local economies.

It was highlighted that a proposal for a Regional Financial Strategy has been adopted (April 2010) by the Forum of Ministers of the Environment of Latin America and the Caribbean aimed precisely to increase the availability of financial resources for sustainable land management, including the increase of governmental budgets with these purposes.

It is recommended to:

- develop, implement and strengthen, as appropriate, sub-regional platforms and financial strategies that have been promoted within the framework of the UNCCD, to implement integrated investment frameworks;
- favor the effective implementation of the Regional Financial Strategy for Latin America and the Caribbean that was approved by the XVII Meeting of the Forum of Ministers of the Environment of Latin America and the Caribbean, and promote similar initiatives in other regions.

### 3. África: Climate, Sustainability and Development in Semi-Arid Regions



Foto: ICID+18

#### Preamble

Land degradation, loss of biodiversity and climate change are major challenges across semi-arid and arid lands in Africa. The interaction among these environmental challenges are affecting the attainment of the UN Millennium Development Goals (MDGs) and threaten to convey poverty, hunger, food insecurity and disease epidemics. The cost of adaptation to climate change is huge and there is need for adequate resources to be allocated to climate change adaptation in semi-arid regions at both national and international levels.

The contributors listed below participated and presented papers in various thematic panels and provide the following recommendations as their contribution to the ICID+18 declaration of Fortaleza.



## Climate information and data management

- There is need to support, monitor and collate climate data from various data centres. A network of climate data modelling, analysis and dissemination centres should be created, equipped and supported across the dryland regions.
- For effective adaptation among small holder farming communities, localised climate information including localised seasonal forecasts should be provided.
- There is need for effective monitoring of climate change adaptation as a basis for scaling up national policy.

## Pastoralist support systems

- The indigenous system should be integrated with the modern system to enhance communities' adaptive capacity. These traditional/indigenous knowledge systems need to be rehabilitated and synthesised wherever they exist; and integrated into climate change adaptation plans.
- Policies should recognize the importance and relevance of pastoral production systems as means of livelihood and there should be investment in alternative livelihoods for pastoralists.
- Development of arid environments need to consider pastoral mobility and flexibility which are key aspects of coping and adapting to climate change: where communities are mobile they should not be disrupted.
- There is need for continuous support to programs that incorporate water harvesting into country policies in the arid and semi-arid areas in order to curb interruption of lives to affected communities during long dry spells.

## Coping and adaptation

- Intellectual Property Rights (IPR) from Indigenous Knowledge (IK) need to be protected and fair benefits distribution systems need to be put in place.
- There is need to stop the loss of rich climatically adapted plant material and livestock breeds in the semi-arid areas.
- Ecosystem management and catchment protection are required to maintain continuous coupling of local systems that drives the local climate.

## Knowledge based research

- There is urgent need for knowledge based research on climate science, scenario, vulnerability and impacts for drylands.
- There is need for technology transfer and capacity building on African innovation for adaptation in drylands.

## Education and capacity building

- There is need to develop evidence based knowledge for effective decision making in climate change mitigation and adaptation.
- The conventional learning environment should make space for the traditional/indigenous learning to continue.
- There is need for an ongoing process for communities to be supported to progress with initiatives related to climate change adaptation.
- Capacity building and development are crucial for addressing climate risk particularly at local level, while disaster risk management requires urgent attention to reduce extreme weather events in urban environments such as flooding, droughts and others.
- There is need to promote capacity development of dryland regions in carbon credit financing from soil carbon sequestration, which are not benefiting from the REDD/REDD plus schemes.

## Indigenous knowledge systems

- There is need to recognise that communities have a thriving traditional/indigenous knowledge that is best attuned to them and this should be integrated in research approaches and in policy making.
- There is need to move from the school of thought that emphasizes the movement of communities to areas where they can be integrated.
- There is need to recognize that the way pastoralists are living is best suited to them and that they have a right to receive information and social amenities where they live.
- Use of adapted genotypes (genetic materials) from arid lands should acknowledge such origin and embrace fair benefit sharing.



## Networking in communities of practice

- A forum should be established whereby issues of drylands are discussed and information is exchanged among policy makers, researchers and academicians and relayed to the communities in understandable form.
- E-Learning for the stakeholders should be promoted and facilitated to improve information sharing and bringing common grounds for Climate change adaptation and control.
- Communities of practice in climate change education and research are important in fostering sustained and situated learning for climate change adaptation. It is therefore critical to mobilize and channel funding to national and regional drylands and semi-arid networks for capacity building, material development, case study development and expansion in pastoralists/ farming policy.

## Policy issues

- Support for markets creation and accessing fair trade standards so that these communities can benefit from the premiums and hence improve their living conditions.
- There is need for localised instruments that link national to global policies, provide incentives for green technologies and harness diverse adaptation options in energy, environmental, financial, technical, human capacity and technological targets.
- There is need for capacity enhancement in African citizens' engagement in the climate change agenda, negotiation of international instruments and access to adaptation finance.
- There is a need for an inclusive and participatory rural development planning approach that truly benefits inhabitants of dryland regions.
- The African team strongly proposes climate justice and that the developed world meets its commitment from the Kyoto Protocol both on emission targets and on the financing mechanism.

## 4. Parliamentary Dialogue – ICID+18



Foto: ICID+18

### Introduction

During the ICID+18, Representatives of Parliaments from several countries met in Fortaleza, in different meetings, with members of civil society, academia and the United Nations system. They discussed issues concerning the drylands of the world and came out with a set of recommendations to enhance the participation of Parliaments in the discussions and decision processes to assure a higher national and international priority to issues and opportunities concerning these regions.

The meetings were organized by the Brazilian Senate and the Parliament of the Southern Common Market (MERCOSUL) and chaired by Senators Inacio Arruda (Brazil), Maria Elena (Uruguay), and Federal Deputy Edson Duarte. José Roberto de Lima, from ICID, José Roberto da Silva Fonseca (Advisor to the Brazilian Senate), Carlos Décimo Parliamentary Assistant), formed the Organizing Committee. Representatives of the Conventions on Climate Change, Biological Diversity and Combating Desertification, the Global Mechanism, and other UN agencies, such as United Nations Environment Programme (UNEP), Economic Commission for Latin America (ECLA) and United



Nations Food and Agriculture Organization (FAO), participated in the discussions. Rapporteurs were Silvio Sant'Anna, from Esquel Brasil Foundation, Francisco Eugênio Arcanjo, from the Brazilian Senate. Margarita Astralaga, from UNEP, and Elena Abraham, from IADIZA (Argentina), were invited speakers.

## Civil society

Participants recognized that civil society organizations have played a part in implementing the Rio Conventions, especially in strengthening the Convention to Combat Desertification. Social organizations have sought to establish synergies between environmental conventions through integrated actions. These actions require the support of public policies that spring from government decisions and legislation. The dialogue between parliamentarians and actors from the civil society discussed institutional issues pertaining to the participation of nongovernmental organizations on policies for sustainable development of arid and semi-arid regions.

## United Nations System

This table discussed the fragility and effectiveness of international policies directed to the dry regions, the problems of implementing the Rio Conventions, the different treatments accorded by the development institutions, the low priority given to the dry regions by various international organizations and the prospects for the future.

## Academia

This dialogue between parliamentarians and the scientists aimed to discuss the advancement of science in matters relating to the sustainable development of drylands, with the purpose of identifying issues, trends, causes, consequences and solutions to problems such as the advance of desertification and land degradation, as well as the climate change scenarios, which will have more impact on these dry regions, and the relationship and the use of the findings in the scientific agenda about desertification.

## Parliamentary declaration

In 1992, the first *International Conference on Impacts of Climate Variation and Sustainable Development in Semi-arid Regions (ICID 92)* was held in Fortaleza, to provide scientific inputs on the ecological and social conditions of all semi-arid regions of the world to the *United Nations Conference on Environment and Development (Rio 92)*. The ICID 1992 provided the rationale for the decision to create the *United Nations Convention to Combat Desertification and Mitigating the Effects of Drought (UNCCD)*, that was signed on June 17, 1994, in Paris. The UNCCD came into force in 1996 and is currently signed by 193 countries.

Along with the Convention on Biological Diversity and the Convention on Climate Change, the Convention to Combat Desertification is part of the Rio family of UN Conventions. It was the last of the three to be signed, and this helped to make it more complete and to incorporate innovations and specific characteristics. It reaffirms the principles and objectives of the three Rio Conventions, and makes them more operational and with more efficacy. Another specificity is the importance it gives to the non-governmental organizations. It is the only convention that requires the direct participation of the organized civil society and of the peoples that are directly impacted by the processes of environmental degradation and desertification.

On the other hand, the Convention to Combat Desertification (UNCCD) is the less appealing of the three conventions, because it works mainly with poor areas and their development. The States Parties and the UN up to now have failed to implement a serious and safe dynamics for this convention. After almost two decades, there has been failure to implement its agenda. And with this lack of priority, 30% of the population remain forgotten.

Studies conducted globally, such as the IPCC, indicate that the arid, semi-arid and dry sub-humid areas, because they are more fragile, will be most adversely affected by climate change.

On the other hand, these areas have important answers for mankind. The resilience of people and species embodies a wealth of information and knowledge that is important for sustainable development.



With regard to aspects of governance, the participation of the politicians has been active, but it requires clear actions that impact on the territory and on the affected populations within a reasonable timeframe.

We must consider that researchers, that are in general more thoughtful, need to acquire certainties that usually require longer periods of time. Both researchers and politicians need support, but the support to the politician comes from the popular vote, while to the researchers it comes from the approval of their peers and from obtaining financing.

The UNCCD has created the Committee on Science and Technology (CST), but has not facilitated the genuine participation of representatives of the academia. This sector has been indirectly present through ad hoc groups or by invitation of international agencies and/or NGOs, but remains excluded from the process in a more organic way, and thus the generation of knowledge remains fragmented and disjointed.

On the other hand, scientists should also make a self-assessment, since in many cases they exclude themselves from the decision-making processes and have little willingness to participate in the process of solving problems. A science that consists only of scientific articles, distant from reality, does not contribute, at least in the short term, to solve problems. Similarly, a science that emphasizes partial or specialized approaches makes difficult the apprehension of the complexity of the processes of desertification, which requires an integrated approach.

Action should not be separated from knowledge. Researchers, social representatives and decision makers are not opposites, but complementary and should work together.

#### **The Parliamentary Dialogue at ICID+18 considered that:**

- There is a clear weakness of synergy among the environmental conventions of the United Nations, particularly among the Rio agreements;
- Climate change will affect the arid, semi-arid and dry sub-humid zones more than any other region;
- Concern with desertification should not be attributed to just one sector, institution or government, but to all institutions, private or public;

- Governments act more in the short term, pressed by immediate interests, therefore the parliament could be the place to think beyond the immediate short term interests;
- Civil society and researchers have been losing political capacity in general, not just in the environmental area, but the accumulation of knowledge, experience and leadership held by these actors is relevant to the development of synergic actions regarding the implementation of the Rio Conventions;
- One cause of loss of capacity for action of NGOs is the deficiency of the regulatory framework, which opens space for the parliament to improve this legislation;
- The sector of science and technology, although housed in a scientific committee of the UNCCD, has not had yet a relevant participation in the discussion and implementation of the agenda of desertification.

#### The Parliamentary Dialogue at ICID+18 recommended:

##### VI. Improving the legal framework and strengthening the role of NGOs.

- Environmental policies should have agendas of complementarity and respect for differences. Conflicts can be negotiated through this perspective and complementary actions between sectors will have better results;
- Notwithstanding the already differentiated role of civil society organizations in the Convention to Combat Desertification, it is important to strengthen such participation and make it more effective;
- There are attempts to discriminate the action of organizations by restricting funding mechanisms. This is an area to be addressed;
- Need for continuation of activities undertaken by non-governmental organizations.
- That civil society works even more closely to parliaments and seek to promote dialogue between scientists and affected populations.
- Valuing non-governmental organizations working on territorial bases.

##### VII. Strengthening public policies and regulatory measures.

- Incorporate in public policies measures envisaged by the UNCCD and by National Programs.
- Include scientific information in public policies to combat desertification and to promote development of arid and semi-arid lands.
- Foster legislation to put the agenda for combating desertification as a national priority.
- Develop legislation allowing public agencies to work closer to communities.
- Develop policies that value centrally farmers and rural producers.



- Review limits and controls to the right to private property in ecologically sensitive areas.
- Develop policies that put social technologies to serve people and communities.
- Give priority to policies and activities of dissemination and information, as well as to the agenda of combating desertification along with all stakeholders, public and private.
- Assure that the agenda of combating desertification pervade all policies, including mainly agricultural policies.
- Create and foster database of social technologies related to populations of semi-arid regions, with protection of community rights on such knowledge.
- Value traditional knowledge and biological diversity typical of semi-arid regions.
- Foster legislation on land use management.
- Create mechanism to facilitate the dissemination of successful experiences for the most needy regions.
- Strengthen institutions for social inclusion in governments and civil society.
- Enable adequate legislation on social technologies.

#### VIII. Assuring the role of Parliaments as forums for fundamental institutional issues and dissemination of information on desertification.

- Create and stimulate regional or thematic parliamentary forums, to assist in the creation and implementation of public policies to combat desertification, especially the democratization of information and programs.
- Expand institutional mechanisms for democratic participation. It is important for parliaments to expand their direct participation.
- Make strategic decisions that lead to the conservation of natural resources.
- Support the implementation of the Rio+20 Conference in 2012.

#### IX. Assuring the Importance of the Convention to Combat Desertification and Synergy among the Rio Conventions

- The conventions are compartmentalized in the global and national level. This creates loss, duplication of efforts, and competition for financial and technical resources;
- The UN system should integrate its actions on semi-arid regions that relate to all three conventions. At the local level there is no perception of different conventions, so the different UN agencies should act in coordination with national and local level institutions;
- Parliaments of the nations that are part of the Rio Conventions could have a central role in drafting regulations that incorporate the priority of the communities in semi-arid

regions. The Rio+20 will represent an opportunity for regional bodies such as Mercosur to demonstrate its consistent action of a normative framework that does justice to 20 years of the signature of the conventions;

- Enormous resources are allocated to support the international financial sector and almost nothing to the mechanisms of multilateral environmental mechanisms;
- It is necessary to balance the institutional framework provided to the Rio Conventions, both in international organizations and in national governments;
- It is necessary to enhance democratization and popular participation of the UNCCD and its mechanisms, regarding the affected populations, preferably in the sub-national level;
- The agenda of the Rio+20 should include a space of at least three days to discuss issues related to sustainable development of arid and semi-arid regions.

#### X. Reviewing the role of the scientific sector in the agenda on combating desertification

- Review the scientific sector participation in combating desertification and climate change. The sector must be empowered and trained to respond to urgent needs as well;
- Transfer knowledge to local communities in places affected by desertification and poverty;
- Collaborate to build a technical-scientific sector capable of meeting the demands of society, committed to their problems, while respecting the contributions and needs of local populations in a participatory process of knowledge generation, capable of going deep in their subjects but also to develop new interdisciplinary contributions, in addition to practicing the democratization of knowledge;
- Capacitate policy makers trained to address the planning processes of knowledge generation in the short, medium and long term;
- Bring science to the semi-arid regions, with the establishment of research centers and training closer to areas of need;
- Organize and make available the existing knowledge and put it where it needs to be at the disposition of farmers.



## 5. Platform on Social Technologies

To conserve biodiversity and address desertification in context of climate change



Foto: ICID+18

Representatives of Brazilian civil society organizations, members of academic institutions in Brazil, Spain and Canada, producer associations, aid agencies and networks, and forums linking social and environmental organizations, met at the Dialogue Table on "Social Technologies in Community Processes to Combat Desertification in the Context of Climate Change," during the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions – ICID+18 meeting in Fortaleza, Brazil, from 16 to 20 August 2010. The Dialogue Table was organised by the Association of Maranhão for the Conservation of Nature - AMAVIDA, under the coordination of João Otávio Malheiros. Rapporteurs were Murilo Sérgio Drummond and Clarissa Lobato da Costa. Participants proposed the promotion of the following **Social Technologies Platform**, to formulate and support actions, projects and programs expressing four fundamental components:

- To undertake and strengthen actions designed to conserve biodiversity and use natural resources sustainably;
- To make viable adaptation, as a top priority, in communities which are vulnerable to the effects of climate change caused by global warming, by means of participatory processes;
- To consider that the principal (though not the only) effect of the climate crisis is the expansion of areas that are undergoing desertification in our regions and countries in all

continents, and for that reason the mutually-reinforcing actions of the three conventions arising from Rio-92 must converge to reduce the rate of land degradation, loss of agricultural land and natural sources across the planet.

- To recognize and reaffirm the important role that entities and institutions which produce Social Technology have played in facilitating the process of coping with areas undergoing the effects of climate change and desertification.

We reaffirm the concept that we have been building since 2001, in a process that has resulted in the creation of the Brazilian Social Technologies and Innovation Forum - a network of civil society organizations which names as “social” the type of technology that fulfills four dimensions:

**Knowledge, science and technology:** social problems are the starting point. Social technology is organized and systematic; it introduces and drives innovation in communities.

**Participation, citizenship and democracy:** Social Technology promotes democracy and citizenship; it relies on participatory methodologies; it seeks inclusion and accessibility.

**Education:** Social Technology carries out a full educational process; it develops in a dialogue between scientific and local knowledge, so that the community produces and takes ownership of understanding and ideas.

**Social Relevance:** Social Technology is effective in solving social problems; it is environmentally sustainable and leads to social transformation.

For the creation of an environment that is not hostile to synergistic strategies on biodiversity, desertification and climate, that values social technology for its practical applications, and that views community processes as a means and communities as an end, we underscore the urgency of the following measures to be taken by all involved:

- Strengthening of civil society institutions, by training and by facilitating access to public and private resources that are in unity with this Platform;
- Increased commitment of scientific institutions to innovation and development of social technologies, with appropriate areas of research on strategic dialogue between local community knowledge in areas affected by and vulnerable to the climate crisis, and scientific knowledge;
- Effective exercising of their environmental and social responsibilities by enterprises of all sizes, starting with the largest (for example), through actions which go beyond marketing and educational campaigns, but in essence which shape the response capacity of communities and their sustainable development, starting in the place where they live;



- Debureaucratization and streamlining, with decreases in response times between the formulation and implementation of public policies and private planning for the synergistic actions of government and international organizations, as well as for the transfer of government funds and resources for civil society actions inspired by this PLATFORM.
- Insertion of the fight against desertification and prolonged droughts into the political agenda of governments, translating this into political and budgetary commitments, and a priority in international negotiations.

We emphasize therefore that:

- Current funding and control measures restrict practices and actions due to excessive bureaucratic requirements, delays in release of funds, and little commitment to the purposes for which activities are proposed. The lines of financing and transfer of resources for the dissemination of social technologies and innovation should adopt, from their conception to their evaluation, innovative control technologies which favor the success of programs and actions arising from the policies adopted by civil institutions, business, and local and national, regional and international governments.
- The current legislation on research, development and application of technology does not address the specific characteristics and key dimensions of social technologies, namely those that are not restricted to the development of purely scientific knowledge or guided solely by market objectives; such legislation should therefore urgently be improved.
- The academic means for research and development of technologies and innovations are excessively devoted to market values, which produce at one end the advancement of knowledge, and at the other the exclusion of its benefits, especially for those who are most vulnerable to the processes of loss of biodiversity and natural resources, and the poorest communities which are the worst affected by climate crisis and the advance of desertification.

For these reasons, we call on all members of the ICID+18 Conference to vigorously support this Platform of social technologies, and refer to it in building their present and future practice.

We expect from all what we demand of ourselves: a proactive attitude and a sense of urgency in action, to address first the needs of the most vulnerable communities who are thus the most intensely affected by climate change, through innovative solutions which have social technologies as intervention tools.

