



**DISCUSSION
PAPER
SERIES**

NO. 7 — MAY 2013

**Global Problems, African Solutions:
African Climate Scientists'
Perspectives on Climate Change**

Lucie Edwards

Copyright © 2013 by Lucie Edwards.



Published by the Africa Initiative and The Centre for International Governance Innovation.

The opinions expressed in this publication are those of the author and do not necessarily reflect the views of The Centre for International Governance Innovation or its Operating Board of Directors or International Board of Governors.



This work was carried out with the support of The Centre for International Governance Innovation (CIGI), Waterloo, Ontario, Canada (www.cigionline.org). This work is licensed under a Creative Commons Attribution — Non-commercial — No Derivatives License. To view this license, visit (www.creativecommons.org/licenses/by-nc-nd/3.0/). For re-use or distribution, please include this copyright notice.

Cover and page design by Steve Cross.

DISCUSSION PAPER SERIES

The CIGI-Africa Initiative Discussion Paper Series presents policy-relevant, peer-reviewed, field-based research that addresses substantive issues in the areas of conflict resolution, energy, food security, health, migration and climate change. The aim of the series is to promote discussion and advance knowledge on issues relevant to policy makers and opinion leaders in Africa. Papers in this series are written by experienced African or Canadian researchers, and have gone through the grant review process. In select cases, papers are commissioned studies supported by the Africa Initiative research program.

ABOUT THE AFRICA INITIATIVE

The Africa Initiative is a multi-year, donor-supported program, with three components: a research program, an exchange program and an online knowledge hub, the Africa Portal. A joint undertaking by CIGI, in cooperation with the South African Institute of International Affairs, the Africa Initiative aims to contribute to the deepening of Africa's capacity and knowledge in five thematic areas: conflict resolution, energy, food security, health and migration — with special attention paid to the crosscutting theme of climate change. By incorporating field-based research, strategic partnerships and online collaboration, the Africa Initiative is undertaking a truly interdisciplinary and multi-institutional approach to Africa's governance challenges. Work in the core areas of the initiative focus on supporting innovative research and researchers, and developing policy recommendations as they relate to the program's core thematic areas.

RESEARCH PROGRAM

The Africa Initiative research program supports field-based research on governance issues critical to the continent. The program's research priorities aim to inform and influence African policy and policy affecting Africa within the Africa Initiative thematic areas. Research produced under the program is packaged as policy briefs, discussion papers and special reports — all available for free download on the Africa Portal.

On an occasional basis, the Africa Initiative invites submissions and recommendations for future priorities to be addressed within the research program. Future calls for papers and proposals will be advertised widely, including on the Africa Portal (www.africaportal.org) and CIGI's website (www.cigionline.org).

ABOUT CIGI

The Centre for International Governance Innovation is an independent, non-partisan think tank on international governance. Led by experienced practitioners and distinguished academics, CIGI supports research, forms networks, advances policy debate and generates ideas for multilateral governance improvements. Conducting an active agenda of research, events and publications, CIGI's interdisciplinary work includes collaboration with policy, business and academic communities around the world.

CIGI's research programs focus on four themes: the global economy; global security; the environment and energy; and global development.

CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion (BlackBerry). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

EDITORIAL REVIEW PANEL

Dr. Berhanu M. Abegaz

Professor of Chemistry and Executive Director
African Academy of Sciences

Dr. Rita Abrahamsen

Associate Professor, Graduate School of Public and
International Affairs and School of International Development
and Global Studies, University of Ottawa

Dr. Emmanuel K. Akyeampong

Professor of History and of African and African American
Studies, Harvard University

Dr. Elizabeth Asiedu

Associate Professor of Economics, The University of Kansas

Dr. David R. Black

Professor of Political Science, International Development
Studies and Director of Centre for Foreign Policy Studies,
Dalhousie University

Dr. Kwabena Mante Bosompem

Professor of Parasitology, Noguchi Memorial Institute for
Medical Research, College of Health Sciences, University of
Ghana, Legon and President of Ghana Red Cross Society

Dr. Catherine Chalin

Professor and Canada Research Chair in Primate Ecology and
Conservation, McGill University

Dr. Colin Chapman

Professor Emerita in the Dalla Lana School of Public Health,
University of Toronto

Dr. Marc J. Cohen

Senior Researcher, Oxfam America

Dr. Jonathan Crush

CIGI Chair in Global Migration and Development, Balsillie
School of International Affairs and Professor of Global
Development Studies and Director of Southern African
Research Centre, Queen's University

Dr. Abdallah S. Daar

Professor of Public Health Sciences and of Surgery, and
Senior Scientist and Director of Ethics and Commercialization
at the McLaughlin-Rotman Centre for Global Health,
University of Toronto

Dr. Chris Gore

Associate Professor of Politics and Public Administration,
Ryerson University

Dr. James P. Habyarimana

Assistant Professor of Economics, Georgetown University

Dr. Ahmed Hassanali

Professor of Chemistry, Kenyatta University

Dr. Sue Horton

Professor of Global Health Economics, Associate Provost,
University of Waterloo and CIGI Chair in Global Health
Economics, Balsillie School of International Affairs

Dr. Uford S. Inyang

Former Director General of the National Institute for
Pharmaceutical Research and Development

Dr. Abbi Mamo Kedir

Lecturer in Economics, University of Leicester

Dr. Gilbert O. Kokwaro

Professor of Pharmacokinetics and Director of Consortium for
National Health Research, University of Nairobi

Dr. Ronald Labonte

Professor of Epidemiology and Community Medicine and
Canada Research Chair in Globalization and Health Equity,
University of Ottawa

Dr. Jacob O. Midiwo

Professor of Chemistry, University of Nairobi

Dr. Winnie V. Mitullah

Associate Research Professor, Institute for Development
Studies, University of Nairobi

Dr. Nakanyike Musisi

Associate Professor of History, University of Toronto and
Former Director of Makerere Institute of Social Research

Dr. Hassan Mshinda

Professor of Microbiology and Director General of Tanzania
Commission for Science and Technology

