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Adapting to Climate Change in China
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CHINA AND SOUTH-SOUTH SCOPING ASSESSMENT FOR ADAPTATION, LEARNING AND DEVELOPMENT

A scoping study on opportunities for China & South-South countries to cooperate on climate change adaptation.

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Protecting and enhancing livelihoods, environments and economies around the world

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Acronyms and Abbreviations

AAKCP	Asia-Africa Knowledge Co-Creation Programme
ACCC	Adapting to Climate Change in China
ACCCRN	Asian Cities Climate Change resilience Network
ACDI	Africa Climate and Development Initiative
ACPC	Africa Climate Policy Centre
AfDB	African Development Bank
ALBA	Bolivarian Alliance for the Peoples of our America
AMCEN	African Ministerial Conference on the Environment
AMU	Arab Mahgreb Union
AOSIS	Alliance of Small Island States
APAN	Asia-Pacific Adaptation Network
ARCAB	Action Research for Community Adaptation in Bangladesh
ASEAN	Association of South East Asian Nations
AU	African Union
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BSEC	Black Seas Economic Cooperation
CAN	Comunidad Andina
CAN	Climate Action Network
CARICOM	Caribbean Community
CASSALD	China and South-South Scoping Assessment for Learning and Development
CCCCC	Caribbean Community Climate Change Centre
CCICED	China Council for International Cooperation on Environment and Development
CEN-SAD	Community of Sahel-Saharan States
COMSATS	Commission on Science and Technology for Sustainable Development in the South
COP	Conference of the Parties
CRGE	Climate Resilient Green Economy (Ethiopia)
CSAG	Climate Systems Analysis Group
DFID	Department for International Development (UK)
DRC	Democratic Republic of Congo
EAC	East African Community
EAPP	Eastern African Power Pool
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West Africa
EDPRS	Economic Development and Poverty Reduction Strategy (Rwanda)
EEC	Eurasian Economic Community
ELLA	Evidence and Learning from Latin America
EPACC	Ethiopia's Programme of Adaptation to Climate Change
FAO	Food and Agriculture Organisation
FOCAC	Forum on China-Africa Cooperation
FYP	five year plan
G-20	Group of 20
G-24	Intergovernmental Group of Twenty-four
G-77	Group of 77
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GLOF	glacial lake outburst floods
HDI	human development index
ICIMOD	International Centre for Integrated Mountain Development
ICCCAD	International Centre for Climate Change and Development
IDS	Institute of Development Studies
IFRPI	International Food Policy Research Institute
IGAD	Intergovernmental Authority for Development

IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
IUR	Independent University of Bangladesh
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
J-SEAM	Japan-Southeast Asian Meeting for South-South Cooperation
KCCAP	Kenya Climate Change Action Plan
KIST	Kigali Institute of Science and Technology
LAPA	Local Adaptation Plan of Action
LDCF	Least Developed Countries Fund
LDC	Least Developed Country
LTMS	Long Term Mitigation Scenarios (South Africa)
MDG	Millennium Development Goal
MEMR	Ministry of Mineral Resources (Kenya)
MGC	Mekong–Ganga Cooperation
MoEF	Ministry of Environment and Forests (Bangladesh)
MoEST	Ministry of Environment, Science and Technology (Nepal)
MOST	Ministry of Science and Technology (China)
MOU	memorandum of understanding
NAPA	National Adaptation Programme of Action
NBI	Nile Basin Initiative
NCCRS	National Climate Change Response Strategy (Kenya)
NDP	National Development Plan (South Africa)
NDRC	National Development and Reform Commission (China)
NELSAP	Nile Equatorial Lakes Subsidiary Action Programme
NEPAD	New Partnership for Africa's Development
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
PACJA	Pan African Climate Justice Alliance
PES	payment for ecosystem services
PIF	Pacific Island Forum
PRS	Poverty Reduction Strategy
R&D	research and development
REC	regional economic community
RELAC	Portuguese speaking Expert Network on Climate Change
RMB	renminbi
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
SCCF	Special Climate Change Fund
SLR	sea level rise
SPCR	Strategic Programme for Climate Resilience (Grenada)
SSCTF	South-South Cooperation Trust Fund
START	System for Analysis, Research and Training
SU/SSC	Special Unit for South-South Cooperation
TWN	Third World Network
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
USA	United States of America
USD	United States dollars
WWF	World Wildlife Fund