Association of Agriculture Popular Movement – AMAP	Josimar Coelho Neto
Beekeepers Association and Meliponinae Pernambuco – APIME	Alexandre Jorge Pimentel Moura
Producers' Association for Sustainable Development – APAEB	Liliane Oliveira Santana
Maranhense Association for Conservation of Nature – AMAVIDA	João Otavio Malheiros
Banco Palmas	Sandra Magalhães
Barca	Silvio Barone
Support Centre for Development of Family Agriculture – Terra Viva	Paul Segundo e Silva
Forest Technology Centre of Catalonia	Evelyn Chaves Jaén
Federation of Rural Workers of Rio Grande do Norte – FETARN	Francisco de Assis Araujo
Esquel Brazil Group Foundation	Silvio Rocha Sant'Anna
Institute Native Bees – IAN	Rafael Cabral Borges
Institute of Social Technologies – ITS	Gerson da Silva Guimarães
Echo Institute for Citizenship – ECOAR	Miriam Duailibi
Federal Institute of Maranhão – IFMA	Clarissa Lobato da Costa
SOS Gilbués	Fabriciano da Cunha Neto Corado
Universidad de Murcia	Maria Julia Martínez Fernández
Federal University of Maranhão – UFMA	Murilo Sergio Drummond
World Vision	John the Evangelist Jose dos Santos
York University	Dawn Rose Ann Bazely, Patrícia Elaine Perkins

**Part V. Concluding remarks: the  
Drylands and the Rio+20**





## The Drylands and the Rio+20

Antonio Rocha Magalhães, Director of ICID+18  
Betina Ferraz Barbosa  
José Roberto de Lima



Foto: CCÉE

This volume contains the main political statements and presentations made during the ICID+18 Conference, in Fortaleza. Together, they confirm the “raison d'être” of the Conference: to call the attention of the world to the special circumstances faced by the peoples of the Drylands, to assemble contributions from scholars and policy makers from all interested parties in the world, to update and deepen the knowledge of the challenges and potentialities pertaining to the drylands, and to provide a set of recommendations to policy makers in order to assure high priority by all parties in regard to the sustainable development of those regions.

In his message to the ICID participants, Mr. Ban Ki-moon, Secretary General of the United Nations, showed why the world should pay more attention to the Drylands: they are the home to 2 billion people, the majority living under extreme conditions of poverty (in reality, most of the poverty of the world dwell in the drylands), with processes that lead to further impoverishment of their

natural resources, with land degradation and desertification, and all of this being a cause for major pressures for outmigration. That is why the United Nations General Assembly decided to dedicate the present decade (2011-2020) to the theme of deserts and the fight against desertification. The United Nations Decade on Deserts and the Fight Against Desertification (UNCDD) was officially launched during the ICID+18. In Ban Ki-moon's words, "Desertification and land degradation are global problems that require a global response".

Ban Ki-moon's message was reinforced by other messages and statements from the Executive Secretaries of the three Rio Conventions. Mr. Luc Gnacadja, of the UNCCD, called the attention to the potentialities of the drylands, which are responsible for 50% of the world's livestock, 44% of all cultivated systems and one third of all crops. Ms. Christiana Figueres, of the UNFCCC, focused on the vulnerability of the drylands to climate change, the potential for adaptation and mitigation and the synergies among the three conventions to jointly address the problems of climate change, protection of biodiversity and combat to desertification. And Mr. Ahmed Djoghlaif, of the UNCBD, showed that the problems faced by the three conventions are linked to common solutions, that is, common effective policies that will help to combat desertification, protect biodiversity and mitigate and adapt to climate change. All agreed on the importance of working together in order to reach the common objectives of the three conventions, help in the process of achievement of the Millennium Development Goals and promote sustainable development in the drylands and elsewhere.

These points were, in one way or another, reinforced by other speakers in the plenary of ICID, such as the Ambassador of the United Kingdom to Brazil, Alan Charlton, and the President of the French Institute for Development Research (IRD), Michel Laurent. The Vice Minister of Environment of Brazil focused on the Brazilian Semi-arid region and advocated that in order to assure priority for this region "we need a political decision beyond technical matters". The Governor of the state of Ceará, Cid Ferreira Gomes, who hosted the Conference, reaffirmed the right of the drylands to sustainable development and mentioned the opportunity provided by the Rio+20 as the right place to discuss these matters.

The same line of reasoning was followed by the keynote speakers. Jeffrey Sachs, from the Earth Institute at the University of Columbia and Special Advisor to the UN Secretary General, went further to make specific suggestions in regard to assurance of more priority to the arid, semi-arid and sub-humid lands. He recommended that the ICID participants should "convey the message



powerfully and clearly that the climate crisis in the semi-arid and arid lands is a growing global security challenge and a direct threat to the MDGs”, and because of this we should “try together to have a UN Security Council meeting on the drylands”. Professor Sachs strongly recommended that we “work together to try to form an alliance of political leadership in the drylands”, with the leaders of the main drylands countries, and fight for the implementation of the polluter pays principle, in the form of a carbon levee by country, in order to finance adaptation and mitigation to climate change in the poor countries. He recommended dryland countries to take profit of the potential for renewable energy in their territories. Finally, he recommended that we should get better at global public awareness and “target the information to national and local political leaders”.

Ignacy Sachs, of the Research Center on Contemporary Brazil, in France, emphasized that “we must confront in our plans two simultaneous challenges”: climate change and what he called the “poverty scandal”, and we should strive for “three-win solutions” that are socially inclusionary, environmentally sustainable and economically viable. In this respect, he underlined the importance of the Rio+20 Summit.

Jesse Ribot highlighted major aspects of the ICID and called the attention to the need to better understand vulnerability, give more attention to the question of representation and empowerment and foster development strategies that address the problems of poverty that characterize the drylands.

This volume also includes the main recommendations from some special sessions, focusing on the importance of joint work of the three Rio conventions to take profit from the possibilities of synergies among them. Specific recommendations were also made in Dialogue Tables addressing the special conditions of Latin America and the Caribbean, the African countries, the Parliaments of the Dryland countries, and the important contribution of the civil society.

Finally, the Declaration of Fortaleza (Part I of this publication) which was discussed and approved in plenary by the participants of the ICID+18, represents the consensus of the researchers, policy makers and representatives of civil society, public sector and private sector, on the main messages that we need to take to the world in regard to the challenges and potentialities of the dryland regions. These are important regions because of their significance in terms of area, population, social conditions, environmental challenges and their contribution to food security and the economy of

the world. The political representation of the drylands falls behind their real importance. There will be no safe world without the sustainable development of the drylands.

The Declaration of Fortaleza starts by recognizing that the drylands contain the largest concentration of poverty and the greatest pressures on the natural resources of the world, such as water and biodiversity. It then calls for political, sustained commitment of all parties – countries and international organizations, as well as organizations of civil society, private sector and the academia - to actions and to provide additional resources to the development of the Drylands. It also highlights the fact that drylands present many opportunities for sustainable development. And finally it offers a set of 25 recommendations that should be considered by every country and every national or international institution in order to concretely support the sustainable development of the drylands. The last recommendation reminds everyone of the “urgency to respond to current and emerging climate, development and sustainability challenges and opportunities in drylands”.

It is fundamental, then, that the theme of the drylands, their challenges as well as their potentialities, be adequately treated in the next United Nations Conference on Sustainable Development (UNCCD), the Rio+20. It is important that the question of the drylands be incorporated in the decisions that will be taken during the Rio+20, and that the pos-Rio+20 brings more voice, representation and actual priority to the cause of the peoples living in these regions. The recommendations that stemmed from the ICID participants offer important points that should be taken into account in the Rio+20 processes and decisions.

The three objectives of the UNCCD are fundamental for the arid, semi-arid and sub-humid areas, as the drylands are defined by the United Nations Convention to Combat Desertification, the UNCCD. These objectives are:

- a) secure renewed political commitment for the sustainable development;
- b) assess the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development, since the Rio 92; and
- c) address new and emerging challenges.



With these objectives in mind, the two main themes of the Rio+20 are also the themes that need to be considered for the drylands:

- a) promote the green economy in the context of sustainable development and poverty eradication, and
- b) improve the institutional framework for sustainable development.

In the Rio+20, we expect that progress will be achieved in regard to the objectives and themes above mentioned for the benefit of life on the planet. As the drylands contain 40% of the whole land area of the planet, 30% of its population and the majority of the existing poverty, there will be no sustainable planet if the specific challenges of the drylands are not faced, and if the specific potentialities presented by the drylands are not promoted. There will not be a sustainable world if the development of the drylands is not sustainable.



## **Annex**

1. List of acronyms
2. Conference program



## **Annex I. List of acronyms**





## List of acronyms

<b>ABC</b>	Brazilian Cooperation Agency	<b>INPE</b>	National Institute of Space Research
<b>AMAVIDA</b>	Maranhense Association for Conservation of Nature	<b>INSA</b>	National Institute of the Semi-Arid
<b>ANA</b>	Water National Agency	<b>IPEA</b>	Institute for Applied Economic Research
<b>APAEB</b>	Producer's Association for Sustainable Development	<b>IRD</b>	Institute of Research for Development
<b>APIME</b>	Beekeepers Association and Meliponinae Pernambuco	<b>ITS</b>	Institute of Social Technologies
<b>IBRD</b>	International Bank for Reconstruction and Development	<b>LACICT</b>	Latin American and Caribbean Initiative on Science and Technology
<b>BNB</b>	Bank of Northeast Brazil	<b>MCT</b>	Ministry of Science and Technology
<b>CDS/UnB</b>	Center for Sustainable Development	<b>MDGs</b>	Millennium Development Goals
<b>CGEE</b>	Center of Strategic Studies and Management	<b>MEAs</b>	Multilateral Environment Agreements
<b>COP</b>	Conference of the Parties	<b>MERCOSUL</b>	Common Market of the South
<b>DfID</b>	United Kingdom Department for International Development	<b>MMA</b>	Ministry of the Environment
<b>DNOCS</b>	National Department of Works Against Drought	<b>NAPS</b>	National Actions Plan
<b>ECLA</b>	Economic Commission for Latin America	<b>NGOs</b>	Non-Government Organizations
<b>ECOAR</b>	Echo Institute for Citizenship	<b>PARLASUL</b>	Parliament of the Common Market of the South
<b>FAO</b>	United Nations Food and Agriculture Organization	<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation
<b>FETARN</b>	Federation of Rural Workers of Rio Grande do Norte	<b>SDEP</b>	Social Dimensions of Environmental Programs
<b>FIEC</b>	Federation of Industries of the State of Ceará	<b>SEI</b>	Stockholm Environment Institute
<b>FUNCEME</b>	Foundation of Meteorology of the state of Ceará	<b>Terra Viva</b>	Support Centre for Development of Family Agriculture
<b>HARC</b>	Houston Advanced Research Center	<b>UFMA</b>	Federal University of Maranhão
<b>IADIZA</b>	Institute of Arid Zones, Argentina	<b>UN</b>	United Nations
<b>IAN</b>	Institute Native Bees	<b>UNCBD</b>	United Nations Convention on Biological Diversity
<b>IDB</b>	Interamerican Development Bank	<b>UNCCD</b>	United Nations Convention to Combat Desertification
<b>IFMA</b>	Federal Institute of Maranhão	<b>UNEP</b>	United Nations Environment Programme
<b>INMET</b>	National Institute of Meteorology	<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
		<b>WASA</b>	Water Assessment & Advisory Global Network



## **Annex 2. Conference program**





## Plenaries

### I. Auditorium Brazil

---

#### 16 AUGUST

7:30 am

##### I. Registration

9:00 am - 11:00 am

##### II. Introductory Session

Introductory Remarks and Conference Agenda

**Chair:** Antonio Rocha Magalhães – Director of ICID

A child's address to the ICID participants

Bianca Macedo

ICID, a Carbon Neutral Event. Delivery of Certificate by OSIP Prima Mata Atlântica

Aline de Oliveira

##### Reports on preparatory meetings and address to participants

Alan Charlton – Ambassador of the UK in Brazil

Michel Laurent – Director General of the IRD

Jesse Ribot – University of Illinois, SDEP

Eduardo Sávio Martins – President of FUNCEME, Government of Ceará

José Almir Cirilo – Under Secretary of Water Resources of Pernambuco

Dalton Melo Macambira – Secretary of Environment of Piauí

José Sydrião de Alencar Júnior – Director of the Bank of the Northeast of Brazil

##### The Drylands of the World

Hervé Thery – UnB/USP, Brazil: Special Presentation on Drylands

##### Opening Ceremony

**Chair:** Cid Ferreira Gomes – Governor of Ceará, Brazil

Antonio Rocha Magalhães – Director of ICID: Opening and Welcome Remarks

Message by the Secretary General of the United Nations - Ban Ki-moon,

Luc Gnacadja – Executive Secretary of the UNCCD

The Responsibility of ICID Participants and the Future of the Planet

David Santos – Address by a Youth Representative

Launching of the UN Decade on Deserts and Combating Desertification. Adoption of the Decade by the Participants of the ICID

Luc Gnacadja – Executive Secretary of the UNCCD

Federal Deputy (member of the house of representatives)

Eduardo Vieira (Deputy Zezeu Ribeiro) – representing the President of the House of Representatives,

A Message from the Parliament

Deputy Michel Temer – Brazil

## The Importance of ICID and the Semi-arid Regions

José Machado – Vice Minister of Environment of Brazil

## ICID and the Semi-arid regions, Welcoming Remarks to all Participants

Cid Ferreira Gomes – Governor of the State of Ceará

---

### 17 AUGUST

10:20 am - 12:15 am

*Plenary Session:*

#### **Synergies among the United Nations Conventions: UNFCCC, UNCBD, UNCCD**

**Chair:** Ambassador Luis Alberto Figueiredo Machado (Ministry of Foreign Affairs – Brazil)

**Rapporteur:** Sergio Zelaya – UNCCD

Christiana Figueres – Executive Secretary, UNFCCC

Luc Gnacadja – Executive Secretary, UNCCD

Sérgio Zelaya – Representing UNCBD

Nora Berrahmouni – FAO

Margarita Astrálega – UNEP

Walter Vergara – The World Bank

---

### 18 AUGUST

5:30 pm - 6:30 pm

*Keynote speech:*

#### **Theme: The Drylands and Development: Raising the Political Stakes**

Jeffrey Sachs – President of the Earth Institute, Columbia University, and Special Advisor to the United Nations Secretary General, Ban Ki-moon

---

### 20 AUGUST

8:30 am - 10:00 am

*Plenary Session:*

#### **Lessons and Recommendations from the Sessions**

Antonio R. Magalhães – Director of ICID, Brazil

Renata Andrade – PUC/Brasília, Brazil

Christian Leduc – IRD, France

Egon Krakhecke – Ministry of Environment, Brazil

Peter Hochet – IRD, France

Eduardo Martins – UFC, Brazil

Michael Hall – NOAA, USA

Chuluun Togtokh – Mongolia Development Institute, Mongolia

Xu Xiuli – Agricultural U. Beijing, China

Mutizwa Mukute – Rhodes University, South Africa

Octavio Perez Pardo – UNCCD, Argentina



10:15 am - 12:15 am

*Keynote speech*

Highlights of the ICID Conference

Jesse Ribot – University of Illinois, USA

2:00 pm - 3:45 pm

Mendoza as a Dryland: Development Perspectives

Governor Celso Jaque – Mendoza, Argentina

A Tribute to the Director of ICID 2010, Antonio Rocha Magalhães

Eduardo Beteta – ECLA – Mexico

Reading of Draft Declaration of Fortaleza

John Redwood – USA

*Plenary Session:*

**Discussion of the Draft Conference Declaration of Fortaleza**

Discussion and Adoption of the Declaration of Fortaleza

**Coordination:** Antonio Rocha Magalhães and John Redwood

**Closing session**

Renê Barreira – Secretary of Science and Technology, State of Ceara, Brazil

João Pedro Gurgel – Representative of Youth, Ceara, Brazil

Eduardo Sávio Martins – President of FUNCEME, Ceara, Brazil

Marcos Dal Fabbro – Representative of Ministry of Environment, Brazil

Jean Loup Guyot – Institute of Research for Development, IRD, France

Maria Teresa Farias – Secretary of Environment, Ceará, Brazil

Carlos Alberto Pinto – Representative of Bank of Northeast, Brazil

Antonio R. Magalhães – Director of ICID: Closing Remarks

## Panels and Roundtables (Organized by Auditorium)

### I. Auditorium Brazil

---

#### 16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.1 - Panel - INMET / IRI*

#### **Climate and Society: Bridging the Gap between Science and Application I**

**Chair:** Antonio Divino Moura – INMET, Brazil

**Rap.:** Lauro Guimarães Fortes – INMET, Brazil

Tools of Adaptation

Edward Sarachik – University of Washington, USA

Droughts in the Northeast: Circulation Mechanisms and Climate Prediction

Stephen Hastenrath – University of Wisconsin, USA

4:00 pm - 4:45 pm

*Session 1.4.1 - Roundtable - MMA*

#### **Lessons from the Brazilian Experience**

**Chair:** Egon Krakhecke – Ministry of Environment, Brazil

José Machado – Ministry of Environment, Brazil

Adoniran Sanches Peraci – Ministry of Agrarian Development, Brazil

Atadeu Ferreira – CODEVASF, Brazil

Igor Arsky – Ministry of Social Development, Brazil

José Luis de Souza – Ministry of National Integration, Brazil

---

#### 17 AUGUST

8:30 am - 10:15 am

*Session 2.1.1 - Panel - WB 1*

#### **Desertification and Implications for Agricultural Yields**

**Chair:** Uriel Safriel – CECBIDR, Israel

**Rap.:** Edward Bresnyan – WB, Brazil

Risk Assessment of Amazon Dieback

Walter Vergara – WB, USA

Using Rainman StreamFlow as a tool for Assessing Climate Variability for Sustainable Crop, Pasture and Water Management

Ian Partridge – DPIF, Queensland, Australia

A “Dynamic Information Framework”: a Construct for Multi-Sector Integration for Resource Management

Jeffrey Richey – U. Washington, USA



2:00 pm - 3:45 pm

*Session 2.3.1 - Roundtable - CGEE*

### **Development of Semi-Arid Regions**

**Chair:** Antonio Carlos F. Galvão – CGEE, Brazil

**Rap.:** Antonio Glauter Teófilo Rocha – CGEE, Brazil

In Search of Three-Win Solutions

Ignacy Sachs – EHESC, France

Drought and Development in the Brazilian Semi-arid

Tania Bacelar – UFPE, Brazil

José Eli da Veiga – UNICAMP, Brazil

Regional Development in Latin America: Some Reflections on the Semi-arid Regions

Ivan Silva Lira – ILPES/CEPAL, Chile

4:15 pm - 6:15 pm

*Session 2.4.1 - Roundtable - Embrapa 1*

### **Genetic Resources in Semi-Arid Regions**

**Chair and rap.:** Natoniel F. Melo – Embrapa, Brazil

**Rap.:** Manoel Abílio Queiroz – Embrapa, Brazil

Ahmed Amri – ICARDA, Syria

Hari Upadhyaya – ICRISAT, India

---

## **18 AUGUST**

8:30 am - 10:15 am

*Session 3.1.1 - Roundtable - BNB*

### **Strategies of Financing for the Development of Arid and Semi-Arid Regions**

**Chair:** José Sydrião de Alencar Junior – BNB, Brazil

Strategies of Financing for the Development of Arid and Semi-Arid Regions

José Sydrião de Alencar Júnior – BNB, Brazil

Strategies of Financing for the Development of Arid and Semi-Arid Regions

Rommel Acevedo – ALIDE, Peru

Economic and Climate Vulnerabilities of Semi-arid Regions

Branca Bastos Americano – MMA, Brazil

Approaches for Semi-Arid Areas in Brazil and Lessons for Beyond

Mark Lundell – WB, USA

Action of the IADB in Brazil

Jaime Mano – IADB, USA

10:30 am - 12:15 pm

*Session 3.2.1 - Roundtable - France Embassy*

### **Food Security, Climate Change and Development in Semi-Arid Regions**

**Chair:** Kaza Abdou – Minister of Water, Development and the Fight Against Desertification, Niger

**Rap.:** Richard Escadafal – IRD, France  
Ghani Chehbouni – IRD, France  
Eduardo Delgado Assad – EMBRAPA, Brazil  
Patrick Caron – CIRAD, France  
Cheikh Oumar Ba – IPAR, Senegal

### 1:30 pm - 3:15 pm

*Session 3.3.1 - Panel - INPE / ICID*

#### **Climate Change Scenarios for Semi-Arid Regions**

**Chair:** Branca Americano – MMA, Brazil

##### Climate Change in Semi-Arid Regions

Carlos Nobre – INPE, Brazil

##### Climate, Climatic Variability and Data Needs in the Global Drylands

Sharon E. Nicholson – FSU, USA

##### The Uptake and Usefulness of Weather/Climate Information for Farm Management by Smallholder Farmers – A Case Study for Southern Africa

Peter Johnston – U. Cape Town, South Africa

W. N. Githungo – KMD, Kenya

### 3:30 pm - 5:15 pm

*Session 3.4.1 - Panel - ICID*

#### **Climate Change and Adaptation in Drylands**

**Chair and rap.:** José Antonio Marengo Orsini – INPE, Brazil

##### Mapping Urban Population & Exposure to Climate-Related Risks: The Brazilian Semi-arid Region and Neighboring Coastal Zone

Sandra Batista – University of Columbia, USA

##### Vulnerability, Impacts and Adaptation to Climate Change in the Semi-arid Region of Northeast Brazil

Jose Antonio Marengo Orsini – INPE, Brazil

##### Challenges and Opportunities for Climate Change Adaptation Among Small-Holder Farmers in Southeast Zimbabwe

Leonard Unganai – UNDP/GEF, Zimbabwe

##### Climate Change Adaptation and Food Insecurity in Maradi District - Niger

Moussa Na About – CADU, Niger

##### Why Does Climate Awareness Differ? Lessons Learned from Coastal Bangladesh

Mustafa Saroar – AIT, Thailand

##### Degradation of the Environment in the “Bonaerense” Semi-arid Region, Argentina

Ramón Mauricio Sánchez – INTA/UNS, Argentina

---

## **19 AUGUST**

### 8:30 pm - 10:15 pm

*Session 4.1.1 - Panel - University of Colorado*

#### **Lessons learned about lessons learned**

**Chair and rap.:** Michael Glantz – University of Colorado, USA



Can Societies Acclimatize to the Consequences of a Changing, Varying and Extreme Climate?