Dr. Romain Murenzi

Professor of Physics and Executive Director of The Academy
of Sciences for the Developing World

Dr. Burton L. M. Mwamila

Professor of Engineering and Vice Chancellor of The Nelson
Mandela African Institute of Science and Technology

Dr. Stephen Nyanzi

Professor of Chemistry, Makerere University

Dr. Alexander Nyarko

Professor of Pharmacology and Toxicology and Director of
Noguchi Memorial Institute for Medical Research, College of
Health Sciences, University of Ghana, Legon

Dr. Obiora Chinedu Okafor

Professor of Law, Osgoode Hall Law School, York University

Dr. George Philander

Knox Taylor Professor of Geosciences and Research Director
of Africa Centre for Climate and Earth Systems Science,
Princeton University/University of Cape Town

Dr. E. Jane Robb

Professor of Molecular and Cellular Biology,
University of Guelph

Dr. Timothy M. Shaw

Professor Emeritus, University of London

Dr. Richard Stren

Professor Emeritus, University of Toronto

Dr. Camilla Toulmin

Director, International Institute for Environment and Development

Dr. Robert I. Rotberg

Professor Emeritus, Harvard University

Dr. Sandro Vento

Professor and Head of Internal Medicine Department,
University of Botswana

Dr. Charles Wambebe

Professor of Pharmacology, International Biomedical
Research in Africa

Dr. Kwesi Yankah

Professor of Linguistics and Pro-Vice Chancellor,
University of Ghana, Legon

Dr. Paul Zeleza

Dean, Bellarmine College of Liberal Arts and Presidential
Professor of African American Studies and History

CIGI MASTHEAD

Managing Editor, Publications

Carol Bonnett

Publications Editor

Jennifer Goyder

Publications Editor

Sonya Zikic

Assistant Publications Editor

Vivian Moser

Media Designer

Steve Cross

EXECUTIVE

President

Rohinton Medhora

Vice President of Programs

David Dewitt

Vice President of Public Affairs

Fred Kuntz

Vice President of Finance

Mark Menard

AFRICA INITIATIVE

Series Director

James Orbinski

Series Manager

Suzanne Cherry

Series Coordinator

Hayley MacKinnon

COMMUNICATIONS

Communications Specialist

Kevin Dias

kdias@cigionline.org

1 519 885 2444 x 7238

Public Affairs Coordinator

Kelly Lorimer

klorimer@cigionline.org

1 519 885 2444 x 7265

ABOUT THE AUTHOR

LUCIE EDWARDS

Lucie Edwards is an instructor in environmental policy in the Political Science Department and a doctoral candidate in the Faculty of the Environment at the University of Waterloo. Her primary research interest is the use of science and technology for the poor, with a particular focus on initiatives to support the “bottom billion” in Africa and South Asia. Her dissertation focusses on the uses of international scientific assessments as policy instruments in such fields as climate change, biodiversity and food security.

ACKNOWLEDGEMENTS

The author would like to thank the African Centre for Insect Science for Food and Health for graciously hosting her and providing logistical support in Nairobi in November 2011; the South African Institute for International Affairs, which generously hosted her in June 2012; the Africa Initiative for sponsoring this project; the Social Science and Humanities Research Council of Canada for its ongoing financial support of the Intergovernmental Science Panels research project; Jennifer Clapp, who guides the overall project and enthusiastically encouraged this survey; and, above all, the African scientists who generously gave the gift of their time to this project.

This paper is dedicated to the memory of Christina Scott, Africa’s late, great science journalist, who passionately supported popular education on climate change.

ABSTRACT

This paper offers a preliminary survey of Africa’s climate scientists’ views on the critical problem of climate change, which has been described as an “out of Africa” problem crying out for “made in Africa” solutions. Based on interviews with these scientists, this paper presents their views on the state of African climate science; discusses the challenges of undertaking scientific research in Africa and ways that research could be done better; identifies the impacts of climate change on contemporary African society and its potential impacts in the future; identifies gaps in the current research agenda on energy, urbanization and migration; and explores the links between climate change and other environmental problems, such as water pollution and deforestation. Finally, while Africa’s scientists value their involvement in international scientific assessments, they would welcome more opportunities to collaborate with their peers on the continent, more dialogue with African policy makers and a broader program of public education, to better equip Africans to take practical actions to meet the challenges of climate change.

INTRODUCTION

Climate change ranks as one of the most important issues facing global environmental policy makers. It is also a crucial issue on the international development agenda, raising important concerns about equity between nations: the carbon emissions that are generated in wealthy parts of the world are having negative consequences in poor communities, whose carbon emissions are typically more modest. Nowhere is this contrast starker than in Africa. Africa’s per capita emissions make a negligible contribution to overall global emissions, but the potential consequences of climate change for Africa’s people and its ecological systems are very severe (Boko, 2007).

Climate change represents a significant threat to Africa’s development. Africa is a relatively dry continent and many of its people are dependent on rain-fed agriculture for both their food and much of their livelihood. Recent analyses of the impact of climate change on Africa’s weather patterns emphasize the following potential impacts:

- increased climate irregularity, making it difficult to predict seasonal rains and therefore to plan for planting and harvesting;
- greater extremes in the climate with more frequent periods of drought and torrential rains;
- more frequent natural disasters, notably an increase in both droughts and forest fires;
- a rise in sea levels and flooding, with potentially severe consequences for low-lying coastal areas and small island states;
- changes in weather patterns leading to altered distribution patterns of insects and other disease vectors;

- changes in weather patterns affecting biodiversity and reducing animal populations in Africa's nature conservation areas; and
- a potential increase in desertification in the Sahel region. (Solomon et al., 2007)

Analyses of the social impacts of climate change on Africa emphasize:

- a potential reduction of agricultural productivity and the reduction of the ability of states to feed their populations;
- the loss of agricultural livelihoods, as well as the potential loss of arable land, leading to an exodus of rural populations to Africa's cities and potentially to other regions;
- new challenges in public health, notably the spread of malaria and other vector-borne diseases, such as meningitis; and
- political discontent when governments fail to meet the social challenges of climate change, leading to either unstable or authoritarian styles of governance. (Parry et al., 2007)

The direct impact of climate change is less significant than its role as an amplifier of the effects of other trends already underway in Africa, notably:

- a high rate of population increase anticipated over the next few decades before it begins to stabilize;
- a high rate of urbanization, with significant challenges in the governance of megacities;
- stagnation in agricultural productivity; and
- anthropogenic environmental damage, notably increasing deforestation and soil erosion, and declines in soil fertility, particularly in vulnerable semi-arid regions.