Executive Summary

South-South learning can illuminate pathways for climate-compatible development, and China has much to offer as well as to learn. But this will require strengthening policies, technologies and project implementation in developing countries. International development agencies can help by channelling resources to fill the gaps and meet the opportunities identified in this report.

About the Report

South-South cooperation, learning and development have huge significance and great potential for climate-compatible development across South-South regions, nations and livelihoods, but are in their infancy in climate change adaptation. South-South potential is due, in part, to progress and concerted efforts by developing countries in climate adaptation- which in some cases is more developed than in the North due to continued and urgently necessitated response strategies - and is, in part, due to the importance of knowledge exchange in sustainable development, adaptation and poverty reduction across South-South nations and communities.

Consequently, this report, which identifies key opportunities and avenues for South-South learning and cooperation to address climate change, is a critical tool for international development organisations, national governments and policy-makers. It outlines how best to channel resources to share China's and developing countries' experiences of integrating climate adaptation into the development process, thereby facilitating developing countries' improved adaptation, learning from each other and avoiding the risk of mal-adaptation to climate change.

Crucially, this report provides clear and defined 'signposts' and recommendations for the future of China-South-South adaptation, learning, and development, upon which pragmatic and effective strategies and activities can be based, which will benefit South-South regions, countries and communities.

The China and South-South Scoping Assessment for Adaptation, Learning and Development (CASSALD) was a six-month scoping study on climate change adaptation for ten South-South priority-selected developing countries in Africa, Asia and the Caribbean.

The countries included in the study were: Angola, Ethiopia, Kenya, South Africa, Rwanda, Bangladesh, Nepal, Indonesia, Grenada and Jamaica. Countries were prioritised and selected through consultation with key stakeholders in China, South-South regions, and international organisations. A range of selection criteria was used, including each country's geographic diversity, the variety of activities in adaptation and learning, their relationship with China and the countries' position and influence in the international climate change agenda. The final mix of participant countries provides a representative spread of the diversity of challenges and development priorities faced by the Global South. Detailed reports of the results from each country are available as appendices to the main report.

Aims and Objectives

The aims and objectives of the study were to identify how development and adaptation are linked in the participant countries; identify and evaluate the 'gaps' and 'needs' of each country and region in relationship to their existing needs, practice and experience; examine, analyse and report the regions' and countries existing relationships with China and their potential to work with China on climate compatible development; and establish and recommend how international development agencies and other donors can best engage with these countries to channel resources most effectively.

During the study, consultations, one-on-one interviews, and regional workshops in both Asia and Africa were undertaken to elicit input, opinions, and recommendations from over 70 international experts and officials distinguished in the fields of development and climate change adaptation in the 10 selected countries. Participants ranged from Senior Government Ministers, Advisors and Programme Directors in all identified African, Asian and the Caribbean countries to eminent regional and national academics, experts and practitioners in adaptation and development.

Through extensive study and analysis, the project has been successful in establishing new findings, identifying opportunities and challenges, and in making recommendations for the future. These recommendations and key findings are outlined in the Executive Summary and in further detail throughout the report.

Funding and Partners

This study is funded by the Adapting to Climate Change in China (ACCC) project and was conducted by The INTASAVE Partnership and CARIBSAVE (Africa, Asia and Caribbean). ACCC is a joint project between the UK Government's Dfid and DECC, the Swiss Agency for Development and Cooperation and the Chinese Government's NDRC. The project team included the Smith School of Enterprise and the Environment at the University of Oxford and the African Climate and Development Initiative (ACDI).