Michael Glantz – U. Colorado, USA

Lessons Learned about Lessons Learned: Hunger and the Right to Food

Marcos Ezequiel Filardi – University of Buenos Aires, Argentina

The International Response to Global Change

Peter E. O. Usher – Consultant, Kenya

Traditional Climate Knowledge in Subsistence Agriculture: How the Mayan Farmers are Dealing with Climate Change?

Fernando Briones Gamboa – CIESAS, Mexico

Lessons Learned about Lessons Learned: Early Warning Systems

S. H. M. Fakhrunddin – RIMES, Thailand

Why Is Cure Preferred to Prevention? The Politics of Promoting Disasters

Ilan Kelman – CECERO, Norway

Unlearned Lessons on Dryland Development in the Aral Sea Basin

Nikolai S. Orlovsky – Ben-Gurion University, Israel

Lessons Learned on Biofuels Development (With a Focus on Africa)

Tsegay Wolde-Georgis – University of Colorado, USA

10:30 am - 12:15 am

*Session 4.2.1 - Panel - WB 3*

**Rainwater Harvesting: Lessons emerging from the Sear-Net Ethiopia Conference**

**Chair:** Edward Bresnyan – WB, Brazil

**Rap.:** Girma H/Michael Gode – ERHA, Ethiopia

Rainwater Harvesting Technology and Policies in Semi-arid Regions – Paraíba and Texas Case Study

Rodolfo Nobrega/Aderbal Correa – ICASALS, USA

Mesfin Shenhut – SEARNET, USA

2:00 pm - 3:45 pm

*Session 4.3.1 - Panel - WMO / University of Nebraska*

**Early Warning Systems for Droughts**

**Chair:** Donald A. Wilhite – University of Nebraska, USA

**Rap.:** Robert Stephanski – WMO, Switzerland

Drought Impacts as Indicators for Early Warning and Assessment

Michael J. Hayes – University of Nebraska, Lincoln, USA

Inter-Regional Workshop on Indices and Early Warning Systems for Drought

Donald A. Wilhite – University of Nebraska, Lincoln, USA

Overview of WMO Drought Activities

Robert Stephanski – World Meteorological Organization (WMO), Switzerland

Drought Monitoring in South America

Paulo Cesar Sentelhas – USP, Brasil

The Development of an International Drought Clearinghouse and Summary of Results of the April 2010 Global Drought Assessment Workshop

Richard Heim – NOAA, USA

## II. Auditório África

---

### 16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.2 - Panel - UNCCD / ICID*

#### **The Challenge of Desertification and Sustainable Development in Semi-Arid Regions**

**Chair:** Luc Gnacadja – UNCCD, UN

**Rap.:** Heitor Matallo – UNCCD, Mexico

Desertification and Drought in Arab Countries

Wadid Erian – ACSAD, Syria

Management of Scarce Water Resources for Rehabilitation of Degraded Rangelands in Arid and Semi-Arid Marginal Ecological Zones of Southern Pakistan

Sahibzada I. Kahn – Pakistan

Hydro-Environmental Development Project (PRODHAM)

Ricardo Lima de Medeiros Marques – SRH/CE, Brazil

4:00 pm - 4:45 pm

*Session 1.4.2 - Panel - ICID*

#### **Sustainable Energy for the Development of Drylands**

**Chair:** Marcelo Poppe – CGEE, Brazil

**Rap.:** Meiry Sayuri Sakamoto – FUNCEME, Brazil

Potential values of the elder vertical axis wind turbine for rural populations in under-developed countries

Larry Simpson – Consultant, USA

Climate, Sustainability and Development in Semi-arid

Renato Walter Rolim Ribeiro – SEINFRA/CE, Brazil

Sustainable Energy for the Development of Drylands: Proposal for a Pílor Program on Combat to Desertification and Adaptation to Climate Change

Emilio Rovere – COPPE/UFRJ, Brazil

---

### 17 AUGUST

8:30 am - 10:15 am

*Session 2.1.2 – Panel - CGEE*

#### **Science and Technology for the Drylands**

**Chair:** Lucia Carvalho Pinto de Melo – CGEE, Brazil

**Rap.:** Antonio Guedes – CGEE, Brazil

Science and Technology for Drylands Development

Mohamed Hassan – TWAS, Italy

Science and Technology for the Drylands: The Medfly Rearing Program in Brazil

Aldo Malavazzi – MOSCAMED, Brazil

Bioenergy in the Brazilian Semi-Arid Region: Problem or Solution?

Luis Augusto Horta Nogueira – UNIFEI, Brazil



2:00 pm - 3:45 pm

*Session 2.3.2 - Panel - MMA*

### **Protected Areas for Sustainable Development in Semi-Arid Regions**

**Chair:** Rodrigo Castro – Associação Caatinga, Brazil

**Rap.:** Maria Tereza B. F. Sales – CONPAM, Brazil

Definition of Priorities of Creation of UCS (Conservation Areas) in the Caatinga

Marcelo Gonçalves de Lima – MMA/ICMBio/TNC, Brazil)

Integrated Watershed Management for Adapting to Climate Change and Prevention of Desertification in Asia and the Role of Protected Areas

Piara Singh – ICRISAT, India

Suggestions for Strengthening of Management in Protected Areas in Drylands in American Continent

Shirley N. Hauff – Consultant, Brazil

Parks for Water

Marli Santos – TNC, Brazil

Progress in the Implementation of the System of Protected Areas

Maria Tereza Bezerra Farias Sales – CONPAM, Brazil

4:45 pm - 6:15 pm

*Session 2.4.2 - Panel - ICID*

### **Vulnerability and Adaptation in Africa, Europe and Latin America**

**Chair and rap.:** Mwangi D. Milano – KARI, Kenya Agricultural Research Institute, Kenya

Livestock Innovative Italian Forecasting Heat Warning System

Maria C. Beltrano – CRA/CMA, Italy

New Strategies for Strengthening Tradition

David Barkin – UAM, Mexico

The Role of the Market in Addressing Climate Change in the Arid and Semi-Arid Lands of Kenya

Mwangi David Milano – Kenya

Agronomic Management Strategies for Adaptation to the Current Climate Variability - The Case of North-Eastern Tanzania

Frederick Kahimbaa – Tanzania

Resource Use Planning Under Climate Change: Experience from Turkana and Pokot Pastoralists of Northwestern Kenya

Stephen Mureithi – U. Nairobi, Kenya

---

## **18 AUGUST**

8:30 pm - 10:15 pm

*Session 3.1.2 - WB 2*

### **Lessons from Public Policies for Dry Regions of Mexico and the Nile Basin**

**Chair:** Alessandra Campanaro – WB, Brazil

**Rap.:** Edward Bresnyan – WB, Brazil

The Special Climate Change Program in Mexico

Felipe Arreguin – CONAGUA, Mexico

## Lessons from Policy and Institutional Development in Dry Regions: the Experience of the Nile Basin Initiative

Hon. E. Asfaw Dingamo – Minister of Water Resources, Ethiopia

## Public Policies and Climate Change Adaptation in the Water Sector in Mexico

Alessandra Campanaro – WB, USA

10:30 am - 12:15 am

*Session 3.2.2 - Panel - University of Duke*

### **Allocating Water Information & Water: Lessons from Ceará, Northeast Brazil**

**Chair and rap.:** Alex Pfaff – University of Duke, USA

#### Queues “Personalize” Water Information, Improving Investments

Miguel Fonseca – U. Exeter, UK

#### Unequal Information Yields Unequal Bargaining Outcomes

Maria Alejandra Velez – U. de los Andes, Colombia

#### Addressing Information Gaps: Provision of Rainfall Forecasts in Rainfed Areas

Renzo Taddei – UFRJ, Brazil

#### Committees & Compensation in Ceará Post-2000: rationales & reflections

Valerie Mueller – IFPRI, USA

#### Committees & Compensation in Ceará’s Future: rationales & reflections

Alexander Pfaff – U. Duke, USA

1:30 pm - 3:15 pm

*Session 3.3.2 - Roundtable - IRD*

### **Carbon Sequestration in Semi-arid Zones**

**Chair:** Michel Brossard – IRD, France

**Rap.:** Tahar Gallali – University Tunis

#### Carbon Sequestration

Martial Bernoux – IRD, France

Tahar Gallali – University Tunis

Ndeye Yacine Badiane Ndour – SRA, Senegal

Edmond Hien, Univ. Ouagadougou – Burkina Faso

Sandra Maria Oliveira As – UEMA, Brazil

4:15 pm - 6:15 pm

*Session 3.4.2 - Panel - NEGOS*

### **Climate Evolution in West Africa: Traditional and Formal Governance**

**Chair:** Peter Hochet – IRD, Burkina Faso

**Rap.:** Cheikh Oumar Ba – IPAR, Senegal

#### A Policy Unfinished but Persistent

Peter Hochet – IRD, Burkina Faso

#### A customary institution to cope with droughts and Resources Degradation

Luigi Arnaldi di Balme – IHEID, Switzerland



Participatory management and delegated participation: The Lessons of the Experience of the Yorosso Pastoral Scheme  
Moussa Djiré – U. Bamako, Mali

Governance of Natural Resources proofed against State Interventionism  
Cheick Oumar Ba – IPAR, Senegal

## 19 AUGUST

8:30 pm - 10:15 pm

*Session 4.1.2 - Panel - DfID 1*

### Climate, Sustainability and Development in Africa

**Chair:** Kenneth Souza – DfID, UK

Climate Change, Genetics of Adaptation and Livestock Production in Low-Input Systems  
Saidu Oseni – OAU, Nigeria

Land Tenure Reform and Challenges of Sustainable Land Management in a Semi-Arid Region in China  
Yongjun Zhao – U. Groningen, The Netherlands

Reaching out to Local Communities and Assist them to Adapt to Climate Change: A Case Study from Northern-Central of Namibia  
Laudika Kandjinga – IECN, Namibia

Farmer Adaptation in Scenarios of Climate Change for Food Security in Ghana: A Case Study of Maize Production in Semi-Arid Zone  
Emmanuel Tachie-Obeng – EPA, Ghana

Assessment of Carbon Storage in Some Savanna Soils Under Different Land-Use Systems in Ghana  
Gabriel N.N. Dowuona – U. Ghana, Ghana

Climate Change, Terrestrial Ecology Imprints and Adaptation Options in Semi-Dry Environments – A Case of the Nigerian Savannah  
Magowa Fasona – U. Lagos, Nigeria

Farmers' Perception of Climate Change and Adaptation Strategies in Sub-Saharan West-Africa  
Peter Johnston – U. Parakou, Benin

10:30 am - 12:15 am

*Session 4.2.2 – Roundtable - CEPAL 2*

### Economics of Climate Change in Central America

**Chair:** Hugo Eduardo Beteta – ECLA, Mexico

**Rap.:** Julie Lennox – ECLA, Mexico

Economic Assessment of Land Degradation Alternative Scenarios to Climate Change: Project VEDTCC (MM/CEPAL)  
Cesar Morales – CEPAL, Chile

Dry Areas of Panama

Israel Torres – ANAM, Panama

Carlos J. Pérez – Central American Commission on Environment and Development (CCAD)

Roberto Mota – Ministry of Environment, Guatemala

Pedro Garcia – Ministry of Environment, Republica Dominicana

Mariano Espinoza – Ministry of Environment, Costa Rica

The Economics of Climate Change in Central America

Julie Lennox – ECLA, Mexico

Luis Rios – MARN, Guatemala

2:00 pm - 3:45 pm

*Session 4.3.2 - Panel - FUNCEME/IRD*

### **Climatic Impacts of the Tropical Oceans on the Semi-arid (The Pirata Project)**

**Chair:** Jacques Servain – IRD/FUNCEME, France/Brazil

**Rap.:** Antonio Geraldo Ferreira – FUNCEME, Brazil

Project CATIN – Climate of the Tropical Atlantic and Impacts over the Nordeste (2005–2009)

Jacques Servain, IRD/FUNCEME – France/Brazil

Climatic Responses of the Tropical Oceans Variability on the Northeast Region of Brazil

Daisy Beserra Lucena – UFCC, Brazil

Semi-arid Areas of the Eastern Northeast of Brazil and of the Sahel of West Africa: Influence of the Ocean - Atmosphere Mechanisms

Yves Kouassi Kouadio – U. Abidjan, Ivory Coast

Impacts of Tropical Ocean Climate Variability Over Rain Fed Agriculture and Hydrological Basin in Northeast Brazil

José Maria Brabo Alves – FUNCEME, Brazil

Works to Mitigate Droughts in the Brazilian Northeast

Eric Cadier – IRD, France

4:15 pm - 6:00 pm

*Session 4.4.2 - Panel - Auditorium 2 Africa*

### **Agricultural and Climate Change**

**Chair:** Moussa Dogo Ali – GVDsa, Niger

A minimum-data approach for agricultural system level assessment of climate change adaptation strategies in resource-poor countries

Lieven Claessens – IPC, Kenya

Developing sustainable practices for community waste management, environmental protection and product recovery in peri-urban Sub Saharan areas

Moussa Dogo Ali – GVDsa, Niger

Stocktaking of future climate and socio-economic scenarios to provide inputs for impact, vulnerability and adaptation assessments

Isaac Habte – UNDP, Eritrea

---

## **20 AUGUST**

8:30 pm - 10:00 pm

*Session 5.1.2 - Roundtable*

### **Signals of Climate Change**

Signals of Climate Change in Tanzania

Osima, Sarah E. – Tanzania Meteorological Agency, Tanzania

Mahongo, S. – Tanzania Fisheries Research Institute, Tanzania

Evidences of Climate Change at Local Scale in Ethiopia and its Implications to the National Environment

Bayable, E. – Climate change impact at local scale, Regional climate change modeling, Ethiopia

Mengistu, G. – Atmospheric Physics and Regional Climate modeling, Ethiopia



Review of Climate Change Impact Potentials on East Africa

Tegegne, E. B. – Climate change impacts and climate change adaptations, Ethiopia

Evolution or Illusion? The Okavango Delta Management Planning Process Versus the Conventional Planning System in the Face of Climate Change and Variability in Botswana

Lapologang Magole – HOORC, Botswana

Paleoclimatic evidence in the semi-arid region of Paraíba: Strongholds and refuges in the Santa Catarina Mountain

Sousa, P. V. P. – Federal University of Ceará - Centro de Ciências, Brazil

Oliveira, V. P. V. – Federal University of Ceará - Centro de Ciências, Brazil

Trends in Indices for Extremes in Daily Precipitation Over Utah State – USA

Carlos Antonio Costa dos Santos – Instituto Nacional de Pesquisas da Amazônia-INPA, Brazil

Christopher M. U. Neale – Utah State University, Canada

Lawrence E. Hipps – Utah State University, Canada

Dry Days Variability in Argentina From a Regional Approach

Penalba, O. – Departamento de Ciencias de la Atmósfera y los Océanos, FCEN-UBA, Argentina

Rivera, J. A. – Departamento de Ciencias de la Atmósfera y los Océanos (DCAO), FCEN-UBA / CONICET, Argentina

Intraseasonal Variability and Diurnal Cycle of Precipitation Over West Africa in the Model LMDZ

Diedhiou, A. – IRD/LTHE, France

Sane, Y. – IRD/LTHE, France

Bonazzola, M. – University of Paris VI, France

Diongue-Niang, A. – ANAMS, Sénégal

Hourdin, F. – University of Paris VI, France

Variability in the Extension of the Northeast Brazil semi-arid as a Result of Climate Change

Javier Tomasella - Centro de Previsão do Tempo e Estudos Climáticos – INPE, Brazil

Rennó, D. A. – Centro de Ciência do Sistema Terra – INPE, Brazil

Santos, W. – Centro de Previsão do Tempo e Estudos Climáticos – INPE, Brazil

Prado, C. – Centro de Ciência do Sistema Terra – INPE, Brazil

Siqueira Júnior, J. L. – Centro de Ciência do Sistema Terra – INPE, Brazil

10:15 pm - 12:15 pm

Session 5.2.2 - Panel

**Effects of Climate Change in Dry Regions**

An Ecosystem Perspective of the Process of Reinfestation by *Triatoma infestans* in Rural Communities of the Gran Chaco Ecoregion

Noireau, F. – IRD, France

Gürtler, R. E. – Universidad de Buenos Aires - CONICET, Argentina

Arias, A. R. – Centro para el Desarrollo de la Investigación Científica (CEDIC)-Laboratorio Díaz Gill, Paraguay

Preliminary Analysis of Possible Effects of Climate Change in Northeast Brazil

Alves, J. M. B. – FUNCEME, Brazil

Impacts of Climate Change on Food and Water Securities in the Semi-arid Zones of India

Nais, S. – Nansen Environmental Research Centre, India

Climate Change and Its Implications in the Mustang District of Nepal

Baral, J. C. – Ministry of Forests and Soil Conservation, Nepal

The interface between climate change and biodiversity

Mont'Alverne, T. C. F. – Federal University of Ceará – UFC, Brazil

Matias, J. L. N. – Federal University of Ceará – UFC, Brazil

2:00 pm - 3:45 pm

*Session 5.3.2 - Roundtable*

### **Climate Change and Droughts Adaptation**

Changement Climatique, Rétrécissement du Lac Tchad et Migration (Climate Change, Narrowing of the Tchad Lake and Migration)