Without an effective policy response, climate change could serve as the proverbial "straw that broke the camel's back" in Africa's already difficult development context (Boko, 2007).

The challenges that Africa faces as a result of climate change were discussed during the Conference of Parties of the UN Framework Convention on Climate Change held in Durban, South Africa in December 2011. The conference was preceded by a meeting of the Intergovernmental Panel on Climate Change (IPCC) held in Kampala, Uganda, in November 2011, that pinpointed the need for disaster management in the event of floods, typhoons and other drastic weather events. While these two international conferences emphasized the significance of climate change and the very real concern of Africa's leaders on its consequences for their development strategies, very little was accomplished in terms of developing a practical action plan to address climate change (International Institute for Sustainable Development, 2011).

“
WITHOUT AN
EFFECTIVE POLICY
RESPONSE,
CLIMATE CHANGE
COULD SERVE AS
THE PROVERBIAL
'STRAW THAT
BROKE THE
CAMEL'S BACK' IN
AFRICA'S ALREADY
DIFFICULT
DEVELOPMENT
CONTEXT

”

“
**THERE IS NO
 COMMUNITY
 WITHIN AFRICA
 THAT KNOWS
 MORE ABOUT THE
 SCIENTIFIC ISSUES
 OF CLIMATE
 CHANGE... THAN
 THE CONTINENT’S
 OWN CLIMATE
 SCIENTISTS**
 ”

AFRICA’S CLIMATE SCIENTISTS

There is no community within Africa that knows more about the scientific issues of climate change, the future consequences for the continent and the strategies that should be adopted to mitigate and adapt to the effects of climate change than the continent’s own climate scientists. Although this community has participated actively — albeit in modest numbers — in international assessments of the impacts of climate change and are available to serve as policy advisers to their home governments, they have not spoken out about what should be done to equip the continent to cope with the real climate challenges ahead. This paper is a preliminary survey of the views of Africa’s climate experts on the nature of the problem, the scientific, governance and public education issues, and ways of adjusting Africa’s development and energy strategies to meet these challenges.

In order to undertake this qualitative survey, the author compiled a list of Africa’s internationally prominent climate scientists participating in the IPCC’s review process.¹

The IPCC is an independent intergovernmental body, consisting of both scientists and state representatives assigned the responsibility of summarizing the “state of the science” for global climate change. It has recently embarked on the fifth assessment of climate change, which is due to be published in 2015. A total of 830 scientists from around the world have been named to the IPCC’s three committees:

- Working Group I assesses the physical science of climate change;
- Working Group II assesses the effects and adaptation to climate change; and
- Working Group III assesses how to avoid or mitigate climate change.

As part of the working group, each scientist is assigned to a chapter of the review, in one of three roles: as a coordinating lead author, lead author or reviewing editor.

Drawn from a range of backgrounds in the physical, biological and social sciences, the scientists participating in the IPCC assessment are nominated by their home governments or, if they have been selected for their specialist qualifications, have been subsequently endorsed by their home countries. The process is highly competitive; only one in three scientists nominated by governments to serve in the IPCC review has been accepted, thus selection is considered a great honour, equivalent to being elected to an international scientific academy. While geographic balance is one factor for selection, professional excellence and specialist knowledge are by far the most important factors. Once selected, the scientists participate in their personal capacity, rather than as national delegates.

¹ To access this list, please visit the IPCC website, available at: www.ipcc.ch/activities/activities.shtml#_UOxJ_rZied5.

African scientists have participated in growing numbers in these surveys since the first IPCC review in 1990 (see Tables 1 and 2). A small number of these scientists have participated in multiple reviews and have ascended to positions of leadership within the IPCC. They coordinate key chapters of the review and are involved in generating the key documents that serve as summaries for policy makers. These senior individuals assume significant international responsibilities, but they also serve as team leaders and supervisors of young researchers in universities or government research facilities. They also often serve as policy advisers to government and international institutions. While their numbers are small, they serve as the visible tip of the iceberg, rising from a substantial foundation of active junior researchers in Africa's academic institutions.

Table 1: African Scientists' Participation in IPCC Reviews, by Region

	First Review	Second Review	Third Review	Fourth Review	Fifth Review
Southern Africa	*	*	20	17	24
West Africa	*	*	12	11	11
East Africa	*	*	16	8	8
Horn of Africa	*	*	0	4	6
Alliance of Small Island States	*	*	0	4	6
Central Africa	*	*	2	3	2
Totals	0	0	50	47	57

*Data not available

Table 2: African Scientists' Participation in IPCC Reviews, by Working Group

	First Review	Second Review	Third Review	Fourth Review	Fifth Review
Working Group 1	6	*	9	5	9
Working Group II	1	*	35	28	34
Africa Chapter (within II)	*	*	19	15	7
Working Group III	*	*	6	14	14
Totals	7	0	50	47	57

*Data not available

Who are Africa's IPCC review climate scientists and what are their backgrounds? There are 52 Sub-Saharan African scientists — 10 of whom are serving for the second or third time in IPCC reviews — involved in the current review, roughly six percent of the scientists assigned to the project. To put this into perspective, the United States is represented by 192 scientists; Canada by 25; China by 34; India by 28; and Brazil by 26. Seventeen Sub-Saharan African countries are represented, but representatives are largely drawn from its most developed regions and elite institutions, with South Africa dominating both in absolute numbers and in scientists' assignments to IPCC leadership positions. The African contribution to the IPCC is heavily biased towards Working Group II, adaptation and impacts, with 34 scientists contributing to this program. Seven of these scientists are currently engaged in the preparation of the Africa chapter of the review. The majority of the

“
WHILE THEIR NUMBERS ARE SMALL, THEY SERVE AS THE VISIBLE TIP OF THE ICEBERG, RISING FROM A SUBSTANTIAL FOUNDATION OF ACTIVE JUNIOR RESEARCHERS IN AFRICA'S ACADEMIC INSTITUTIONS

”

“
**ALTHOUGH MOST
 OF THESE IPCC
 SCIENTISTS ARE
 BASED IN AFRICA,
 A SIGNIFICANT
 NUMBER OF
 THEM WORK FOR
 INTERNATIONAL
 ORGANIZATIONS,
 RATHER THAN
 AFRICAN
 NATIONAL
 INSTITUTIONS AND
 UNIVERSITIES**

”

participants in Working Group II are social scientists with a strong grounding in policy and development. In contrast, Africa’s representation in the other two working groups is quite modest. Most of the physical scientists are biologists or ecologists, rather than physicists or climate modellers, even though meteorology and climate modelling represent the IPCC’s core scientific disciplines.

Although most of these IPCC scientists are based in Africa, a significant number of them work for international organizations, rather than African national institutions and universities. There is, nonetheless, a cluster of IPCC scientists associated with three key institutions: the University of Cape Town, with its strength in climate modelling, the University of Dakar and the University of Khartoum, both of which specialize in the social and policy issues related to adaptation.

METHODOLOGY

Qualitative interviews were conducted with a representative sample of 12 scientists appointed to current or previous IPCC assessments who agreed to participate in confidential, semi-structured interviews, where they were asked about their perspectives on the state of climate science in Africa, their experience in international scientific initiatives on climate change, the impact of climate change on the continent and policy options to mitigate the effects of, and to adapt to, climate change in the future. In addition, qualitative interviews were conducted with four agricultural scientists who had assessed climate change’s impact on agricultural productivity and resilience in the 2008 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) review (IAASTD, 2009). Notes were taken by hand and later transcribed. A number of key themes of the discussion were identified at this stage, and follow-up interviews were made in some cases to address gaps in the interview process. These interviews took place between September 2011 and June 2012. The interviews were conducted in person during two visits to Africa, in November 2011 and June 2011, and by telephone.

While the IPCC scientists represent the most visible African contribution to international climate science, they invest their own hopes in the next generation of climate scientists who are now younger faculty, post-doctorates and graduate students. In order to meet and interview this younger cadre of African scientists, the author attended the African Academy of Science’s first continent-wide conference on “Climate Change: The Road for Africa,” held in Nairobi in November 2011. Thirty-four scientists, drawn from 24 countries, delivered papers primarily focussed on adaptation issues, with a particular concentration on agriculture, water and public health. Nineteen young scientists participated in short interviews; 11 of these participated in a focus group on food security and climate change. The participation of the younger scientists broadened the geographic, linguistic and disciplinary breadth of the sample group.

A key source of information was the Consultative Group on International Agricultural Research’s (CGIAR) research plan on global climate change that integrates the work of a substantial number of African agricultural scientists

on climate change and agricultural productivity. A second important source was the Climate Change Adaptation in Africa Program, a joint initiative of the International Development Research Centre and the Department for International Development that provides grants to young African climate scientists and promotes institutional collaboration on climate science within Africa. This program's reports provide useful information on the locations and research agendas of African climate change centres.

The interviews form one component of a larger study examining the role of scientists in intergovernmental science panels. The larger study explores the impact of these panels in the global policy debate around three major, interlinked development issues of the twenty-first century: climate change, food security, and biodiversity and habitat preservation.

WHAT AFRICAN SCIENTISTS SAY

The State of the Science

The African climate scientists that were interviewed had much to say about the state of African climate science. While the scientists fully support the work of the IPCC, the word they most frequently used to describe the state of African climate science was “uncertainty.”² They expressed a real concern about the quality of the basic climate data for Africa, which they attributed to a long-term decline in investment in weather monitoring in Africa amid years of political instability and economic stagnation. They argued that the “coarse” analysis — the general trend lines of temperature increase and unstable precipitation patterns — was clear, but a “fine-grained” or detailed analysis of a given region or a sound prediction on future patterns remains out of reach. There is an urgent need to strengthen basic weather and climate monitoring data, whether through reinvestment in traditional weather stations or the introduction of more high-tech monitoring equipment. Without this basic data, advising local governments and communities about a sensible response strategy to climate change becomes very difficult.

The scientists repeatedly raised concerns about Africa's limited capacity to “crunch the numbers” and design climate change models. To a great extent, African scientists still depend on work that is done elsewhere on Africa's climate system, notably the influential work undertaken at the Hadley Centre in the United Kingdom (Hulme et al., 2001; Low, 2005). While such work, which serves as the foundation for their own research, is appreciated, there are reservations over dependence on overseas researchers. Can overseas centres be trusted to ask the right questions about Africa and its needs? As one scientist commented, “When it comes to science, Africa is still more studied by foreigners than understood by its own people.”

A third concern was about the organization of climate science research within Africa. Science is a team effort, never more so than in climate science, but scientists specializing in this work often work in isolation, widely separated from one another and hampered by limitations in

“
THE SCIENTISTS
REPEATEDLY
RAISED CONCERNS
ABOUT AFRICA'S
LIMITED CAPACITY
TO ‘CRUNCH THE
NUMBERS’ AND
DESIGN CLIMATE
CHANGE MODELS
”

² All comments in quotations are drawn from interviews with, or comments from, the focus group of African scientists.

“
**AFRICAN
 SCIENTISTS ARE
 MORE LIKELY TO
 BE IN CONTACT
 WITH THEIR
 EUROPEAN OR
 NORTH AMERICAN
 PEERS THAN THEIR
 COLLEAGUES
 ELSEWHERE IN
 AFRICA**

”

communications technology, such as Internet access and bandwidth. Those communications links that do exist often extend along global North-South lines rather than as a network across Africa itself. As a result, African scientists are more likely to be in contact with their European or North American peers than their colleagues elsewhere in Africa. This makes it difficult to arrange collaborative projects within Africa, or to compare and contrast data generated in neighbouring countries. Participation in the IPCC assessment is one of the rare occasions when local data on Africa can be “scaled up” to facilitate regional assessments. Several scientists commented that it would be useful to invest resources to create strong research facilities at key centres where a critical mass of researchers could be built up into an “African Hadley.”