Arnold, O. K. P. – Université de Yaoundé II, Cameroun

Flood Disaster Risk Management in Namibia

Kaurivi, J. Z. U. – University of Namibia, Namibia

Siyambango, N. – University of Namibia, Namibia

The Role of Moisture Transport in the 2008-2009 Drought in Southern South America

Gulizia, C. N. – Centro de Investigaciones del Mar y la Atmósfera - CIMA/CONICET-UBA, Argentina

Rivera, J. A. – Departamento de Ciencias de la Atmósfera y los Océanos (DCAO), FCEN-UBA/CONICET, Argentina

Jatropha curcas Biofuels: how a miracle crop is reshaping socio-ecological relationships in India and Brazil

Baka, J. – Yale School of Forestry and Environmental Studies, India

Bailis, R. – Yale School of Forestry and Environmental Studies, India

Climate Change in the Context of Territorial Governance - The UNCDF experience

Alvergne, C. – United Nations Capital Development Fund - UNCDF (West African Office), USA

How Useful are Geosciences in Making Water and Other Resources Available in the Semi-arid Regions

Pinto, M. S. – GeoBioTec, University of Aveiro, Portugal

Government Agencies and International Institutions: Patterns of Interaction

Moreira, P. G. – State University of the Rio de Janeiro (UERJ) – Brazil

Valuation of Environmental Services of the Caatinga

Rabelo, M. S. – Federal University of Ceará (UFC), Brazil

Lima, P. V. P. S. – Federal University of Ceará (UFC), Brazil

4:00 pm - 5:00 pm

*Session 5.4.2 - Roundtable*

### **Water and Land Management**

Water, Territory and Management: Complementary Looks

Bermúdez, O. B. – Profesor Asociado Universidad del Valle, Cali, Colombia

Management of Caatinga Conservation Units: The Ecological Station Castanhão

Sena, L. M. M. – PRODEMA-UFC, Brazil

Build up Policy and Strengthen Decision Making Power for Communities aiming to Sustainability of the Rural Water Supply

Gunapala, A. H. – National Water Supply & Drainage Board, Siri Lanka

Fernando, W. B. G. – National Water Supply & Drainage Board, Siri Lanka

International Sources of Financing for Northeast Public Policy Derived from Preoccupation with the Climate

Castro, I. S. B. – Federal University of Ceará (UFC), Brazil

Public Policy and Coping with the Semi-Arid

Piriaux, M. – CIRAD /UFCEG, France

Diniz, P. C. – UFRPE, Brazil

The Relationship between Public Administration and Reverse Logistics in a Context of Sustainable Development

Andrade Filho, J. C. – Université de la Méditerranée (CRET-LOG), France

Colin, J. – Université de la Méditerranée (CRET-LOG), France



### III. Auditório Europa

#### 16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.3 - Panel - University of Georgia*

#### **Adaptation with a Long-Term View: Promoting Resilience**

**Chair and rap.:** Donald R. Nelson – University of Georgia, USA

Climate Change, Rural Poverty and the Political Dimension of Resilience in Kenya

M. Carla Roncoli – Emory University, USA

Building Resilience Through Water System Innovations in Dryland Smallholder Agriculture: Example from Makanya Catchment, Tanzania

Line Gordon – SRC, Sweden

Adapting with a Long View: The Future of Maize in Mexico

Hallie Eakin – Arizona State U., USA

Adaptation with a Long View: Promoting Resilience in Response to Environmental and Development Challenges

Donald R. Nelson – U. Georgia, USA

4:15 pm - 6:15 pm

*Session 1.4.3 – Panel - ICARUS/SDEP 1*

#### **Adaptation and Governance in Semi-arid Regions**

Climate Change Adaptation and Governance in the Water Sector

**Chair:** James McEvoy – University of Arizona, USA

**Rap.:** Renata Marson Teixeira de Andrade – PUC/Brasília, Brazil

Responding to Drought in Ceará: the role of development and risk management in disaster response, agricultural planning and water management

Maria Carmen Lemos – U. Michigan, USA

Raising Risk: desalination as an adaptive or maladaptive strategy in water sector?

Jamie McEvoy – U. Arizona, USA

The Triple Challenge

Barbara Lynch – Georgia Institute of Technology, USA

Vulnerability, adaptation and competing economic and climatic exposures in the Bolivian highlands

Julia Z. McDowell – Emory U., USA

Comments

Jesse Ribot – University of Illinois, USA

#### 17 AUGUST

8:30 pm - 10:15 pm

*Session 2.1.3 - Panel - INPE / ICID*

#### **Vulnerability, Impacts and Adaptation to Climate Change in Semi-Arid Regions**

**Chair:** Jurgen Kropp – Postdam Institute PIK, Germany

**Rap.:** Tabea Lissner – Postdam Institute PIK, Germany

Transition to Sustainability: How to Derive Blueprints for a Climate-Friendly and Sustainable Development

Jurgen Kropp – PIK, Germany

Global Climate Change and the Brazilian Northeast: Choices

Paulo Nobre – INPE, Brazil

Prediction of Droughts and Climate Changes: The Complementary Passage

Otamar de Carvalho – Consultant, Brazil

The role of rain water harvesting for climate change adaptation in Brazil

Johann Gnadlinger – ABCMAC, Brazil

Effect of Climate Change in Mustang (Nepal)

Jagdish Baral – MF, Nepal

2:00 pm - 3:45 pm

*Session 2.3.3 - Panel - ICID*

### **Vulnerability and Adaptation in the Health Sector**

**Chair:** Ulisses Confalonieri – FIOCRUZ, Brazil

**Rap.:** Peter Banks – ECC, USA

Impact of Climate Variability on Malaria Incidence and Prevalence in the Forest Zone of Ghana: A Case Study of Two Hospitals Located within the Kumasi Metropolitan Area of the Ashanti Regional Ghana

S. K. Danuor – KNUST, Ghana

Evaluation of Community Action to Fight Against Malaria In Context of Climate Change: The Case in Benin

Foe Bertrand – IDRC/CRDI, Benin

Impact of Weather Change: the Challenges for Public Health in Swaziland

Abul Salam – U. Suaziland, Suaziland

Examining the Impact of Climate Change on Elderly People Caring for Orphans and Vulnerable Children in Zaka District in the Face of HIV and AIDS

Ignatius Gutsa – ASRT, Zimbabwe

Climate, Vulnerability and Health

Ulisses E. C. Confalonieri – CPqRR/FIOCRUZ, Brazil

4:15 pm - 6:15 pm

*Session 2.4.3 - IADB*

### **Vulnerability and Adaptation in Latin America/Land Degradation and Climate Change in Latin America**

**Chair:** Alfred Grunwaldt – IADB, USA

**Rap.:** Tadashi Shimizu – IADB, USA

Climate Change Adaptation in LAC

Ana Rios Galvez – IADB, USA Brazil

Vulnerability and Adaptation in Latin America: Climate Change and Land Degradation

Tadashi Shimizu – IADB, USA

Global, Regional and Local Climate Science Applications

Lawrence Buja – NCAR, USA

Land Use/Land Cover Change and Forest Degradation in Semi-Arid and Dry Forest Regions of the LAC

Geraldo Fernandes e Arturo Sanchez – IDB, USA



## 18 AUGUST

8:30 am - 10:15 am

*Session 3.1.3 -Panel - ANA 3*

### **Interbasing Water Transfer in Semi-Arid Regions**

**Chair:** Gabriel Azevedo – Odebrecht, Brazil

**Rap.:** Rubem Porto – USP, Brazil

Trans-basin Diversion of Water: Conclusions from experience in the United States  
Larry Simpsons – NGECC, USA

Project of Integration of the San Francisco River with the Hydrographic Basins of the Setentrional Northeast

Francisco Lopes Viana – ANA, Brazil

Inter-Linkage of Basins in Semi-arid Regions: The case of the North Axis of the San Francisco  
José R. Simas – WRC, USA

Water Management and Inter-Basin Transfers in Semi-Arid Regions: Experiences in South Africa  
Peter van Nierck – DWA, South Africa

Economic Valuation of Two Technologies to Transfer Water. A Case Study of Morocco  
Bruno Belletini Cedino – UNDP, Equador

10:30 am - 12:15 am

*Session 3.2.3 - Round Table - CEPAL 1*

### **Vulnerability, Adaptation and Development in Latin America**

**Chair:** Cesar Morlaes – ECLA, Chile

**Rap.:** Cesar Morlaes – ECLA, Chile

Fernando Santibañez – University of Chile, Chile

Alejandro León – University of Chile, Chile

3:00 pm - 3:15 pm

*Session 3.4.3 - Panel - LEDUC / ESCADAFAL*

### **Impact of Global Change on Semi-Arid Hydrology**

**Chair:** Julien Burte, UFC - Brazil

**Rap.:** Christian Leduc, IRD, France

The Culmination of Severe Hydrological Stresses in the Murray-Darling Basin  
Marc Leblanc – University of Cairns, Australia

The uncertainties in rainfall and water resources in the Maghreb countries  
Mohamed Meddi – BLIDA, Algeria

La Région du Maghreb Face à la Rareté de l'Eau. L'Exemple du Défi Algérien: Mobilisation et Gestion Durable des Ressources (The Maghreb Regions and Water Scarcity. Example of the Algerian Challenge: Mobilization and Sustainable Management of Resources)

Azzedine Mebarki – U. Mentouri of Constantine, Alger

Historical Changes in Climate and Lake Chad Surface Area in the Chad Basin  
Ibrahim Baba Goni – U. Maiduguri, Nigeria

Diversity of Social-Ecological Systems in Semi-arid Regions: a Few Experiences from North and West Africa

Christian Leduc – IRD, France

La Reactivation Recente des Koris de la Région de Niamey et L'Ensablement du Fleuve Niger (Recent Reactivation of the Koris of the Niamey Region and Silting of the Niger River)

Mamadou Ibrahim – CNRS, France

---

## 19 AUGUST

8:30 am - 10:15 am

*Session 4.1.3 - Panel*

### **Agroecology, Climate Change and Food Security**

**Chair:** Lapologang Magole – Botswana

**Rap.:** Kavitha Anjanappa – India

Policy Change Implications for Climate Change Vulnerability and Adaptation in Botswana

Lapologang Magole – HOORC, Botswana

Role of Agro-Forestry on Community Livelihood and Climate Mitigation in Semi-Arid Region of South India

Kavitha Anjanappa – ATREE, India

10:30 am - 12:15 am

*Session 4.2.3 - Panel - ICID*

### **Adaptation Strategies in Dryland Regions**

**Chair:** Saidu Oseni – OAU, Nigéria

And if the Instruments to Combat Vulnerability of Populations were Themselves Vulnerable?

Example of Participatory Forest Management Plan in Senegal

Coumba Ndoffène Diouf – UCAD, Senegal

Vulnerability and Adaptation to Extreme Weather Events in Kwara State, Nigeria

Felix Olaunfemi – NISER, Nigeria

Sustainable Irrigation and Adaptation to Climate Change: Tales of Semi-Arid Regions of India

Shailendra Kumar Mandal – NITP, India

Inter-Linked Utilisation of Ecosystem Services by Communities in Arid Lands

Mogodisheng Sekhwela – U. Botswana, Botswana

Adaptation to the Impacts of Climate Change in a Mexican Semi-arid Region

José Luis Gonzales-Barrios – CLNID-RASPA, Mexico

2:00 pm - 3:45 pm

*Session 4.3.3 - Panel - Africa Education 2*

### **Social Learning and Human Capacity 2: Social Learning for Climate Change Adaptation at Community Level - Policy and Practice Implications**

**Chair:** Carolyn Palmer – National Research Foundation, South Africa

**Rap.:** Sheona Shackleton – Rhodes University, South Africa

Heila Sisitka – Rhodes University, South Africa



Climate Change, social learning and water management adaptation in vulnerable communities  
Samuel Chimbuya – Khanya, South Africa

Designing Social Learning Systems for Sustainable and Resilient Community Driven Development  
in a Climate Changing World  
John Colvin – Open University, UK

Integrating Sustainability in School Curriculum and Practice: The Case of the Schools and Colleges  
Permaculture Programme in Zimbabwe  
Mutizwa Mukute – Rhodes University, South Africa

Exploring Farmer Learning and Agricultural Education (College) and Training: Do These Processes  
Meet the Climate Challenge?  
Victor Tichaona Pesanayi – SADC, South Africa

Discussants  
Sheona Shackelton – Rhodes University, USA  
Akpezi Ogbuigwe – UNEP, Kenya

---

## 20 AUGUST

8:30 am - 10:00 am

*Session 5.1.3 - Roundtable*

### Local Adaptation Strategies

**Chair:** Arona Coumba Ndoffène Diouf – Sénégal

Livelihood Adaptation Capacities to Climate Variability in the Sahel  
Arona Coumba Ndoffène Diouf – Université Cheukh Anda DIOP de Dakar, Sénégal  
Cheikh Mbow – ISE, Sénégal

Adaptations to Climate Change (Anti-Flooding Solutions) in Kuttanadu Agro-Ecosystems (India)  
Paimpillil J. S. – Center for Earth Resources and Environment Management, India

Local Adaptation Strategies to Climate Induced Water Stress and Hazards in Yunnan, Southwest  
China

Yufang Su – Center for Mountain Ecosystem Studies/Yunnan Academy of Social Sciences, China  
Qiaohong Li – World Agroforestry Center, China Program/Kunming Institute of Botany, China  
Yao Fu – World Agroforestry Center, China Program/Kunming Institute of Botany, China  
Andreas Wilkes – World Agroforestry Center, China Program/Kunming Institute of Botany, China  
Jianchu Xu – World Agroforestry Center, China Program/Kunming Institute of Botany, China

What Drives Effective Adaptation to Climate Change Among Poor Farmers in Africa? The Case of  
East and West Africa Trans-Boundary Sites  
Ephraim Nikonya – International Food Policy Research Institute, USA

The West African Sahel: Challenges of Climate Change Adaptation Strategies  
Lekan Oyebande – University of Lagos, Nigeria

Livelihood dynamics in semi-arid communities: adapting to climate change around Kanji Lake,  
Nigeria  
Raheem Usman Adebimpe – University of Ilorin, Nigeria

Safariland: Adapting to Social and Climate Changes  
Angela Kabiru – National Museums of Kenya, Kenya

Inter-linked Utilisation of Ecosystem Services by Communities in Arid Lands of Botswana: Strategic  
Adaptation to Climate Variability and Climate Change  
Mogodisheng B. M. Sekhwela – University of Botswana, Botswana

10:15 am - 12:15 am

*Session 5.2.3 - Roundtable*

### **Innovative Solutions**

**Chair:** Mihir Joshi – India

**Innovative Solutions of Shelter Against Climate Change Impact for Desert Regions of India**

Mihir Joshi – SEEDS, India

**Forest Decentralization and Local Adaptation to Climate Change: an Insight from Yunnan, Southwest China**

Jun He – ICRAF, China and University of East Anglia, Norwich, China

**And if the Fighting Instruments of the vulnerability of people were, themselves, vulnerable? The example of “participatory management plans in Senegal**

Coumba Ndoeffène Diouf – Université Cheuck Anta DIOP de Dakar, Sénégal

**Climate Change and Ecosystem Vulnerability in the Semi-Arid Brazil**

Izaura Cristina Nunes Pereira – Núcleo de Altos Estudos Amazônicos, Universidade Federal do Pará, Brazil

**Impacts of Climate Variations on Water Availability in Reservoirs in Northeast Brazil: A Case Study for the Basin of the Santa Cruz Reservoir in Apodi-RN**

George Leite Mamede – Universidade Federal Rural do Semi-Árido, Brazil

Débora Carla Barboza de Sousa – Universidade Federal Rural do Semi-Árido, Brazil

Daniel Lima de Lyra – Universidade Federal Rural do Semi-Árido, Brazil

**Enhancing Climate Resilience for Sustainable Development in an Arid Region of Nigeria**

Surveyor Efik – National Coordinator, Climate Change Network (CCN), Nigeria

2:00 pm - 3:45 pm

*Session 5.3.3 - Roundtable*

### **Impacts, Adaptation and Mitigation**

**Impact of the Glacier Melting to the Social-Economic Development and Climate Change Adaptation Strategies in West China**

Shiyin Liu – Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China

Nanqing Jiang – UNEP China Office, China

**Adapting and mitigating climate change through agriculture-Complementary or conflicting priorities?**

Patrick Doyle – DAI, USA

Chuck Chopak – DAI, USA

Andrew Watson – DAI, USA

**Mitigation and Adaptation to Climate Change: China’s Forestry Policy Adjustment**

Miao Guangping – The Department of Rural Forestry Reform and Development, China

Zhang Lei – The Department of Rural Forestry Reform and Development, China

**Auroville - The City the Earth Needs**

Lalit Kishor Bhati – Gaia University, India

**Climate Change: Impacts, Vulnerabilities and Adaptation in Kilimanjaro Region**

Abdallah Ramadhani – Envirocare

Loyce Lema – Envirocare



Vulnerability, Impacts and Adaptation to Climate Change in the Semi-arid Region of Northeast Brazil

Jose Antonio Marengo Orsini – CCST/INPE, Brazil

Sin Chan Chou – CPTEC/INPE, Brazil

Lincoln M. Alves – CPTEC/INPE, Brazil

Francinete Francis Lacerda – Instituto de Tecnologia de Pernambuco, Brazil

Elder Almeida Beserra – CPTEC/INPE, Brazil

Integrated Assessment on Vulnerability and Adaptation to Climate Change in Eastern Africa

Geneve Mulugeta – Uppsala University, Sweden

The Dilemma of Climate Change in Tropical Countries: Vulnerability, Adaptation and Sustainable Development in Nigeria

Ogundele Fatai Olakunle – Lagos State University, Ojo Lagos, Nigeria

Jesse C. Ribot – University of Illinois, USA

4:15 pm - 6:15 pm

*Session 5.4.3 - Panel*

**Reducing Drought Vulnerability**

Reducing Drought Vulnerability by Drought Characterizing Using Meteorological Data and Spatial Soil Moisture Modelling

Budi Hadi Narendra – Forestry Research Institute of Maratam, Indonesia

Coping with Environmental Variability: Pastoral Livestock Mobility and Socio-Ecological Dynamics in Eastern Africa

Bilal Butt – University of Wisconsin, Madison, USA

CLIMA-IVCSAB Software for Estimation of Climatic Vulnerability Index for the Brazilian Semi-arid

Maria Elisa Zanella – UFC, Brazil

Vlândia Pinto Vidal de Oliveira – UFC, Brazil

Rosa Maria Ramos Maranhão – UFC, Brazil

Lívio Antonio Melo Freire – UFMG, Brazil

## IV. Auditório Ásia

---

### 16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.4 - Panel - ANA 1*

#### **Rational Use and Reuse of Water in the Semi-Arid Regions**

**Chair:** Erwin de Nys – WB, USA

**Rap.:** Ivanildo Hespanhol – USP, Brazil

Water Producer Program

Devanir Garcia dos Santos – ANA, Brazil

The Mexican Experience with Household Waste Water Reuse in Irrigated Crops

Blanca Elena Jiménez Cisneros – UNAM, Mexico

Sustainable Sanitation and Re-use of Reclaimed Water in the Semi-Arid Brazil

Alice Miranda Martins – UPC, Spain

Management of Integrated Micro-Basins, Water and Sanitation Integrated Management Strategies in Rural Communities in the Brazilian Semi-arid

Verlania de Medeiros Moraes – DCF/UFLA, Brazil

Carlos Magno de Medeiros Moraes – ASA, Brazil

Water Re-Use Concepts and Examples

Guido Soto – CAZALAC, Chile

4:30 pm - 6:15 pm

*Session 1.4.4 - Panel*

#### **Education and Development in the Semi-Arid Lands**

**Chair:** Antonio Gomes Pereira – Consultant, Brazil/USA

**Rap.:** Washington Bonfim – University of Piauí, Brazil

Macrotrends in Economic Development, Education and Environmental Protection

Ladislau Dowbor – PUC/SP, Brazil

The Ignored Half: Can Expanded Education Participation in Kenya's Arid Lands Stimulate Growth and Development?