Mind the Gaps

African scientists also recognized important gaps in African climate research, which they believed reflected broader issues within the African research community. Good marks were given to the work being done on the impact of climate change on agriculture, water policy, public health and biodiversity. These are areas of strength within the African scientific community and are highly relevant areas of African public policy. Little work, however, was being done on climate change’s potential impacts on urban populations, population migration or on the built environment; these are important areas of study that need to be addressed as they are in other regions in the global South.

Since African development will be contingent on dependable and sustainable energy sources, energy is, in the scientists’ view, a particularly important area for further study. Africa is an important and growing exporter of hydrocarbons and it will be important for policy makers to have accurate forecasts of energy demands and sources for the future. While Africa is currently a negligible source of carbon emissions, this will not necessarily be the case in future, especially if high rates of economic growth continue. The scientists further recommended that more work should be done to identify appropriate technologies to help transition from the use of biomass for heating and cooking to more efficient and healthier fuels.

Another gap the scientists identified is that there is very little understanding of the potential impact of the rise of sea levels in fast-growing cities that are in low-lying areas of West and East Africa. Africa’s urban population has grown at an average annual rate of 4.3 percent, reaching 353 million in 2005 (Parry et al., 2007). During the interviews, scientists predicted that a situation might arise where inland populations were forced out of their homes by repeated droughts, while coastal populations were moving inland after repeated floods. But here, too, they argue, predictions are uncertain due to an absence of dependable data and analysis.

Climate scientists who have participated in the “roll-up” of information in the chapter on Africa in the IPCC’s 2007 review noted that there are also important gaps in the regional database. Central Africa, in particular, has been studied very little, largely because of political instability in the region. This is not only a problem for the Congolese, but also makes it difficult

to identify broader climatic patterns, given the scale of the forest cover (an important carbon sink) within this region and its important impact on broader weather patterns.

Finally, interviewees were also concerned that climate change was not yet being fully integrated, or “mainstreamed,” as a key variable in African research programs. While African scientists and policy makers recognized that the study of climate change is important, it is often treated as an afterthought in the design of scientific research projects. One climate scientist compared the state of climate change research to the early days of gender analysis in development studies, when everyone “nodded in women’s direction” but still treated its study as a footnote. This particular scientist suggested that it would be useful if the key agencies developed tools and techniques to integrate climate into research design and evaluation *ex ante*, beginning with the development research projects they currently support.

International Collaboration

The climate scientists who participated in this study are all highly enthusiastic about their roles with the IPCC and in related initiatives such as the climate change research undertaken by CGIAR. They acknowledged that such international research endeavours represent a time-consuming commitment that takes them away from their own research, but also brings them many professional advantages. First among these was the ability to network with peers working on similar problems in other centres. These contacts led to collaborations outside the IPCC when, in the course of their research discussions, they identified new issues beyond the scope of the IPCC study and opted to work on them collaboratively. As a result of these strengthened networks, the scientists were also able to help their talented junior staff by finding them post-doctoral and graduate placements elsewhere and by bringing colleagues from other regions to teach and train their students new techniques. Participation in international teams also facilitated the acquisition of laboratory equipment and other research resources. Last but not least, the scientists believed that their international collaborations facilitated acceptance of their articles in high-impact international journals.

Another advantage of participation was the prestige it offered and, along with it, increased influence at their home institutions. The scientists believe this form of international recognition has been a factor in promotions and professional recognition in the broader academic community, such as invitations to participate in symposia and key committees — mentioning somewhat ruefully that it also added to their already heavy workload. International participation has also brought a measure of “glamour” to climate research, helping to attract younger scholars to the field. The scientists did not, however, want to emphasize these benefits too much, as, they argued, international prestige was no substitute for a solid record of academic publication and institutional leadership.

Participation in the IPCC also brought the scientists greater impact in policy circles. As all IPCC climate scientists must be either nominated or endorsed by their home governments, this affords government officials a rare occasion to review the state of climate science at their own institutions.

“
WHILE AFRICAN
SCIENTISTS AND
POLICY MAKERS
RECOGNIZED THAT
THE STUDY OF
CLIMATE CHANGE
IS IMPORTANT,
IT IS OFTEN
TREATED AS AN
AFTERTHOUGHT
IN THE DESIGN
OF SCIENTIFIC
RESEARCH
PROJECTS

”

“
**AFRICAN
 RESEARCH THUS
 BENEFITTED FROM
 A ‘BOOMERANG
 EFFECT,’ MOVING
 FROM AFRICA TO
 INTERNATIONAL
 CIRCLES AND
 THEN BACK,
 GAINING
 MOMENTUM AND
 INFLUENCE ALONG
 THE WAY**

”

Some countries, such as Kenya, Sudan, Senegal and Tanzania, make a point of honouring their nationals through nominations to the IPCC. Sometimes this translates into policy influence for the scientists at home, at least in terms of identifying the issues, if not the policy choices adopted by governments. The scientists also believed that the IPCC assessments, and especially the executive summary and Africa chapter, were more likely to be read in government circles precisely because they were international documents and therefore seen as more important than the same research published in peer-reviewed publications. African research thus benefitted from a “boomerang effect,” moving from Africa to international circles and then back, gaining momentum and influence along the way (Hochstetler, 2002).

Nonetheless, with the possible exception of those from South Africa, the climate scientists do not believe that their participation in the IPCC has led to more investment in climate research from cash-strapped African governments. To a great extent, they still rely on international sources and Western donors for financial support. The IPCC’s trust fund, which supports the participation of Southern scientists in its gatherings, was, in the scientists’ views, an indispensable tool for integrating African perspectives into intergovernmental scientific panels. This echoes the perspective of Southern scientists from other regions as well (Agrawala, 1998).

In interviews, the scientists consistently reported that they enjoy their involvement in the IPCC and similar international initiatives, and they believed they participate on a level playing field with their peers from other regions. This is in interesting contrast to Brazilian researchers in another study, who reported that language issues proved a daunting barrier to their full participation in the IPCC process (Lahsen, 2004). Language barriers did not seem to pose a problem for African scientists: even those who are French-speaking had worked or studied overseas prior to their involvement in the IPCC and were comfortable working with their peers in English, the primary language used at IPCC. At the same time, it is worth noting that there are few — if any — Spanish- or Portuguese-speaking African scientists at these gatherings.

More broadly, interviewees suggested that involvement in the IPCC breaks the isolation that African scholars feel and allows them to see themselves as belonging to a global epistemic community of climate scientists sharing a common research project, scientific practices and a policy agenda to combat the consequences of climate change (Haas, 1992).

THE EFFECT OF CLIMATE CHANGE ON AFRICA

The African climate scientists who were interviewed generally conveyed a sense of resignation at the inevitability of climate change’s effects. Given that climate change is a global phenomenon and Africa is only a modest source of emissions, the scientists believe there is little that Africans can do to mitigate its impacts by changing their patterns of industrial production or consumption. One ecologist summarized the situation as an “out of Africa” problem with major consequences for the continent, and called out for “made in Africa” solutions. A clear distinction is drawn between the

African community's responsibilities, compared to the responsibilities of the prosperous countries in Europe and North America and the major carbon emitters in Asia.

According to interviewees, with Africa generally helpless to influence events through its own mitigation strategies, these scientists' energies are focussed on creating adaptation strategies that prepare Africans to live in a generally hotter climate with irregular climatic seasons. Their prescriptions for action include:

- intensified agricultural research, to provide seeds for staple cereals and indigenous crops that are better adapted to drought conditions, irregular rainfall and higher salinity;
- the development of improved "climate smart" agricultural techniques, generally designed to reduce water demand;
- encouraging afforestation and conservation initiatives to preserve forest cover, in order to protect existing carbon sinks and facilitate shade-grown agriculture; and
- increasing research on pests and other crop and animal diseases so that farmers are prepared for these new threats in a hotter climate.

Although physical scientists are concerned about the potential loss of productivity due to climate change, they are not necessarily pessimistic about the future. Some argued that Africa's productivity is comparatively low at present, especially compared to the productivity of tropical agriculture in Asia. This suggests that there is considerable built-in resilience in Africa's biosystems that could be unlocked through efficient agricultural techniques. Even if climate change were to reduce Africa's potential agricultural productivity by a factor of 10 percent, examples elsewhere, such as Asia, suggest that introducing new technology (in the form of improved seeds, techniques, irrigation and storage systems) could increase Africa's effective productivity by at least 600 percent (The Royal Society, 2009). Under ideal conditions, Africa could not only weather the effects of food security under climate change very easily, it has the potential to become the "breadbasket" of the world (ibid.). The scientists pointed to foreign companies' recent acquisitions of large tracts of African land as evidence that at least some foreigners were betting on a booming future for African agriculture.

Others, social scientists in particular, were skeptical that the introduction of technology alone could lead to greater productivity, unless it was accompanied by the extensive reform of social and political support systems for Africa's indigenous farmers. The scientists see the social and political challenges associated with a substantial increase in agricultural productivity as enormous, and worry about the potential dislocations to community life. One social scientist commented that his villages are populated by "seven- and 70-year-olds" as a result of migration and the depredations of AIDS; he doubted, frankly, whether African villages still had the essential reserves in terms of labour and agricultural skills to mount a "green revolution."

“
SCIENTISTS’
ENERGIES ARE
FOCUSSED
ON CREATING
ADAPTATION
STRATEGIES
THAT PREPARE
AFRICANS TO LIVE
IN A GENERALLY
HOTTER CLIMATE
WITH IRREGULAR
CLIMATIC
SEASONS

”

“
**SCIENTISTS
SAW CLIMATE
CHANGE AS JUST
ONE, AND NOT
NECESSARILY THE
MOST IMPORTANT,
FORM OF
ANTHROPOGENIC
CHANGE THAT
AFRICA MUST
FACE IN THE NEXT
FEW DECADES**

”

A third group of scientists saw climate change as just one, and not necessarily the most important, form of anthropogenic change that Africa must face in the next few decades. Climate change is distinctive as a global phenomenon, while other anthropogenic changes affecting the continent are largely a result of Africans' environmentally unsustainable activities. These include deforestation — the result of both “slash and burn” agricultural techniques and the conversion of upland forests into agricultural production; the destruction of watercourses; downstream water pollution associated with excessive water diversion; soil erosion; the loss of soil fertility due to the abandonment of traditional soil conservation techniques; declines in biodiversity resulting from habitat destruction, animal poaching and overfishing; and black carbon (soot) air pollution, because of Africans' pervasive reliance on wood as a fuel for cooking. These issues are viewed by the scientists as structural problems that impact villagers all the time, while the impact of climate change is seasonal or variable. Anthropogenic damage to the environment is a serious issue for Africa and will only get worse as the anticipated population increases pose additional burdens on Africa's ecosystems. From the perspective of these interviewees, unlike climate change, something can be done to mitigate the impact of each of these problems by adopting “made in Africa” solutions. Adopting mitigation strategies to deal with these problems will also increase community resilience and help Africans to cope with climate change.

One exception to the scientists' emphasis on adaptation over mitigation is their belief in the possibility of reducing black carbon emissions. Black carbon is considered the second- or third-largest global source of carbon emissions; it is dubbed the “greenhouse gas of the poor” (Ramanathan and Carmichael, 2008). Africa relies heavily on burning wood and other organic fuels — putting great pressure on its forest cover — largely because rates of electrification are so low. Only 53 percent of urban residents and eight percent of rural communities are electrified (United Nations Development Programme [UNDP], 2007). In the short term, Africa would benefit by introducing more efficient wood stoves and planting woodlots. Over the longer term, Africa would benefit from massive electrification. The investment costs and the availability of appropriate energy sources for large scale electrification, however, represent a major challenge (Nkomo, Nyong and Kulindwa, 2006).