Sara Jerop Ruto – UWEZO, Kenya

Living with the Semi-Arid: Doing Education with the Feet on the School Ground

Maria Luciana da Silva Nóbrega – RESAB, Brazil

---

### 17 AUGUST

8:30 am - 10:15 am

*Session 2.1.4 - Panel - ICARUS/SDEP 2*

#### **The Importance of Community, Culture, Identity and Equity in Climate Change Adaptation Strategies**

**Chair:** Jamie McEvoy – U. Arizona, USA

**Rap.:** Lisa Shipper – SEI, Sweden



Redistribution, Recognition, Representation. Risk-proofed Justice in Latin-American Cities  
Julien Rebotier – SET/CNRS, France

Community Based Adaptation and Culture  
Jonathan Ensor – Practical Action, UK

Contestations and Effects of Climate Refugees Narratives  
Carol Farbotko – U. Wollongong, Australia

Vulnerability to Climate Change in Brazil: Mapping Adaptation Strategies, Key Policies and Assessing Gaps  
Renata Marson Teixeira de Andrade – UCB, Brazil

2:00 pm - 3:45 pm

*Session 2.3.4 - Panel*

### **Sustainable Adaptation: Climate and Sustainable Development**

**Chair and rap.:** Chuluun Togtokh – Mongolia Development Institute, Mongolia

Mongolia's GHG Inventory. Technology Needs Assessment  
Tsogoo Baltav – MDI, Mongolia

Millennium Development Goals-Based Comprehensive National Development Strategy of Mongolia and New Policy for Combating Desertification  
Tsendendamba Lkhanaajav – MDI, Mongolia

Vulnerability Assessment of Social-Ecological Systems in Mongolia  
Altanbagana Myagmarsuren – DSI, Mongolia

Synergies Between Climate Change, Desertification and Human Development at Multiple Scales  
Chuluun Togtokh – DSI, Mongolia

Building Development Under Climate Change in Arid Mongolia  
Andrei Marin – U. Bergen, Norway

4:30 pm - 6:15 pm

*Session 2.4.4 - Roundtable - University of Paris 13*

### **Migrations, Climate Change and Development in Semi-Arid Regions**

**Chair:** Pierre Salama – University of Paris 13, France

**Rap.:** Paulo Klias – Brazil

Migrations, Climate Change and Development in Semi-Arid Regions  
Pierre Salama – Un. Paris, France

Climate Change and Migration (with a Case Study on the Brazilian Semi-Arid)  
Alisson Flávio Barbieri – CEDEPLAR, Brazil

Migrations, Climate Change and Development in Semi-Arid Regions  
Gabriela Munoz Meléndez – COLEF, Mexico

Ecosystem Change in Europe's South Border and Migration  
Eladio Fernandez-Galiano – Europa Council, France

**18 AUGUST**

10:30 am - 12:15 am

*Session 3.2.4 - Panel - UNCBD***Biodiversity, climate change and development in dry and sub-humid lands****Chair:** Sergio Zelaya – UNCCD, Germany**Wetlands in drylands: threats from climate change and desertification and their role for adaptation**  
Maria Rivera – RAMSAR, Colombia**Loma Mama Doña**

Maria Guacho Orozco – Guaman Poma Ayala, Ecuador

**The role of Indigenous Knowledge and Biodiversity in Livestock Disease Management under Climate Change**

Harrison Chitambo – National Institute for Scientific and Industrial Research, Zambia

**Teaching and Learning the Value of Biodiversity-Based Livelihoods**

Aderbal C. Correa – ICASALS, USA

1:30 pm - 3:15 pm

*Session 3.3.4 - Panel - Univ. Georgia***Forms of adaptive management Under Climate Change****Chair:** Donald Nelson – UG, USA**Rap.:** Jorge Jatobá – UFPE, Brazil**Agricultural Droughts and Local Crises: A Spatial and Temporal Analysis of the Socioeconomic Impacts of Hydrological Variability in Ceara**

Francisco Assis Souza Filho – UFC, Brazil

**The Historical Evolution of Adaptive Political Institutions in Ceará, Northeast Brazil**

Timothy J. Finan – U. Arizona, USA

**Explaining Problematic Predictions: Forecaster and "User" Perspectives from Ceará, Brazil**

Karen Pennesi – U. Western Ontario, Canada

**Bali on the Brink? Adaptive Co-Management for Subaks, Rice Terraces and Water Temples of Bali**

Karyn Fox – U. Arizona, USA

**Reducing Poverty, Protecting Livelihoods and Building Assets in a Changing Climate**

Dorte Verner – WB, USA

3:30 pm - 5:15 pm

*Session 3.4.4 - Panel - Africa Education 1***Social Learning and Human Capacity 1: Higher Education Capacity Development Processes for Climate Change in Africa — Teaching and Research****Chair:** John D. Colvin**Rap.:** Sheona Shackleton – Rhodes U., South Africa**Discussants:** Sheona Shackleton – Rhodes U., South Africa

Akpezi Ogbuigwe – UNEP, Kenya



A Conceptual Framework for Integrating Climate Change Adaptation into Higher Education (HE) Learning and Research: Strengthening Capacity To Respond at Multiple Levels

Sheona Shackleton – Rhodes U., South Africa

The MESA Universities Partnership Project

Akpezi Ogbuigwe – UNEP, Kenya

Social Learning and Human Capacity Development Innovations for Climate Change Adaptation

Karen Pennesi – U. Western Ontario, Canada

Research: Social Learning in Policy & Practice for Sustainability

Carolyn Palmer – NRF, South Africa

Integration of ESD in National Education Systems: Issues to Consider when Including Climate Change

Mphemelang Ketlhoilwe – U. Botswana, Botswana

---

## 19 AUGUST

8:30 am - 10:15 am

*Session 4.1.4 - Panel - ICARUS/SEI/SDEP 3*

### From Impacts to Vulnerability: Locating Climate Change Adaptation in the Development Agenda

**Chair:** Lisa Schipper – SEI, Thailand

Netra Chhetri – Arizona State University, USA

**Rap.:** Maria Carmen Lemos – University of Michigan, USA

Nailing Down Adaptation: Why Examples of Adaptation are so Elusive

Lisa Schipper – SEI, Thailand

Pastoralism and Climate Change: Clarifying Research and Policy Agendas

John Morton – U. Greenwich, UK

Clumsy Solutions to a Wicked Problem of Climate Change: Smallholder Agriculturists Approach to Increase Systems Resiliency

Netra Chhetri – Arizona State U., USA

Climate Variability and Building Pastoral Socio-Ecological Adaptive Capacity in Ethiopia

Dawit Abebe – UN. Greenwich, UK

Community-Based Adaptation of Tribal Women to Climate Change in Semi-Arid India

Purabi Bose – Wageningen UN., Netherlands

10:30 am - 12:15 am

*Session 4.2.4 - Roundtable - Monica Amorim / UFC*

### Poverty Alleviation and Environmental Conservation

**Chair:** Monica A. Amorim – UFC, Brazil

**Rap.:** Clarisse T. B. Dall Acqua – Consultant, Brazil

Poverty Alleviation and Environmental Conservation in the Context of Climate Change

José Antonio Puppim de Oliveira – United Nations University, Japan

Sweet Combination: Production of Organic Honey and Conservation of the Semi-arid in Simplício

Mendes/PI

Paulo Jordão de O. C. Fortes – UFPI, Brazil

Laundry Companies in Toritama in the Pernambuco Agreste

Clarisse T. B. Dall Acqua – Consultant, Brazil

Global Production Networks: The Practice of Environmental and Economic Sustainability and Cacao  
 Janice Goldman – U. Massachusetts, USA

Poverty Reduction? Social Inclusion? Semi-arid? Underserved Populations? What Programs?  
 Francisco C. de Oliveira – UNIFOR, Brazil

Sustainability and the production of agroecological cottons in the semi-arid of Ceará, in northeast Brazil  
 Vilma Moreira Faria – UFC, Brazil

Poverty Reduction and Environmental Concerns  
 Monica A. Amorim – UFC, Brazil

2:00 pm - 3:45 pm

*Session 4.3.4 - Roundtable - ICID*

### Social Sciences Research Agenda in Climate Change Response

**Chair and rap.:** Jesse Ribot, U. Illinois - USA

Climate Change: Impact on Poverty  
 Monica A. Amorim – UFC, Brazil

Social Sciences in Response to Climate Change in Mongolia and the MAIRS Region  
 Chuluun Togtokh – MDI, Mongolia

Adapting with a Long View: The Future of Maize in Mexico  
 Hallie Eakin – Arizona State U., USA

Social Sciences Research Agenda in Climate Change Response+AE61  
 Papa Faye – ISM, Senegal

Lessons learned about lessons learned  
 Michael Glantz – U. Colorado, USA

Uncertainty, Culture and Climate Change  
 Renzo Taddei – UFRJ, Brazil

What Has Been Changed by “Climate Change”? Challenges and Implications to Rural Development Studies  
 Zuo Ting – China Agricultural U., Beijing

Participative Management and Delegated Management: Lessons from Experience of the Yorosso Pastoral Scheme  
 Moussa Djiré – U. Bamako, Mali

Nailing Down Adaptation: Why Examples of Adaptation are so Elusive  
 Lisa Schipper – SEI, Thailand

## 20 AUGUST

8:30 am - 10:15 am

*Session 5.1.4 - Roundtable*

### Water Management

Social Organization of Water in the Context of Climate Variability and Mining Contamination of Water  
 Víctor Hugo P. Miranda – Maestría en Gestión Integral de Recursos Hídricos/Universidad Mayor de San Simón, Bolivia

Water Management and Drought in the Jaguaribe Basin, Ceará  
 Viana, C. F. G. – UFC, Brazil  
 Marcel Bursztyn – UnB, Brazil



**Water Market in the Batateira Fountain in Cariri and the New Water Policy in Ceará**

Francisco Wilson Cordeiro de Brito – IFCE–Instituto Federal do Ceará, Brazil

Ticiania Marinho de Carvalho Studart – IFCE–Instituto Federal do Ceará, Brazil

**Methodological Proposal for the Creation of a System of Conflict Management among Water Users in Microbasins of Espírito Santo**

Walter Batista Júnior – Programa de Pós Graduação em Meteorologia Agrícola da UFV, Brazil

Gustavo Batista D' Angiolella – Programa de Pós Graduação em Meteorologia Agrícola da UFV, Brazil

Ricardo Valory – Instituto Estadual de Meio Ambiente e Recursos Hídricos do Espírito Santo

**Water Management Strategies to Combat Scarcity in Semi-arid and Mediterranean Regions: Differences and Similarities**

Maria Manuela Morais – University of Évora – Water Laboratory (ICAA), Portugal

**Environmental Impacts of Climate Change on Groundwater Resources in Sri Lanka**

Ranjana Udaya Kumara Piyadasa – Department of Geography, University of Colombo, Sri Lanka

**Climate Change Impact Assessment on Rainfall-Runoff Process: A Case Study of Pishin Reservoir Basin in Iran**

Banafsheh Zahraie – Associate Professor, Iran

Roodabeh Mohammadnejad – Graduate student, Iran

10:15 pm - 12:15 pm

*Session 5.2.4 - Roundtable*

**Rainwater Harvesting and Adaptation**

**The Recent Reactivation of Koris of the Niamey Region and the Siltation of the Niger River**

Mamadou Ibrahim – Institut de Géographie, Université Panthéon-Sorbonne, France

Gautier Emmanuèle – Laboratoire de Géographie Physique (LGP)/CNRS UMR, France

Luc Descroix – Institut de Recherche pour le Développement (IRD), France

Bouzou Moussa Ibrahim – Département de Géographie, FLSH, Université Abdou Moumouni Niamey, Niger

**Rainwater Harvesting Technology and Policies in Semi-arid Regions: Paraíba (Northeastern Brazil) and Texas (Southwestern United States) Case Study**

Rodolfo Luiz Bezerra Nóbrega – Universidade Federal de Campina Grande – UFCG, Brazil

Aderbal C. Correa – International Center for Arid and Semiarid Land Studies, USA

Carlos de Oliveira Galvao – Universidade Federal de Campina Grande – UFCG, Brazil

**The Use of Roof Catchments and Cisterns for Domestic Supply in the Brazilian Semi-Arid Region**

Luiz Rafael Palmier – Universidade Federal de Minas Gerais, Brazil

Rodolfo Luiz Bezerra Nóbrega – Universidade Federal de Campina Grande – UFCG, Brazil

**Climate Change Adaptation for Sustainable Water Resources Management: A Case Study**

Banafsheh Zahraie – Associate Professor, Iran

Abbas Roozbahany – Ph.D. Candidate, Iran

Amirreza Salamat – Graduate student, Iran

**Role of agro-forestry on community livelihood and climate mitigation in Semi-arid region of South India**

Gladwin Joseph – ATREE, Bangalore, India

Kavitha Anjanappa – ATREE, Bangalore, India

**Impacts of Climate change on livelihood of farmers in a Semi-Arid region of South India**

Kavitha Anjanappa – ATREE, Bangalore, India

Badenahally Chikkarangappa Nagaraja – Bangalore University, Bangalore, India

2:00 pm - 3:45 pm

*Session 5.3.4 - Roundtable***Challenges and Perspectives in the Semi-arid Regions**

Challenges and perspectives of actions of protection to agriculture production in the Brazilian Semi-arid  
Marcos Antonio Alves de Lima – UnB, Brazil

Characterizing and modelling the diversity of cropping situations under climatic constraints in West Africa

Seydou Traore – Agrhimet Regional Center, Niger

Effects of Rainfall Precipitation on Food Production in Ceará: Unfolding in Historical Periods

José de Jesus Sousa Lemos – Universidade Federal do Ceará – UFC, Brazil

Demartone Coelho Botelho – Universidade Federal do Ceará – UFC, Brazil

Trends in Indices for Extremes in Daily Temperature Over Utah State – USA

Carlos Antonio Costa dos Santos – Instituto Nacional de Pesquisas da Amazônia – INPA, Brazil

Lawrence E. Hippias – Utah State University, Canada

Christopher M. U. Neale – Utah State University, Canada

Impacts of climate changes in cultivation of upland cotton in rainfed systems in Northeast Brazil

Madson Tavares Silva – Universidade Federal de Campina Grande–UFCC

Vicente de Paulo Rodrigues da Silva – Universidade Federal de Campina Grande–UFCC

Promotion of Ecological and environmental micro-financings on activities that generate income for local communities

Agbavito Koku Selom – Association des Volontaires pour l'Environnement Sain, Togo

Agroforest Systems for the Brazilian Semi-arid

João V. F. Pimentel – Universidade Federal de Campina Grande–UFCC / Escola Agrícola de Quixeramobim–CE, Brazil

Hugo Orlando Carvalho Guerra – UFCC/DEAG/Campus I, Brazil

Francisco Jardel Rodrigues da Paixão – Universidade Federal de Campina Grande–UFCC, Brazil

4:15 pm - 6:00 pm

*Session 5.4.4 - Panel***The Challenges of Efficient Agriculture**

The Challenges of Eco-Efficient Agriculture in Arid West Africa and Implications for Food Security

Samuel A. Igbatayo – Igbinedion University, Okada, Nigeria

Group Farming Produces Making Market Work for Poor Farmers

Ganesh Parida – CYSO, India

Vulnerability of Irrigated Agriculture in Face of Drought

Israel Velasco – Mexican Institute of Water Technology, Mexico

Agro-Ecological Vulnerability of Smallholder Farming Systems to Climate Change Dynamics and Mitigation Options in Zimbabwe

Raphael Jingura – Chinhoyi University of Science and Technology, Zimbabwe

Kumbirai Musiyiva – Chinhoyi University of Science and Technology, Zimbabwe

Trend in Precipitation Features as an Index of Climate Change in the Guinea Savanna Ecological Zone of Nigeria: Its Implications on Crop Production

Mojisola Rhoda Olanrewaju – University of Illorin, Nigeria



## V. Auditório Paraíba

16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.5 - Panel - IRD*

### Northeast Brazil Climate Variability and Tropical Tele-connections

**Chair:** Stahis Panagides – Millennium Challenge, Cape Verde

Paleoclimatology and climatic vulnerability of the Brazilian northeast: a regional and global vision  
Abdelfettah Sifeddine – IRD, France/Brazil

The Northeast Potential in Regard to the Register of Climatic Variability

Heitor Matallo – UNCCD, Mexico

Heitor Evangelista – UERJ, Brazil

Brazilian Nordeste Droughts, ENSO and the Atlantic Climate Variability: Some Insights from a Documentary Study on Historical “Secas”

Luc Ortlieb – IRD, France

The Archeological Researches in the National Parks of the Capivara and the Confusões Mountains and some Paleoclimatic Data

Gizele Felice – UFPI, Brazil

The Cave of Win Timdouine (High Atlas Mountains, Morocco): A contribution to the Inventory of Geological Heritage and Speleothem Study

Lhoussaine Bouchaou – CM - AIH, Morocco

4:30 pm - 6:15 pm

*Session 1.4.5 - Panel - ICID*

### Vulnerability and Impacts Indexes

**Chair:** Fernando Cosme Rizzo – CGEE, Brazil

**Rap.:** Antonio Glauter Teófilo Rocha – CGEE, Brazil

Reductions of vulnerability conditions in face of climate change in housing, urbanism and sanitation

Adrian Fernando Neyra Palomino – MVUS, Peru

Agricultural Vulnerability in the Brazilian Semi-Arid Region

Marília Magalhães and Eduardo Magalhães – IFPRI, USA

A Process-Based Assessment of Land Vulnerability: Italy as a Case-Study

Luigi Perini – CRA/CMA, Italy

Performance of Drought Quantitative Indexes

Alexandre Brian Heineman – Embrapa, Brazil

Construction of a Synthetic Index of Sustainable Development (IDS) for the Municipalities of the Ceará State, Brazil

Manuel Osório de L. Viana – UFC, Brazil

---

**17 AUGUST**

8:30 am - 10:15 am

*Session 2.1.5 - Panel - ICID***Vulnerability Impacts and Adaptation: lessons and recommendations from the Australian Conference****Chair and rap.:** Sergio Zelaya – UNCCD, GermanyThe whole life cycle approach to capacity building in semi-arid lands: a case study of Sauri Cluster, Kenya  
Shira Kronich, Shmuel Brenner – AIES, IsraelImpacts of government policies on pastoralist livelihoods in the semi-arid areas of Tanzania  
Martin Shem – SUA, TanzaniaAsset managers for one thousand days: addressing vulnerability until the next elections  
Samuel Mwangi – U. Nairobi, Kenya2010 Climate Adaptation Futures Conference: Gold Coast, Queensland, Australia, 29 June–1 July  
Jean Palutikof – NCCARF, Australia

2:00 pm - 3:45 pm

*Session 2.3.5 - Panel - ANA 2***Water Governance in Drylands****Chair:** Paulo Varela – ANA, Brazil**Rap.:** Carlos Jauregui – WASA-GN, SpainWater Governance in Arid and Semi-Arid Regions: Experience of Proagua Program  
Ricardo Andrade – National Water Agency (ANA), BrazilRivers in Semi-Arid Lands  
Jurgen Schmandt – University of Texas, USASustainable Water Resources Management in the Lake Chad Basin: Problems and Challenges  
Benjamin Ngounou Ngatcha – U. Ngaoundere, CameroonWater, Territory and Management: Complementary Looks  
Oscar Buitrago Bermúdez – University del Valle, ColombiaWater Governance in the Brazilian Semi-arid  
Otamar Carvalho – Consultant, Brazil

4:30 pm - 6:15 pm

*Session 2.4.5 - Panel - LEDUC / ESCADAFAL***Remote Sensing and Water Management****Chair and rap.:** Richard Escadafal – IRD CESBIO, FranceEgypt is Hyperarid  
Ismail Galil – DRC, Egypt

Integrated Modelling and Remote Sensing Approach for Sustainable Management of Water Resources in Semi-arid Basin in Morocco: the SUDMED Program

D. El Hadani – RSC, Morocco

Abdelghani Chebouni – CESBIO, Egypt

Remote Sensing for Risk Assessment and Mapping in Dryland Areas-Lebanon  
Talal Darwish – CNRS/CRS, Lebanon



Analyses of Vegetation Cover Monitoring through Multi-Scale Satellite Observation  
Zohra Lili Chabaane – INAT, Tunisia

Earth Observation and Geoinformation for Water Resource Monitoring and Information Sharing  
in Semi-Arid Regions: Application to Semi-Arid Northeast Brazil  
Pascal Kousuth – UMR-Tetis/CEMAGREF, France

Satellite monitoring of environmental degradation and desertification in drylands: examples in  
Northern Africa  
Richard Escadafal – IRD, France

---

## 18 AUGUST

8:30 am - 10:15 am

*Session 3.1.5 - Panel - MMA*

### Conservation and Sustainable Use of Native Species

**Chair:** Bráulio Dias – Ministry of Environment, Brazil

**Rap.:** João Arthur Seyffarth – MMA, Brazil

Ignácio J. March Mifsut – TNC, Mexico

Species Conservation as a Monitoring Strategy of Climate Change and Desertification: The Case  
of the Onça-Pintada (Jaguar) in the Brazil Semi-arid

Ronaldo Gonçalves Morato – CENAP, Brazil

Joaquim de Araujo Silva – Fundação Biotrópicos, Brazil

Advice and Management in Nature Studies, Human Development and Agroecology

Maurício Aroucha – AGENDHA, Brazil

Successful Experiences of Sustainable Use in the Brazilian Semi-arid: The Caatinga Ecosystem

Francisco Campello – MMA, Brazil

Experiences of Traditional and/or Sustainable Agriculture in the Caatinga

Daniel Duarte – UFPB, Brazil

10:30 am - 12:15 pm

*Session 3.2.5 - Panel - Rep. China*

### Vulnerability and Adaptation: Implications of Climate Change at Macro and Micro Levels in China

**Chair:** Xu Xiuli – Agricultural U. Beijing, China

**Rap.:** Yongjun Zhao – University of Groningen, the Netherlands

**Discussant 1:** Zuo Ting – China Agricultural University, Beijing, China

**Discussant 2:** Li Fengyang – Ningxia Center for Environment and Poverty Alleviation, China

Key Measures and Achievements of China's Forestry for Combating Climate Changes

Qian Nengzhi – Copping Climate Change Office, SFA, China

Farmers' Vulnerability to Climate Change and Adaptation Strategies in a Semi-arid Area in China

Zhang Yue – China Agricultural University

Local Perspectives of Climate Risks, Vulnerabilities and Adaptation

Xu Xiuli – China Agricultural U. Beijing, China

Coping, Adaptation and Vulnerability to Drought in Yunnan, China

Lu Caizhen – Kunming Institute of Botany, Chinese Academy of Science, China

Decentralization and local adaptation to climate change: insights from Yunnan, Southwest China

He Jun – University of East Anglia

1:30 pm - 3:15 pm

*Session 3.3.5 - Panel - ICID*

### **Vulnerability and Coping in Rural Areas**

**Chair:** Mark Lundell – WB, Brazil

**Rap.:** Edward Bresnayan – WB, Brazil

Sustainable Agriculture Development Indicators in the Semi-arid Regions of the Northeast of Brazil  
Angela Küster – KAF, Brazil

Coping with environmental variability: pastoral livestock mobility and socio-ecological dynamics in Eastern Africa

Bilal Butt – U. Wisconsin, USA

José Aderivaldo Silva da Nóbrega – UFCC, Brasil

Reducing vulnerability of pastoralist communities to climate change and variability in Northern Kenya  
Joy Obando – Kenyatta University, Kenya

What drives effective adaptation to climate change among poor farmers in Africa? The case of east and west Africa trans-boundary sites

Ephraim Nkonya – IFPRI, USA

4:30 pm - 6:15 pm

*Session 3.4.5 - Panel - CDS/UnB*

### **From Fighting Drought to Confronting Desertification in the Northeast Semi-Arid**

**Chair:** Marcel Bursztyn – UnB, Brazil

**Rap.:** Cristine Viana – UFC, Brazil

Desertification, Adaptation and Climate Change in the Drylands: What Can We Learn from Amazonia?  
Anthony L. Hall – London University, UK

Geo-History of the Northeast Semi-arid

Martine Droulers – CNRS, France

Rurbanisation: Alternative Path to Stop Environmental Degradation in the Brazilian Semi-arid

Claudio Egler – UFRJ, Brazil

Climate Vulnerability Reduction Measures in the Semi-Arid Lands: Experience from Eritrea

Woldetinsae Tewolde – Asmara University, Eritrea

Public Policies, Climate, Human and Social Changes

Marc Piraux – CIRAD/UFCC, Brazil

---

## **19 AUGUST**

8:30 am - 10:15 am

*Session 4.1.5 - Panel - Embrapa 2*

### **Technologies for the Development of the Semi-Arid Regions: The Case of Embrapa**

**Chair:** Nataniel F. de Melo – Embrapa, Brazil

**Rap.:** Marcos A. Drumond – Embrapa, Brazil



Desertification in the Brazilian Semi-arid

Iedo B. Sá – Embrapa, Brazil

Climate Changes and the Brazilian Semi-arid: some trends and Lags

Eduardo D. Assad – Embrapa, Brazil

Carbon in the Brazilian Semi-arid

Vanderlise Gingo Petrelli – Embrapa, Brazil

10:30 am - 12:15 pm

*Session 4.2.5 - Panel - ICID*

### **Vulnerability, Impacts and Adaptation in Drylands**

**Chair:** Renato Ferreira – MMA, Brazil

**Rap.:** Henrique Veiga and Regina Gleice – MMA, Brazil

Challenges and opportunities to climate change adaptation among Tanzanian Rural Communities

Esther Dungumaro – University Dar es Salaam, Tanzania

Building development under climate change in arid Mongolia

Andrei Marin – U. Bergen, Norway

Freshwater Program. Sustainable Use of Groundwater in the Brazilian Semi-arid: a Measure of Adaptation to the Effects of Climate Changes - Program Água Doce

Renato Ferreira – SRHU/MMA, Brazil

Poverty and Sustainable Development in Cocoa Producing Communities, Cameroon

Tcharbuahbokengo Nfinn – Cameroon

The Impact of Precipitation in the Economy of Ceará

Nicolino Trompieri Neto – IPECE, Brazil

2:00 pm - 3:45 pm

*Session 4.3.5 - Roundtable*

### **International Governance of Environmental Institutions**

**Chair:** Tarim Montalverne – COMPAM, Brazil

**Rap.:** Max Falque – ICREI, France

Aquaculture in the World

João Luis Nogueira Matias – UFC, Brazil

The Impact of the Mata Branca Project for the Sustainable Development of the Caatinga: The Example of the State of Ceará

Maria Tereza Bezerra Farias Sales – COMPAM, Brazil

Comments:

Tarim Montalverne – COMPAM, Brazil

## VI. Auditório Pernambuco

---

### 16 AUGUST

2:30 pm - 3:45 pm

*Session 1.3.6 - Roundtable - CDS Rede Luso*

#### **Climate, Desertification and Sustainable Development**

**Chair:** Manoel Serrano Pinto – University of Aveiro, Portugal

**Rap.:** João Nildo de Souza Viana – University of Brasília, UnB, Brazil

Water management strategies to combat scarcity in semi-arid and mediterranean regions: differences and similarities

Maria Manuela Morais – U. Évora, Portugal

Vulnerability and sustainability of spring's micro basins in face of climate change in a semi-arid region

Maria do Carmo Sobral – UFPE, Brazil

Bank Filtration: ecotechnology for drinking water treatment and its application to the semi-arid zone

Günter Gunkel – UFPE/U. T. Berlin, Germany

How useful are geosciences in making water and other geo-resources available in the semi-arid regions?

Manuel S. Pinto – U. Aveiro, Portugal

4:30 pm - 6:15 pm

*Session 1.4.6 - Roundtable - FUNDAJ*

#### **Desertification and Climate Change**

**Chair:** Edineida Cavalcanti – FUNDAJ, Brazil

**Rap.:** Guillermo Gamarra-Rojas – UFRPE, Brazil

Contributions of Environmental History to the Study of Desertification and Climate Change

Elena Abraham – IADIZA, Argentina

Co-evolution Environment-Society in the Productive Systems of the Pernambuco Semi-arid

Guillermo Gamarra-Rojas – UFRPE, Brazil

Desertification and Climate Change

Valdemar Rodrigues – UFPI, Brazil

Pre-Columbian Cultures, Desertification and Climate Change in Peru

Juan Torres Guevara – UNALM, Peru

---

### 17 AUGUST

8:30 am - 10:15 am

*Session 2.1.6 - Panel*

#### **Education and Development in the Brazilian Semi-Arid**

**Chair:** Antonio Gomes Pereira – Consultant, Brazil

**Rap.:** Silvio José Rossi – INSA, Brazil

Contextual Education: Five Inherent Tensions

Antonio Gomes Pereira – Consultant, Brazil



### Contextual Education, Local Empowerment and Sustainable Development

Silvio José Rossi – INSA, Brazil

### Education in Face of the Knowledge Economy

Ladislau Dowbor – PUC/ SP, Brazil

### Semi-arid of Piauí: Living Together in Development

Vera Lúcia Araújo Silva – MOC/PI, Brazil

### Challenges of Education in the Brazilian Semi-arid

Washington Bonfim – UFPI, Brazil

### Education and development: living together in the semi-arid, making education with the feet on the school's ground

Maria Lucimar da Silva Nóbrega – RESAB, UNIVASF, Brazil

2:00 pm - 3:45 pm

*Session 2.3.6 - Panel - IICA*

### **IICA 1 - Poverty Index**

**Chair:** Gertjan Beekman – IICA, Brazil

**Rap.:** Emanuel de Melo – IICA, Brazil

### The Water Poverty Index: a tool for evaluation, monitoring and prioritization in water management

Caroline Sullivan – S.C. University, Australia

### Water Poverty Index – Use of the Methodology in Lavelle Desert (Mendoza, Argentina)

Elena Maria Abraham – IADIZA, Argentina

### Cisterns Program

Igor Arsky – MDS, Brazil

### Index of Water Poverty

Renata Luna – UFC, Brazil

4:30 pm - 6:15 pm

*Session 2.4.6 - Panel - ICID*

### **Impacts and Adaptation in Agriculture**

**Chair and rap.:** Peter A. O. Odjugo – University of Benin, Nigeria

### Adaptation Measures Implemented by Agricultural Sector and Agricultural Policy Reactions to Climate Change in Zambia

Justine Ngoma – ZBU, Zambia

### Good Rural Living: Water and Agriculture

Cristina Rosero – Ecuador

### Community (Group) Farming: An Eco-Friendly Sustainable Agriculture Practice

Ganesh Parida – CYS, India

### Climate Change and Agriculture

Magume Stephen – ACCC, Uganda

### Effect of Rainfall Precipitation in the Evolution of Food Production in Ceará: Unfolding in Recent Historical Periods

José de Jesus Sousa Lemos – UFC, Brazil

### Adaptation to Climate Change in the Agricultural Sector in the Semi-Arid Region of Nigeria

Peter A. O. Odjugo – U. Benin, Nigeria

---

**18 AUGUST**

8:30 am - 10:15 am

*Session 3.1.6 - Panel - INMET / IRI***Climate and Society: Bridging the Gap between Science and Application II****Chair:** Eduardo Martins – UFC, Brazil**Rap.:** Alexandre Costa – UECE, Brazil

Value of climate Information

John Michael Hall – Newcastle University, UK

From Knowledge to Action for Climate Adaptation in Arid Cities

Jim Buizer – U. Arizona, USA

Climate and Society: Bridging the Gap between Science and Application

Walter E. Baethgen – IRI, USA

Science-based Climate Prediction and Applications: Recollections of a Successful International Collaboration IRI &amp; Ceara's FUNCEME

Antonio Divino Moura – INMET, Brazil

10:30 am - 12:15 pm

*Session 3.2.6 - PANEL - INMET / IRI***Climate and Society: Bridging the Gap between Science and Application III****Chair and rap.:** Antonio Geraldo Ferreira – FUNCEME, Brazil

Opportunities for Adapting Water Resources Systems to a Changing Climate

Upmanu Lall – U. Columbia, USA

Seasonal Climate Prediction and Agriculture: the Chilean Experience

Francisco Meza – CCC, Chile

Climatic Risk Management for the Agricultural Sector in the Guerrero Region, in Mexico

René Lobato Sanchez – IMTA, Mexico

Malaria Biological Models and Dynamical Downscaling for Northwestern South America in the Observatorio Andino Framework

Angel Muñoz – U. del Zulia, Venezuela

Operation of Reservoirs Using Climate Information

Francisco de Assis de Souza Filho – UFC, Brazil

Renewable Energy, Climate and Climate Forecast

Alexandre Araujo Costa – UECE, Brazil

1:30 pm - 3:15 pm

*Session 3.3.6 - Panel - SFB***Sustainable Use of Forestry Resources in the Caatinga and the Development of Northeast Brazil****Chair:** Antônio Carlos Hummel – IBAMA, Brazil**Rap.:** Lucio Valerio Coutinho de Araújo – UFCE, Brazil



Caatinga: Description and Use  
Everardo Sampaio – UFPE, Brazil

Forest Management as a Tool for Climate Change Adaptation and Mitigation in the Caatinga  
Enrique Riegelhaupt – PNE, Brazil

Non-wood Forest Production in the Caatinga  
Caroline Almeida Souza – IPT, Brazil

The Energy Question and the Forest Management of the Caatinga  
Newton Barcellos – SFB, Brazil

4:30 pm - 6:15 pm

*Session 3.4.6 - Roundtable - INSA / GNDRI*

### Global Network of Dryland Research Institutes

**Chair:** Roberto Germano – INSA, Brazil

**Rap.:** José de Sousa – Consultant, Brazil

Instituto Argentino de Investigaciones de las Zonas Áridas (Argentinian Institute of Arid Zones Research)  
Elena Abraham – IADIZA, Argentina

ICARDA Research Agenda and Opportunities for Partnership for Agricultural Development in  
Non-Tropical Drylands  
Ahmed Amri – ICARDA, Syria

Climate Change and Agriculture in Semi-Arid Tropics  
Hari D. Upadhyaya – ICRISAT, India

The International Center for Arid and Semi-arid Land Studies (ICASALS) and International Partnerships  
Aderbal Correa – ICASALS, USA

Networking of Institutions for Promoting Technical and Scientific Cooperation  
Uriel Safriel – GNDRI, Israel

---

## 19 AUGUST

8:30 am - 10:15 am

*Session 4.1.6 - Panel - LEDUC / SCADAFAL*

### Adaptation Strategies in Water Resources

**Chair:** Christian Leduc – IRD, France

**Rap.:** Julian Daniel Pierre Burte – UFC, BRAZIL

Hydrology and Water Resources in a Changing Semi-arid Environment: Insights for Policy Makers  
Christian Leduc – IRD, France

Climatic and Anthropogenic Effects on Hydrology of Semi-Arid Regions in India  
Mohan Kumar – IISC, India

Coupling Hydrology and Climate Models to Analyse Climate Change Implications at River  
Catchment Scale  
Jacques Ganoullis – University of Thessaloniki, Greece

How to Increase Aquifer Recharge in Semi-arid Regions: the Spanish Case  
Antonio Pulido-Bosch – University of Almería, Spain

How to Increase Aquifer Recharge in Semi-arid Regions: a Case Study (SE Spain)  
Wenceslao Martín-Rosales – University of Granada, Spain

10:30 am - 12:15 pm

*Session 4.2.6 - Panel - LEDUC*

### **Adaptation Strategies for Water Resources Management**

**Chair:** Christian Leduc – IRD, France

**Rap.:** Cristine Viana – UFC, Brazil

Climate Risk Management as Climate Change Adaptation and Mitigation Strategy

Francisco Assis de Souza Filho – UFC, Ceará

The LMI Tchad Lake: A New Momentum to Improve Water Resources Management in the Lake Tchad Basin

Benjamin Ngounou Ngatcha – IRD, France

Adaptive Management of Groundwater in an Over-Exploited Aquifer in a Semi-arid Region through a Decision Support Tool

Shakeel Ahmed – IFCGR/NGRI, India

Water Networks x Power Networks in the Ceará Central Backlands

Cristine Viana – UFC, Brazil

Recommendations to Improve Water Resources Management: Experience from the Semi-arid Northeast Brazil

Eric Cadier – IRD, France

Tanya Keikkila – IRI, USA

2:00 pm - 3:45 pm

*Session 4.3.6 - Roundtable - IICA*

### **Lessons from the Aridas Initiative**

**Chair and rap.:** Carlos Miranda – IICA, Brazil

Aridas Project

Antonio Rocha Magalhães – CGEE, Brazil

Regional Sustainable Development Plans

Leonel Leite – IICA, Brazil

The Vision of Sustainable Development in the Semi-arid Regions: the ICID Contributions

Maria Irles de Oliveira Mayorga – UFC, Brazil

Aridas Project and Water Resources

Ramon Rodrigues – SRH/CE, Brazil

Participation and the Projeto Aridas

Juergen Schmandt – Un. Texas, USA



## Poster Sessions

August - 16th to 18th

Monday 8:30 am to Wednesday 12:15 am

Climate	
Title	Authors
Climate Change Impacts in East Africa	Habiba I. Mtongori – Tanzania Meteorological Agency (TMA), Tanzania Dr. Pete M. Inness – University of Reading, United Kingdom
Potentiality of aridization in Espírito Santo in the light of global climate change (in Portuguese)	Walter Batista Junior – Graduate Program in Agricultural Meteorology, Federal University of Viçosa, Brazil Gustavo Batista D' Angiolella – Graduate Program in Agricultural Meteorology, Federal University of Viçosa, Brazil
An examination of the impact of climate change, HIV and AIDS on the elderly's livelihoods	Ignatius Gutsa – Applied Social Research Trust, Zimbabwe
The Impact of Human Activities in Africa, the North and South Pole Regions, on Global Climate Change	Babagana Abubakar – Kanuri Development Association, Nigeria Laila Deribe Abubakar – Kanuri Development Association, Nigeria
Municipal Index Alert – IMA (in Portuguese)	Rogério Barbosa Soares – IPECE/CE, Brazil Klinger Araújo Magalhães – IPECE/CE, Brazil Cleyber Nascimento de Medeiros – IPECE/CE, Brazil
Impact of sea surface temperature over East Mole and South Atlantic Ocean on Rainfall Pattern over the Coastal Stations of Nigeria	Ediang Okuku. A. – Nigerian Meteorological Agency, Nigeria Ediang Aniekan. A. – Nigerian Meteorological Agency, Nigeria Adelugba Taiwo – Nigerian Meteorological Agency, Nigeria Dogby Joseph K. – Nigerian Meteorological Agency, Nigeria Tsakporhore Oviri I. – Nigerian Meteorological Agency, Nigeria
Climate Change and its impact on Rainfall in Zimbabwe Using General Circulation Models (GCMs)	Patrick Mukunguta – Zimbabwe Meteorology, Zimbabwe
Indicative of changes in annual average temperatures of the State of Ceara (in Portuguese)	Eunice Maia de Andrade – UFC, Brazil Meilla Marielle Araujo Rodrigues – UFC, Brazil Eveline Viana Salgado – UFC, Brazil Fernando Bezerra Lopes – UFC, Brazil Luiz Carlos Guerreiro Chaves – UFC, Brazil
Detection Monitoring Indices of Climate Change on River Basin Capibaribe Pernambuco (in Portuguese)	Laryssa Galdino Tertuliano – UFCC, Brazil José Ivaldo Barbosa de Brito – UFCC, Brazil Francinete Francis Lacerda – ITEP/PE, Brazil
Study of Detection of Climate Change on the Brigida River Basin in Pernambuco (in Portuguese)	Lais Alves Santos – UFCC, Brazil José Ivaldo Barbosa de Brito – UFCC, Brazil Francinete Francis Lacerda – ITEP/PE, Brazil
Conditions over the Pacific Ocean during the Quaternary and Possible Implications for Climate in Northeast Brazil	Tyhago Araújo Dias – UECE, Brazil Alexandre Araújo Costa – UECE, Brazil Francisco Franklin Sousa Rios – UECE, Brazil Felipe Viana Pimentel – UECE, Brazil