African Farmers and Climate Change

What do Africa's farmers think? In a focus group of agricultural scientists who work directly in farmers' fields, participants agreed that farmers are “exquisitely sensitive” to weather fluctuations and possess a richly detailed form of indigenous knowledge, relying on phenomena such as patterns of insect population changes to forecast the weather. According to these scientists, farmers are generally convinced that they are already in the midst of significant climate change; however, they are less concerned about an overall increase in temperatures than they are about climate fluctuations, such as delays in the arrival of the seasonal rains that make it difficult to plant their seeds, deeper, more intense droughts and more violent rainstorms that wash away the topsoil.

The scientists reported that the farmers do not understand the concept of greenhouse gases; when they are asked what has caused the change in the weather, the farmers generally link the change to “cutting down the trees.” Thus scientists suggest that if governments or the international community wish to embark on a program of grassroots education, they should stress “man-made changes in the environment,” rather than global climate change. This focus offers farmers a menu of practical, local-level activities — from tree planting to watercourse protection — that could make a difference, and be understood, at the community level.

Climate Change and Policy

Climate scientists are generally reluctant to pronounce on policy issues, as they tend not to see themselves as playing decisive roles in the policy process. Most of the scientists commented that they have little or no direct contact with Africa’s political leaders on the issue of climate change. One scientist, who does play an influential role as a senior policy adviser, believes that Africa’s political leaders understand the importance of climate change and want to do something about it, but, he believes, they have no idea what to do and feel impotent to effect any change. In interviews preceding the Durban Conference on Climate Change, scientists expressed the hope for a breakthrough on a post-Kyoto climate treaty. They also hoped that the conference, the first of its kind on the continent, would increase the understanding of the challenges that Africa faces. In follow-up interviews after the conference, the scientists expressed disappointment with the outcome. Those who attended during the “agriculture” and “forest” days at the summit commented on the quality of the discussions.

Although they were generally disappointed in terms of their influence on policy and the results of the recent Durban conference, African scientists saw at least one important advantage of being based in Africa. They commented, with astonishment, about the savage attacks that North American and European climate scientists, including senior scientists in the IPCC, have endured from climate change skeptics. These attacks led one distinguished climate scientist, Stephen Schneider (2009), to describe climate science as a “contact sport.” The African scientists suggested that this sort of attack reflects a general lack of understanding about the process of science, which advances through testing of hypotheses refining of models, and they fear that such bitter controversies may compromise investment in essential research. The scientists understand that the criticism is often rooted in concerns about the disruptive impact that mitigation strategies would have on well-entrenched economic and political interests and they are grateful that, at least so far, they have been spared these controversies. Some suggested that this is because climate change is still identified as a problem “caused by the West” but worry that the political tolerance they currently enjoy may deteriorate if important economic interests, such as West Africa’s oil and gas industry, are affected.

As a final comment, many of the scientists stated that it was “unusual” and “refreshing” to be asked for their views on climate change. There is very little coverage of science issues in the African media, whether measured in the number of qualified science journalists or the amount of available

“
CLIMATE
SCIENTISTS ARE
GENERALLY
RELUCTANT TO
PRONOUNCE ON
POLICY ISSUES,
AS THEY TEND
NOT TO SEE
THEMSELVES AS
PLAYING DECISIVE
ROLES IN THE
POLICY PROCESS
”

“
**THE SCIENTISTS
 SEE A REAL
 DISCONNECT
 BETWEEN THE
 RESPONSE OF
 POLITICIANS AND
 OFFICIALS AND
 THE TRAVAILS
 OF AFRICA’S
 FARMERS, AND
 THEY OFTEN FEEL
 STUCK IN THE
 MIDDLE**

”

column space. The scientists see a real disconnect between the response of politicians and officials and the travails of Africa’s farmers, and they often feel stuck in the middle. They believe that more information and educational materials targeted to a lay audience on climate change and the related problems of anthropogenic change would be useful in this regard. With so many of Africa’s problems found at the intersection of science, poverty and the environment, the time for a thoughtful African debate on these issues has definitely come.

FOR THE FUTURE

Africa’s climate scientists are a thoughtful, engaging and eloquent community, with many useful and practical ideas about how Africa should meet the climate challenge. Drawing on their suggestions, the following initiatives for strengthening African climate science and adapting to the impacts of climate change are proposed. To strengthen the science, Africa’s regional institutions, governments and scientific academies, with the support of international agencies, should:

- Create a regional IPCC chapter for Africa — an intergovernmental panel where African science could be assessed in greater detail and in a more timely fashion than the global IPCC reviews. This would allow African policy makers and a substantially larger cadre of scientists to exchange ideas on meeting the challenge.
- Reinforce the existing centres of excellence in Dakar, Khartoum and Cape Town by seconding multinational staff to them and assigning them explicit regional assessment responsibilities.
- Create virtual networks of African climate scientists at other centres by developing listservs of active scientists, reinforcing communications facilities connecting African universities and supporting the creation of African climate science e-journals.
- Develop “train the trainer programs”; publish tools and techniques to integrate climate into research design and evaluation for development research.
- Invest in programs of science journalism that could offer an attractive career path for science graduates and raise the general level of understanding of key scientific problems in Africa.

To fill the gaps, all investors in African science should:

- Reinvest in the continent’s weather monitoring systems that are the indispensable foundation for all other climate research. Particular efforts should be made to strengthen the systems along the equator and in central Africa.
- Invest in research on urbanization, including generating a list of urban “hot spots” — communities that are at particular risk because of their coastal or marine locations — and direct research into flood and waste management, and other critical issues of the built environment.

To meet the challenge of climate change, African governments and their donor supporters should:

- Launch a major regional feasibility plan for large-scale electrification, a productive option for both development and climate change mitigation. This is a project that the New Partnership for African Development might take up.
- Invest in agricultural extension systems to help African farmers adopt climate-friendly agricultural techniques and develop a new generation of drought- and salt-tolerant seeds.
- Invest in research on the impact of climate change on pests and other vectors that affect plant, animal and human health.