## Climate

Title	Authors
Influence of microphysical parameters of the solid phase in the life cycle of convective clouds in different conditions of vertical stability	André de Sena Pinheiro – UECE, Brazil Maria Jocilandia Mendes Vasconcelos – UECEE, Brazil Alexandre Araújo Costa – UECE, Brazil
Climatic impacts of biomass burning over west Africa	Abdourahamane Konare – Universite de Cocody, Cote D'Ivoire
Climatic changes and population dynamics: a scenario for the State of Bahia (in Portuguese)	Fabio Antonio Moura Costa de Souza – INGA/BA, Brazil Heraclio Alves de Araujo – INGA/BA, Brazil
Climate change, sustainable development and Nepal : Global and national concerns	Shambhu Dutta Joshi – Community Health and Environmental Society Nepal, Nepal Bindu Joshi – Tribhuvan University, Nepal
The participation of IBAMA in implementing the National Plan on Climate Change: mapping related activities and analysis of institutional solutions (in Portuguese)	Flávia Lemos Sampaio Xavier – IBAMA, Brazil Francisca de Sousa Lima – Programa Prefuturo/IBAMA, Brazil Iranildo de Sousa Ferreira – Programa Prefuturo/IBAMA, Brazil
Paleoclimate Time Series Analysis of Concentrations of Greenhouse Gases in Ice Cores (in Portuguese)	Francisco Franklin Sousa Rios – UECEE, Brazil Alexandre Araújo Costa – UECE, Brazil Tyhago Aragão Dias – UECE, Brazil Felipe Viana Pimentel – UECE, Brazil
Comparative Study of the interglacial periods (in Portuguese)	Francisco Franklin Sousa Rios – UECE, Brazil Alexandre Araújo Costa – UECE, Brazil Tyhago Aragão Dias – UECE, Brazil Felipe Viana Pimentel – UECE, Brazil
Analysis of variation of sea surface temperature in the Atlantic Ocean Late Quaternary and their possible impact on Climate Change in Northeast Brazil (in Portuguese)	Felipe Viana Pimentel – UECE, Brazil Alexandre Araújo Costa – UECE, Brazil Tyhago Aragão Dias – UECE, Brazil Francisco Franklin Sousa Rios – UECE, Brazil
Adjusting probability functions rainfall data of stations in the region of the Sierra Norte de Puebla (in Spanish)	Tavarez Nieto Juana María – CONAGUA, Dir. local Puebla, México Ramírez Orozco Aldo Ivan – IAQ,uaq, México Lobato Sánchez René – IMTA, México Gutiérrez López Alfonso – CIAQ,uaq, México
Teleconnections and impacts between the sea surface temperature of the Southern hemisphere and the daily intensity of extreme rainfall over Southeast of South America	Federico Ariel Robledo – FCEN-UBA, Argentina Olga C. Penalba – FCEN-UBA, Argentina Maria Laura Bettolli – FCEN-UBA, Argentina
Climate change as a result of new human activities	Babagana Abubakar – Kanuri Development Association, Nigeria Dungus Mohammed – NNPC DEPORT,DAMBOA ROAD, Nigeria
Business Strategies in response to climate change (in Portuguese)	Aline Mota Albuquerque – COELCE/UFC, Brazil Monica Cavalcanti Sá de Abreu – UFC, Brazil
Prediction of changes in Stream flow of Karoon River in the Next 50 Years	Hossein Ghorbanizadeh Kharazi – Iran Bahram Saghafian – Iran
Scenarios A2 and B2 of temperatures for the years 2020, 2030, 2040, 2050, 2060 e 2070 – Brigida River basin – PE	José Alegn Roberto Leite Fechine – UFC, Brazil Josicleda Domiciano Galvêncio – UFPE, Brazil
The right to a balanced environment: analysis of the performance of the Brazilian government to the new landscape of climate change and sustainability (in Portuguese)	Ives Romero Tavares do Nascimento – UFC, Campus Cariri, Brazil Suely Salgueiro Chacon – UFC, Campus Cariri, Brazil



### Climate

Title	Authors
Seasonal rainfall variability over part of Trans-Kalahari Transect: influence beyond ENSO	Akintayo Adedoyin – University of Botswana, Botswana Adelaide Kurusa – University of Botswana, Botswana
Spatial variability of the statistical parameters of the annual maximum temperatures in Ceará State (in Portuguese)	Fernando Bezerra Lopes – UFC, Brazil Luiz Carlos Guerreiro Chaves – UFC, Brazil Eunice Maia de Andrade – UFC, Brazil Eveline Viana Salgado – UFC, Brazil Meilla Marielle Araujo Rodrigues – UFC, Brazil
Climate variability in the Semi-arid Regions: the case of the Cariri Region in the Interior of Ceará, Northeast Brazil (in Portuguese)	Milanya Ribeiro da Silva – UFC/Cariri, Brazil

### Water Resources & Hydrology

Title	Authors
Adapta Sertão: optimizing the use of water and improving access to efficient irrigation technologies and modern agronomic knowledge as a strategy to prevent desertification and adapt small farmers of semi-arid Brazil to climate change impacts	Daniele Cesano – REDEH and Centro Clima, UFRJ, Brazil Emilio Lèbre La Rovere – Centro Clima, UFRJ, Brazil Debora Cynamon Kligerman – Fund. Osvaldo Cruz and Centro Clima, UFRJ, Brazil Maria Regina Maroun – Centro Clima, UFRJ, Brazil Martin Obermaier – Centro Clima, UFRJ, Brazil Thais Corral – UNIFACS, Brazil
Bringing innovation to the ground: the role of farmers cooperative in the climate adaptation process	Nereide Colho Segala – Cooperative "Ser do Sertao", Brazil
The water availability for agricultural production in Cape Verde, Africa (in Portuguese)	Nereide Colho Segala – Cooperative "Ser do Sertao", Brazil
Fresh Water Programme, Sustainable use of groundwater in scattered rural localities in the Brazilian semi-arid (in Portuguese)	Henrique Pinheiro Veiga – MMA, Brazil Renato Saraiva Ferreira – MMA, Brazil
Evaluation of the performance of groundwater dams constructed in the state of Minas Gerais, Brazil	Luiz Rafael Palmier – UFMG/ABCMAC, Brazil Ana Paula Viana – UFMG, Brazil Rodolfo Luiz Bezerra Nóbrega – UFMG/ABCMAC, Brazil
The problem of multiple small dams in the Semi-arid North-Eastern Brazil	José Carlos de Araújo – UFC, Brazil Iran Eduardo Lima Neto – UFC, Brazil Pedro Henrique Augusto Medeiros – UFC, Brazil Vanda Tereza Costa Malveira – UFC, Brazil
Artisanal fishing in the pond of Pentecost-CE (in Portuguese)	Clarissa Maria Telles Vieira – UFC, Brazil Marcelo José da A. Feitosa Vieira – DNOCS, Brazil Gleydson Ribeiro dos Santos – UFC, Brazil
Methodological proposal for creating a system for managing conflicts between water users in the watersheds of the state of Espírito Santo (in Portuguese)	Walter Batista Junior – UFV, Brazil Gustavo Batista D' Angiolella – UFV, Brazil Ricardo Valory – IEMARH/ES, Brazil
Water Management in Rural Communities in the Hinterland of Ceará (in Portuguese)	Delano Cardoso Lima – UFC, Brazil Marta Celina Linhares Sales – UFC, Brazil
Management of watersheds, Strategies for Integrated Management of Water and Sanitation in Rural Communities in the Brazilian Semi-arid (in Portuguese)	Verlândia de Medeiros Morais – UFGC, Brazil Gregório Mateus Santana – UFGC, Brazil Rayssa de Medeiros Morais – UFGC, Brazil Patricio Borges Maracajá – UFGC, Brazil Carlos Magno de Medeiros Morais – UFGC, Brazil

### Water Resources & Hydrology

Title	Authors
Satellite monitoring of the eutrophication of large dams in the Northeast (in Portuguese)	Jean-Michel Martinez – IRD, France Anna Paola Bubel – ANA, Brazil Dhalton Ventura – ANA, Brazil Marcia Regina Coimbra – ANA, Brazil Maurrem Ramom Vieira – ANA, Brazil José Luiz Attayde – UFRN, Brazil Eurides de Oliveira – ANA, Brazil
Ceara Water Watchers: Project under expansion (in Portuguese)	Enio Giuliano Girão – EMBRAPA, Brazil Francisco Nataniel dos Santos Silva – EMBRAPA, Brazil Francisca Dalila Menezes de Sousa – EMBRAPA, Brazil
Evaluation of Water Policy of Ceara: The Case of Dam Castanhão (in Portuguese)	Luiz Antônio Maciel de Paula – UFC, Brazil Francisca Silvania de Sousa Monte – UFC, Brazil
Experiences and actions for the implementation of public policies on water resources in the state of Ceara (in Portuguese)	Inah Maria De Abreu – UNIFOR, Brazil João Bosco Andrade de Moraes – UNIFOR, Brazil Mary Lúcia Andrade Correia – UNIFOR, Brazil Karen Abreu Hissa – UNIFOR, Brazil

### Adaptation, Mitigation & Vulnerability

Title	Authors
Impact of a household biodigester in the economics of greenhouse gas emissions at a family farm in the Cariri Paraibano (in Portuguese)	Luis Cláudio Mattos – PDHC, Brazil Joel Krehbiel – Mennonite Central Committee, USA
Dissemination of efficient stoves in Northeast Brazil (in Portuguese)	Jörgdieter Anhalt – IDER, Brazil Thomson José de Souza – IDER, Brazil
Impact of the implementation of more efficient wood stoves on the pressure to deforestation of native vegetation in the region of Pajeú, Pernambuco, Brazil (in Portuguese)	Tainah Regueira – PDHC, Brazil Luis Cláudio Mattos – PDHC, Brazil
Social Technologies: potential tools for minimization of global warming? (in Portuguese)	Andréa Cardoso Ventura – UFBA, Brazil José Célio Silveira Andrade – UFBA, Brazil Liliane de Queiroz Antonio – SENAI CIMATEC, Brazil
Family Grant Program Meets Main Goal in Semi-arid Northeast: Immediate Relief to Poverty and Hunger (in Portuguese)	Maria Claudene Bezerra Gomes – IFCE - Campus Iguatu, Brazil Bráulio Gomes de Lima – IFCE - Campus Iguatu, Brazil
Maldives and its Atolls is unique because of its geological and topographic aspects and their fragile and delicate environmental system	Ali Rasheed – Auckland University of Technology, New Zealand
Vulnerability to climatic and socioeconomic factors of municipalities of Ceará using multivariate analysis (in Portuguese)	Rogério Barbosa Soares – IPECE/CE, Brazil Eunice Maia de Andrade – UFC, Brazil Fernando Bezerra Lopes – UFC, Brazil Francisco José Firmino Canafístola – UFC, Brazil
Mechanisms for Implementation of Environmental Rights and Vulnerability Reduction: An Analysis of Civil Society Organizations in the Cariri Cearense (in Portuguese)	Sarah Maria da Silva Gonçalves – UFC/Cariri, Brazil



### Adaptation, Mitigation & Vulnerability

Title	Authors
Knowing how to provide in order to predict: DNOCS and the policy of dams to "combat drought" in Ceará from 1909 to 1945 (in Portuguese)	Aline Silva Lima – UFC, Brazil Renata Felipe Monteiro – UFC, Brazil

### Others

Title	Authors
Localized rainfall production: a new source of clean water to the semi-arid (in Portuguese)	Ricardo Imai – ModClima Research and Development Ltda, Brazil Majory Imai – ModClima Research and Development Ltda, Brazil Inácio Malmonge Martin – ITA, Brazil Mauro Ângelo Alves – Instituto de Aeronáutica e Espaço, Brazil Takeshi Imai – ModClima Research and Development Ltda, Brazil
Tsunami on people's livelihoods and the effectiveness of aid	Ali Rasheed – Auckland University of Technology New Zealand, New Zealand
Extreme rainfall events in Ceará State and its relationship with tropical oceans temperature	Carlos Antonio Costa dos Santos – INPA, Brazil Prakki Satyamurty – UEA, Brazil Antonio Ocimar Manzi – INPA, Brazil
Investigation of the maxima, minima and mean temperatures at a semi-arid region in Northeast Brazil	Eunice Maia de Andrade – FC, Brazil Meilla Marielle Araújo Rodrigues – FC, Brazil Marcos Amauri Bezerra Mendonça – FC, Brazil Luis Carlos Guerreiro Chaves – FC, Brazil Rebeca Mendes Feitosa – FC, Brazil
Radiative impacts of desert aerosols over West Africa	Ibrah Seidou Sanda – Département de Physique, Université Abdou Moumouni – Niamey, Niger Arona Diedhiou – IRD/LTHE, France
A world fit for children and adolescents from the semi-arid (in Portuguese)	Gilbert Scharnik – IIDAC/UEG, Brazil
Land management of the catchment area of Ribeira Seca (Cape Verde) and its climatic and topographic constraints (in Portuguese)	Regla Viviana Amorós Hernández – INIDA, Brazil Sebastião Cavalcante de Sousa – UFC, Brazil
SITIMI Project. Inovachuva system: Innovative Technologies (in Portuguese)	Eduardo Humberto Camara Monte – Project SITIMI, Brazil
Comparison between observed data by the BANDA-X Radar and simulated data by the RAMS model during the Emfin Experience (in Portuguese)	Arthur Costa Tomaz de Souza – FUCEME/CE, Brazil Alexandre Araujo Costa – FUCEME/CE, Brazil Antonio Carlos Santana dos Santos – UECE/CE, Brazil

18th to 20th August

Wednesday 14:00 pm to Friday 12:00 pm

### Public Policies

Title	Authors
Environmental policy of displacement of peasant populations in semi-arid environment of Piauí (Dialogues on emerging preservation / conservation of the Caatinga) (in Portuguese)	Maria Sueli Rodrigues de Sousa – UESPI, Brazil
Participation of Youth and Adolescents in Public Policies in the Semi-arid (in Portuguese)	Gilson Scharnik – IIDAC/UEG, Brazil
Green Seal Municipality Project and the Strengthening of environmental protection in the municipalities of Ceará (in Portuguese)	Maria do Socorro Ferreira de Azevedo – CONPAM/CE, Brazil Maria Dias Cavalcante – CONPAM/CE, Brazil Maria Tereza Bezerra Farias Sales – CONPAM/CE, Brazil Maria Goretti Gurgel Mota de Castro – CONPAM/CE, Brazil Rita de Cássia Lima Bezerra – CONPAM/CE, Brazil Márcia Maria dos Santos Souza – CONPAM/CE, Brazil Tarin Cristino Frota Mont'Alverne – UFC, Brazil
The Council of Public Policies and Environmental Management: Integrated and participatory management of the State Government of Ceara to ensure the effectiveness of Public Policies (in Portuguese)	Tarin Cristino Frota Mont'Alverne – UFC, Brazil Marcia Maria dos Santos Souza – CONPAM/CE, Brazil
Dendroenergia and the Caatinga ecosystem of the Northeast Brazil: the ineffectiveness of public policies on environmental conservation of the semi-arid (in Portuguese)	Joaci Galindo – IFPE, Brazil Alexandre Valença do Nascimento Silva – IFPE, Brazil
Disjunctions of public policies for the semi-arid (in Portuguese)	João Mendes da Rocha Neto – MIN, Brazil Djalma Freire Borges – UFRN, Brazil
Public policies in the semi-arid Piauí: Nova Santa Rita-PI (in Portuguese)	Maria de Jesus Rodrigues Alves – UFPI, Brazil Maria do Socorro Lira Monteiro – UFFPI TROPPEM, Brazil
Public Policy in the Lower Jaguaribe / CE: socio-environmental vulnerabilities and development (in Portuguese)	Camila Santiago Martins Bernardini – UFC, Brazil
Public policies for the semi-arid northeast: an analysis of development indicators of the National Pact "A world fit for children and adolescents of the Semi-arid" (in Portuguese)	Antonia Ivete Alves de Matos – UFC, Brazil Suely Salgueiro Chacon – UFC/ Cariri, Brazil

### Energy

Title	Authors
Renewable energies, social inclusion and biodiesel: analysis of the socio-economic potential of Cariri, Ceará (in Portuguese)	Francisco Arrais Nascimento – UFC/ Cariri, Brazil
Estimation of wind resources in the Ceará coast using the theory of linear regression (in Portuguese)	Marcos Antonio Tavares Lira – IFPI/PI, Brazil Emerson Mariano da Silva – UECE, Brazil
Energy production at semi-arid: a challenge or an opportunity to sustainable development?	Manuel Rangel Borges Neto – IFSertão/PE, Brazil Paulo Cesar Marques de Carvalho – UFC, Brazil



## Environment & Sustainable Development

Title	Authors
Rules of the <i>all or nothing</i> type as abuse and/or abusive claims of law and violations of fundamental rights (in Portuguese)	Maria Sueli Rodrigues de Sousa – UESPI, Brazil
Phytotherapy as a Factor for Sustainability and Development in Semi-arid Regions	Gloria Marinho – Federal Institute of Science, Technology and Education of Ceará, Brazil Marco Antonio Botelho – Federal Institute of Science, Technology and Education of Ceará, Brazil Rinaldo Araújo – Federal Institute of Science, Technology and Education of Ceará, Brazil Evandro Martins – Federal Institute of Science, Technology and Education of Ceará, Brazil Basílio Rommel Almeida Fechine – Federal Institute of Science, Technology and Education of Ceará, Brazil Francisco Cristiano da Silva Sousa – Federal Institute of Science, Technology and Education of Ceará/Caninde Antonio Ulisses de Sousa Jr – Federal Institute of Science, Technology and Education
Quixadá: adventure tourism in the middle of the semi-arid region of Ceará (in Portuguese)	Amaurícia Lopes Rocha Brandão – UECE, Brazil
Are ecological sanitation systems accepted to our society and culture?	A.H.Gunapala – National Water Supply & Drainage Board, Sri Lanka Rohan Wijesooriya – National Water Supply & Drainage Board, Sri Lanka
Environmental zoning of an area of backland depression with a focus on the preservation of environmental protection area (APA) in the Stream of Sobral – CE (in Portuguese)	Maria Isabelle Oliveira da Costa – IFCE, Brazil Francisco Renato Rodrigues Aragão – IFCE, Brazil Vicente de Paulo Miranda Leitão – IFCE, Brazil
The importance of a global organization for the environment to ensure the synergy among multilateral environmental agreements (in Portuguese)	Tarin Cristino Frota Mont'Alverne – UFC, Brazil João Luis Nogueira Matias – JFCE, Brazil
Algorithm for mapping burnt areas in the Brazilian caatinga, northeastern Brazil (in Portuguese)	Helio Leandro Lopes – UNIVASF, Brazil Luciano José de Oliveira Accioly – EMBRAPA, Brazil Maria do Carmo Martins Sobral – UFPE, Brazil Ana Lucia Bezerra Candeias – UFPE, Brazil
Maracanaú Protocol (in Portuguese)	Marcos Alberto de Oliveira Vieira – SEMA/Maracanaú/CE, Brazil
Environmental management of the impacts of climate change in small towns of the semi-arid (in Portuguese)	Maria do Socorro Silva Mesquita – UFC, Brazil Monica Cavalcanti Sá de Abreu – UFC, Brazil Jamille Moura – UFC, Brazil
Impacts of environmental management in semi-arid regions: The case of the communities of the Araripe – CE (in Portuguese)	Paulo Sérgio Silvino do Nascimento – IFCE, Brazil Manuel Baldomero Rolando Berríos Godoy – UNESP Rio Claro, Brazil Rodolfo José Sabiá – URCA, Brazil