Finally, to promote the understanding of climate change and its impacts, African governments and their communications media should:

- Develop public education programs that explain the impact of anthropogenic change on communities and recommend simple, practical steps that people can take to improve their environment, such as forest conservation, tree planting, watercourse preservation, crop rotation, mulching and avoiding overfishing.

These measures would not only help to preserve the environment, but would empower communities through cooperative action and imbue the people with the belief that they can control their own future: a “made in Africa” solution for a global problem.

“
**AFRICA'S CLIMATE
SCIENTISTS ARE
A THOUGHTFUL,
ENGAGING AND
ELOQUENT
COMMUNITY, WITH
MANY USEFUL
AND PRACTICAL
IDEAS ABOUT
HOW AFRICA
SHOULD MEET
THE CLIMATE
CHALLENGE**

”

WORKS CITED

- Agrawala, Shardul (1998). "Context and Early Origins of the Intergovernmental Panel on Climate Change." *Climatic Change* 39: 605–620.
- Boko, Michel et al. (2007). "Africa." In *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, edited by M. L. Parry et al. Pages 433–467. Cambridge: Cambridge University Press.
- Haas, P. M. (1992). "Introduction: Epistemic Communities and International Policy Coordination." *International Organization* 46, no. 1:1–35.
- Hochstetler, Kathryn (2002). "After the Boomerang: Environmental Movements and Politics in the La Plata River Basin." *Global Environmental Politics* 2, no. 4: 35–57.
- Hulme, J. et al. (2001). "African Climate Change: 1900–2100." *Climate Research* 17:145–168.
- IAASTD (2009). *Agriculture at a Crossroads Synthesis Report*. Washington, DC: Island Press.
- International Institute for Sustainable Development (2011). "Earth Negotiations Bulletin." Available at: www.iisd.ca/enbvol/enb-background.htm.
- Lahsen, Myanna (2004). "Transnational Locals, Brazilian Experience of the Climate Regime." In *Earthly Politics: Local and Global in Environmental Governance*, edited by S. Jasanoff and M. L. Martello. Pages 151–172. Cambridge, MA: MIT Press.
- Low, P. S. (ed.) (2005). *Climate Change and Africa*. Cambridge: Cambridge University Press.
- Nkomo, J. C., A. O. Nyong and K. Kulindwa (2006). *The Impacts of Climate Change in Africa*. Report prepared for the Stern Review on the Economics of Climate Change in Africa.
- Parry, M. L. et al. (eds.) (2007). *Climate Change 2007: Impacts, Adaptations and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge: Cambridge University Press.
- Ramanathan, V. and G. Carmichael (2008). "Global and Regional Climate Changes due to Black Carbon." *Nature Geoscience* 1: 221–227.
- Schneider, Stephen H. (2009). *Science as a Contact Sport: Inside the Battle to Save Earth's Climate*. Washington, DC: National Geographic Society.
- Solomon, Susan et al. (eds.) (2007). *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Cambridge: Cambridge University Press.
- The Royal Society (2009). *Reaping the Benefits: Science and the Sustainable Intensification of Global Agriculture*. The Royal Society Policy Document No. 11/09.
- UNDP (2007). "Energizing the Least Developed Countries to Achieve the Millennium Development Goals." UNDP Issues Paper presented at the United Nations Ministerial Conference of the Least Developed Countries, Istanbul, July.

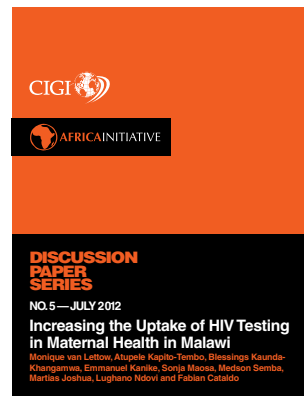
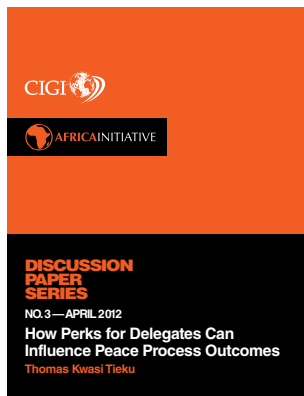
CIGI-AFRICA INITIATIVE PUBLICATIONS

To date, 45 researchers have been awarded the Africa Initiative Research Grant to conduct innovative, policy-relevant fieldwork in Africa. The Research Grant program pays particular attention to studies which are amenable to cross-country comparison and develop benchmarks for measuring policy outcomes, with the goal of influencing African policy and policy affecting Africa.

This research will be published on an ongoing basis throughout 2013-2014.

DISCUSSION PAPER SERIES

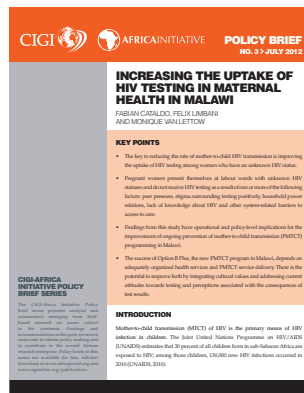
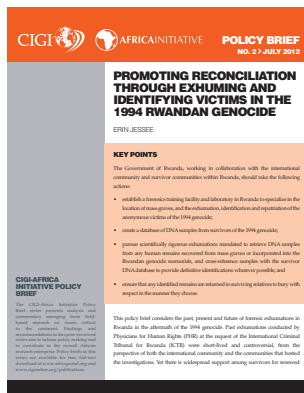
The CIGI-Africa Initiative Discussion Paper Series promotes discussion and advances knowledge on issues relevant to policy makers and opinion leaders in Africa.



New papers in this series will be offered throughout 2013.

POLICY BRIEF SERIES

The CIGI-Africa Initiative Policy Brief Series presents the innovative policy recommendations which emerge from the fieldwork of Africa Initiative Research Grant recipients.



New policy briefs in this series will be offered throughout 2013.



57 Erb Street West
Waterloo, Ontario N2L 6C2, Canada
tel +1 519 885 2444 fax +1 519 885 5450
www.cigionline.org