### Environment & Sustainable Development

Title	Authors
Sustainable Sanitation and Water Reuse in Brazilian Semi-Arid (in Portuguese)	Jordi Morató Farreras – Universitat Politècnica de Catalunya, Spain Alex Pires – Universitat Politècnica de Catalunya, Spain Alice Miranda Martins – Universitat Politècnica de Catalunya, Spain Angel Gallegos – Universitat Politècnica de Catalunya, Spain Angeles Ortiz – Universitat Politècnica de Catalunya, Spain Carlos Augusto González – Universitat Politècnica de Catalunya, Spain Heraldo Peixoto – UFBA, Brazil
Vegetation mapping and land use of the Caatinga (savanna) biome (in Portuguese)	Iêdo Bezerra Sá – EMBRAPA, Brazil Marcos Antônio Drumond – EMBRAPA, Brazil Tatiana Aiako Taura – EMBRAPA, Brazil
Environmental Education - Practical experiences with students from the EEEP (School) Governor Valdemar Alcantara, in the town of Ubajara-CE (in Portuguese)	Ana Lúcia Feitoza Freire – UFC, Brazil
Pre-Operational Vegetation Product Derived from MSG SEVIRI for Drought Monitoring (in Portuguese)	Humberto Alves Barbosa – UFAL/LAPIS, Brazil Leopold Christian vande Berg – UFAL/LAPIS, Brazil Ahmet Yıldırım – UFAL/LAPIS, Brazil Thomas Heineman – UFAL/LAPIS, Brazil Olivier Samain – UFAL/LAPIS, Brazil Simon Elliott – UFAL/LAPIS, Brazil Aydin Gürol Ertürk – UFAL/LAPIS, Brazil
The Peoples Zabelê and the National Park of Serra da Capivara (PI): environmental conflict between traditional populations and management of UC (Conservation Unit) (in Portuguese)	Maria Sueli Rodrigues de Sousa – UESPI, Brazil
Environmental strategies of the Carbon Disclosure Project and its impact on the environmental governance of climate (in Portuguese)	Luana das Graças Queiróz de Farias – UFBA, Brazil Kristian Brito Pasini – UFBA, Brazil José Célio Silveira Andrade – UFBA, Brazil
Payments for Environmental Services in the Watersheds of the Piauí and Canindé rivers (in Portuguese).	Ayri Saraiva Rano – PRODEMA/TROPEN/UFPI, Brazil Jaíra Maria Alcobaça Gomes – PRODEMA/TROPEN/UFPI, Brazil
Environmental services of the Caatinga (in Portuguese)	Laudemira Silva Rabelo – UFCE, Brazil Maria Alice Cruz Alencastro – FFB, Brazil Melca Silva Rabelo – UFC, Brazil

### Desertification

Title	Authors
The White Forest Project as a tool for protecting biodiversity in the Caatinga biome: a vision of the Government of Ceará (in Portuguese)	Maria Tereza Bezerra Farias Sales – CONPAM/CE, Brazil Maria Goretti Gurgel Mota de Castro – CONPAM/CE, Brazil Rita de Cássia Lima Bezerra – CONPAM/CE, Brazil Gabriela Alves – CONPAM/CE, Brazil Tarin Cristino Frota Mont'Alverne – UFC, Brazil Diana Odete Moura Nogueira – CONPAM/CE, Brazil Jovelina Brito – CONPAM/CE, Brazil Monica Carvalho Freitas – CONPAM/CE, Brazil



## Desertification

Title	Authors
Analysis of the pedological contribution to the process of degradation/desertification in parts of Semi-arid region of Ceará (in Portuguese)	Paulo Roberto Abreu de Oliveira – UECE, Brazil
Simulated climate impacts of desertification on a large scale in semi-arid Northeast (in Portuguese)	Bruno Jacques Durand – UFC, Brazil Horst Frischkorn – UFC, Brazil Francisco de Assis de Souza Filho – UFC, Brazil Alexandre Araujo Costa – UFC, Brazil
Evaluation of Works on Desertification in Gilbués – PI (in Portuguese)	Adeodato Ari Cavalcante Salviano – UFPI, Brazil Lima, M. G. – SEMAR-PI, Brazil Nunes, L. A. P. L. – SEMAR-PI, Brazil Melo, L. F. S. – SEMAR-PI, Brazil
Environmental degradation and desertification in semi-arid of Minas Gerais: A survey of the municipality of Espinosa – MG (in Portuguese)	Anete Marília Pereira – UNIMONTES/MG, Brazil Maria Ivete Soares de Almeida – UNIMONTES/MG, Brazil
Extraction plant, desertification and soil fertility in the municipality of Conception – PB (in Portuguese)	Ibrahim Soares Travassos – UFPB, Brazil Bartolomeu Israel de Souza – UFPB, Brazil
Green fertilization to prevent desertification and recuperation of soils in semi-arid regions	Jaime Ferré Martí – Konrad Adenauer Foundation Fortaleza, Brazil
NanoClay - Turning sandy soil to farmland	Kristian P. Olesen – desertcontrol, Norway Ole M. Olesen – desertcontrol, Norway
Recovery of Riparian Vegetation for Multiple Use in the Semi-arid of Paraíba, São Benedito Farm, Galante District, Campina Grande, PB (in Portuguese)	Daniel Duarte Pereira – UFPB/CAMPUS II, Brazil Ovídio Paulo Rodrigues da Silva – UFPB/CAMPUS II, Brazil Elder Cunha de Lira – UFPB/CAMPUS II, Brazil João Carlos Camilo da Silva – UFPB/CAMPUS II, Brazil Ananias Carvalho Coimbra Maia – UFPB/CAMPUS II, Brazil Augusta Giselle de Albuquerque – UFPB/CAMPUS II, Brazil Edson Moreira de Abrantes – UFPB/CAMPUS II, Brazil Marcolino Brígido da Silva Neto – UFPB/CAMPUS II, Brazil Flávia Janaína de Araújo Silva – UFPB/CAMPUS II, Brazil
Sweet Combination: Organic Honey Production and the Conservation of the Semi-Arid in Simplicio Mendes, Piauí	Jose Antônio Puppim de Oliveira – United Nations University, Japan Paulo Fortes – UFPI, Brazil
The impacts of climate change and desertification on the biodiversity and indigenous communities of Africa: a case study of the Sahel and the Horn	Babagana Abubakar – Kanuri Development Association, Nigeria Laila Deribe Abubakar – Kanuri Development Association, Nigeria
Contextual education, educational communication and sustainable tourism from the perspective of coping with desertification and adaptation to climate change effects (in Portuguese)	Solange Coutinho – Joaquim Nabuco Foundation, Brazil Edneida Cavalcanti – Joaquim Nabuco Foundation, Brazil Edilene Pinto – Joaquim Nabuco Foundation, Brazil
The role of the public sector in the context of desertification in the state of Ceará: the example of Project PREVENT (in Portuguese)	Ana Cecy Braga Pontes – CONPAM/CE, Brazil Maria Dias Cavalcante – CONPAM/CE, Brazil Maria Tereza Bezerra Farias Sales – CONPAM/CE, Brazil Maria Goretti Gurgel Mota de Castro – CONPAM/CE, Brazil Rita de Cássia Lima Bezerra – CONPAM/CE, Brazil Márcia Maria dos Santos Souza – CONPAM/CE, Brazil Tarin Cristino Frota Mont'alverne – UFC, Brazil

### Desertification

Title	Authors
Desertification risks in agricultural projects in Northern State in Sudan	Mona Dawelbait – Ministry of Environment, Sudan Francesco Morari – Ministry of Environment, Sudan
Desertification Vulnerability Index (in Portuguese)	Eveline Barbosa Silva Carvalho – IPECE, Brazil Rogério Barbosa Soares – IPECE, Brazil Klinger Aragão Magalhães – IPECE, Brazil Cleyber Nascimento de Medeiros – IPECE, Brazil

### Climate & Agriculture/Livestock

Title	Authors
Agrosценari – Adaptation scenarios to climatic changes in agriculture	Luigi Perini – CRA-CMA, Italy Sofia Bajocco – CRA-CMA, Italy Tomaso Ceccarelli – CRA-CMA, Italy Marco Zitti – CRA-CMA, Italy Luca Salvati – CRA-CMA, Italy
Wild South American Camelids use as Adaptation Strategy to Climate Change in Andean Countries	Gabriela Lichtenstein – (UICN/SSC/GECS), CONICET, Argentina
Diagnosis of fruit production potential areas of small family farming in the Western Region of Rio Grande do Norte (in Portuguese)	Verlândia de Medeiros Morais – Brazil Josefa Edjane de Araújo – Diaconia, Brazil Gregorio Mateus Santana – Brazil Rayssa de Medeiros Morais – UFCEG, Brazil
Optimization of natural resource for sustainable crop production	Dharm Pal Malik – CCS Haryana Agricultural University, India
Backyard production of women: from invisibility to recognition (in Portuguese)	Dayse Reis Rodrigues – PDHC, Brazil Maria Cristina Lima – Brazil
Caatinga and feeding: dietary aspects of the rural municipality of Cajazeiras – PB (in Portuguese)	José Deomar de Souza Barros – Brazil Wesley Santana Silva – Brazil Maria de Fátima Pereira da Silva – Brazil
Evaluation of irrigation projects in the perspective of sustainable family farming in the semi-arid region of Pernambuco (in Portuguese)	Maria do Carmo Martins Sobral – UFPE, Brazil Renata Maria Caminha Mendes de Oliveira Carvalho – IFPE/PE, Brazil
Institutional/Organizational Diagnosis for the Management of Aquifers of the Chapada Apodi – Ceará (in Portuguese)	Maria Mires Marinho Bouty – COGERH/CE, Brazil Clara de Assis Jerônimo Sales – COGERH/CE, Brazil Ubirajara Patrício Álvares da Silva – COGERH/CE, Brazil Marcos André Lima da Cunha Silva – COGERH/CE, Brazil Tereza Maria Ximenes Moreira – COGERH/CE, Brazil Lucivânia Figueiredo de Sousa – COGERH/CE, Brazil
Public politics articulated to the implementation of the irrigated perimeters for food production in the Brazilian northeast semi-arid region	Sylvia Meimaridou Rola – UFGC, Brazil Ednaldo de Paiva Pereira – UFRJ, Brazil Neilton Fidelis da Silva – UFRJ, Brazil Marcos Aurélio Vasconcelos de Freitas – UFRJ, Brazil
Agroforestry systems for the Brazilian semi-arid region (in Portuguese)	João Vianey Fernandes Pimentel – UFCEG, Brazil Hugo Orlando Carvalho Guerra – UFCEG/CAMPUS I, Brazil Francisco Jardel Rodrigues da Paixão – UFCEG, Brazil
Agroforestry systems and sustainable development of family farming in the Backlands of Caninde – Ceará (in Portuguese)	Cely Martins Santos de Alencar – UFC, Brazil Sebastião Cavalcante de Sousa – UFC, Brazil



### Climate & Agriculture/Livestock

Title	Authors
The importance of agricultural-based polycultures Agroecology and Permaculture in the direct prevention of hunger, as multiple alternatives to generate income and prevent the impact of the intense process of climate change (in Portuguese)	Mauro Kassow Schorr – Anima Institut, Brazil Maristela Ogliari – Anima Institut, Brazil
The agroecological transition as an instrument to combat rural poverty in the northeastern semi-arid (in Portuguese)	Francýalisson Lima de Oliveira – UFC, Brazil Enio Giuliano Girão – EMBRAPA, Brazil Angela Küster – Konrad Adenauer Foundation Stiftung, Germany
Acceptance of agroforestry systems in the savanna environment for agrarian reform settlers (in Portuguese)	Daniel Duarte Pereira - UFPB/CAMPUS II, Brazil Hugo Orlando Carvalho Guerra – UFPB/CAMPUS I, Brazil Melchior Naelson Batista da Silva – EMBRAPA, Brazil
Conventional agriculture x agroecological transition: A systemic analysis of sustainability in the semi-arid (in Portuguese)	Carlos Magno de Medeiros Morais – UFCG, Brazil Sonia Correia Assis da Nóbrega – UFCG, Brazil Francisco Roserlândio Botão Nogueira – UFCG, Brazil Sérgio Alves Oliveira – UFCG, Brazil
Index Insurance & Residual Risks	D. Osgood – IRI, USA
Agroecological Coefficients in Agroforestry Systems in the Caatinga (in Portuguese)	Daniel Duarte Pereira – UFPB/CAMPUS II, Brazil Hugo Orlando Carvalho Guerra – UFPB/CAMPUS I, Brazil Melchior Naelson Batista da Silva – EMBRAPA, Brazil
The impact of agro-ecological practices among generations of farming families (in Portuguese)	Andréa Alexandre Vidal – Brazil Julia Sursis Nobre Ferro Bucher-Maluschke – Brazil
Socio-economic and environmental evaluation of the agro-pastoral-forestry system in the semi-arid cariense (in Portuguese)	Antônia Edneide Santos Lima – UFC-CARIRI, Brazil Fernando Gil Mesquita de Freitas Gonçalves – UFC-CARIRI, Brazil Josefa Maria Francieli da Silva – UFC-CARIRI, Brazil Cicero Secifram da Silva – UFC-CARIRI, Brazil Antonio Glaydson de Sousa Freitas – UFC-CARIRI, Brazil Sebastião Cavalcante de Sousa – UFC, Brazil
Environmental labeling: a study on the decision factors to purchase organic products (in Portuguese)	José Deomar de Souza Barros – Brazil Maria de Fátima Pereira da Silva – Brazil
The organic horticulture and dissemination of technology applied to increase the resilience of family farming in Xixa – Pentecoste-CE (in Portuguese)	Artur Felipe Arruda da Fonseca – UFC, Brazil Ricardo Espíndola Romero – UFC, Brazil Sebastião Cavalcante de Sousa – UFC, Brazil
Vulnerability of agricultural production systems to climate change and studies of adaptive technology in Senegal and Burkina Faso	Ndour Badiane – Institut Senegalais de Recherches Agricoles: ISRA, Senegal Ndeye Yacine – Institut Senegalais de Recherches Agricoles: ISRA, Senegal Masse Dominique – Institut Senegalais de Recherches Agricoles: ISRA, Senegal

## Dialogue Tables

Day 16/08

---

### Afternoon

**Session 1** - Press Conference Room, Table ABC - Brazil's Cooperation Agency

*Prospects and Challenges for Brazil-Maghreb Technical Cooperation in the Field of Combating Desertification and Climate Change Adaptation*

**Coordination:** Pedro Veloso, Diplomat, ABC/MRE - Brazil

**Moderation:** Heitor Matalo, UNCCD - ONU

**Session 2** - Room B5, Table Parliament I

*Parliamentary Action on Sustainable Development: Dialogue with Civil Society*

**Coordination:** Deputy Maria Helena – Parliamentary from Mercosul - Uruguay

**Rapporteur:** Francisco Eugênio Arcanjo (Senate, Brazil)

**Speaker:** Sílvio Rocha Santana, Esquel Foundation

Day 17/08

---

### Morning

**Session 4** - Press Conference Room, Table IRD - Institute of Research for Development, France

*Technical Cooperation - Tripartite Science for Sustainable Development of Arid Regions and Semi-Arid, in Francophone Countries in Africa*

**Coordination:** Paulo Kliass, Casa Civil - Brazil and  
Ghani Chehbouni, IRD - Marrocos

**Rapporteur:** Betina Ferraz Barbosa, ICID - Brazil and Jean Loup Guyot, IRD - France

**Session 5** - Room B6, Table ANA - Brazil's Water Agency

*Global Water Governance*

**Coordination:** Benedito Braga, President of the International Committee of the 6th Fórum and Vice-President of the World Water Council

**Session 6** - Room B4, Table INSA – Institute of the Semi-arid, and MMA – Ministry of Environment

*Observatories of the Semi-Arid*

**Coordination:** José Machado, MMA - Brazil

**Rapporteur:** Roberto Germano, INSA – Brasil



---

### Afternoon

#### Session 7 - Room B5 (14:30 à 16:30), Table Parliament II

*Parliamentary Action on Sustainable Development: Dialogue with Bodies of the United Nations System*

**Coordination:** Senator Inácio Arruda, Brazil

**Rapporteur:** Francisco Eugênio Arcanjo (Senate, Brazil)

#### Session 8 - Room B6 (16:30 à 18:30), Table Parliament III

*Parliamentary Action on Sustainable Development: Dialogue with Scientists*

**Coordenação:** Deputy Edson Duarte, Parliament - Brasil

**Rapporteur:** Francisco Eugênio Arcanjo (Senate, Brazil)

#### Session 9 - Room B6, Table Luso-Brazilian Network

*Climate For Sustainable Development*

**Coordination:** Laura Duarte, University of Brasilia/CDS - Brazil

**Rapporteur:** J. Nascimento (University of Cape Verde)

#### Session 10 - Room B4, Table ECLA – Economic Commission for Latin America and the Caribbean

*National Reports - PRAIS*

**Coordination:** Guillermo Dascal, CEPAL - Chile

**Rapporteur:** Marcos Santana, MMA

Day 18/08

---

### Morning

#### Session 11 - Room B4, Table SRH – Secretariat of Water Resources, CE

*Participatory Management of Water Resources: the Importance of Watershed Committees*

**Coordination:** Maria Zita Timbo Araújo, SRH - Brazil

**Rapporteur:** Mires Bouty, Coregh - Brazil

---

### Afternoon

#### Session 12 - Room B5, Table NGOs

*Platform Social Technologies : to Conserve Biodiversity and Address Desertification in the Context of Climate Change*

**Coordination:** João Otávio Malheiros, AMAVIDA - Brazil

**Rapporteur:** Murilo Sérgio Drummond, UFMA - Brazil

**Session 13** - Room B6, Table of Countries CPLP – Community of Portuguese Speaking Countries

*Measurement Of Vulnerability - Information System For Countries Of The CPLP*

**Coordination:** Aidil Borges, Focal Point/UNCCD - Cape Verde  
Heitor Matalo, UNCCD - UN

**Rapporteurs:** Clara Justino, CPLP - Portugal  
Marcos Santana, MMA - Brazil

**Session 14** - Room B4, Table ECLA and Global Mechanism

*Sustainability and Development in the Dry Areas: Desertification and Adaptation to Climate Change*

**Coordination:** Otávio Perez Pardo, Ministry of Environment - Argentina

**Rapporteurs:** Francisco Brzovic (Global Mechanism) and Alexandrina Sobreira, FUNDAJ - Brazil

Day 19/08

---

**Morning****Session 15** - Room B5, Table Northeast Brazil

*Public Policy and Governance for the Semi-Arid Region*

**Coordination:** Guilherme Rebouças, SUDENE - Brazil

**Rapporteur:** Edneida Cavalcanti, FUNDAJ - Brazil

**Session 16** - Room B6, Table CREA

*Contribution System Confea/CREA to the Sustainable Development Plan of the Semi-Arid*

**Coordination:** Roberto Germano, INSA - Brazil

**Rapporteur:** Jose Geraldo Baracuy, UFCG - Brazil