Key Findings of the study

In relation to the aims and objectives of the study the following key findings were identified:

1. Current Status of Climate Change Adaptation Practices in Participating Countries

This section includes both the challenges faced and the good practices, which with the right assistance, support and development, could be replicated across South-South regions and nations, the section also examines how development and adaptation are linked in the countries.

Climate Adaptation – Current Progress

Currently, all countries who participated in the study have made significant progress in developing and implementing strategies for climate adaptation. All participant countries have submitted some level of documentation to the UNFCCC including National Communications, and National Adaptation Plans for Action, with Bangladesh and Rwanda showing early leadership. All have developed national climate adaptation strategies within the last six years (except Angola, which is still recovering from a 27-year long civil war). All are in the process of mainstreaming climate change adaptation into national development strategies.

However, progress on implementation has been limited, due partly to the lack of funding and partly to the complexity and scope of work.

The Sectors

Over the course of the study, common challenges to climate change adaptation and development in developing countries were highlighted, these challenges fall into eight core categories. The categories are: i) identifying the sectors at risk ii) increasing adaptive capacity of the vulnerable groups iii) fostering inter-agency cooperation iv) accessing appropriate technology and financial resources v) limited human capacity vi) managing resources for adaptation programmes vii) integrating climate change aspects into sector policies, laws, plans and programmes and viii) implementation.

With in the context of these challenges, three key sectors were identified as fundamental priorities by all ten country governments – **water, agriculture** and **health** – while infrastructure and disaster risk reduction also featured regularly. Other key priority sectors for adaptation and development work included coastal zones, forestry, tourism and biodiversity.

Good Practices

The study also highlighted a number of good practices in climate change adaptation that have been, or are being implemented in the participant countries, which provide valuable lessons for other developing countries facing similar challenges.
Examples of good practice include:

- community forestry management in protected areas in Nepal
- flood management and Community-Based Adaptation in Bangladesh
- vulnerability mapping on health and food security in Indonesia
- insurance and risk management in Ethiopia
- green growth and climate resilience strategy in Rwanda
- local adaptation planning in Nepal
- climate modelling and online knowledge sharing in South Africa
- sea level rise impacts modelling in Grenada and Jamaica

2.The Gaps and Needs for South-South Adaptation, Learning and Development

The key findings of this section identify and evaluate the gaps and needs of each country and region in relation to their existing needs, practice and experience, which South-South learning and cooperation provides the opportunity to fill and meet. The sections below clearly outline a number of these gaps and needs and identify the recommended ways forward at the end of each section.

Current Efforts on South-South Learning and Development

South-South cooperation, learning and development between countries has been underway for decades in a variety of forms, as illustrated in the figure below.

Current South-South work includes governments cooperating bilaterally and through regional and international bodies; civil society organisations collaborating bilaterally and through networks; academia sharing and cooperating on research through individual contacts and professional societies; private sector companies engaging through regional and international headquarters; and development partners sharing lessons with country and regional offices around the world.

While each sector has had some engagement across communities, according to the country stakeholders civil society has been the strongest form of cooperation and learning, followed by academia. More generally, engagement has also focussed on promoting economic development and has been led by national governments and multi-lateral organisations, with the support of both the North and South. While the involvement of the North has widely been considered as beneficial and often necessary to assist in facilitation, there is a strongly expressed desire in the South to have ownership and to set their own long-term priorities.

Additionally, climate change adaptation is a new area of cooperation, learning and development and the level and mode of engagement varies across stakeholder groups. Due to the infancy of the area and as adaptation is highly context specific, most South-South learning and development currently occurs between individuals working for NGOs, development agencies and academia in the South. Consequently, in order to upscale existing programmes, additional effort is required to understand nuances at national and community level, giving civil society and academia an important role to play in South-South learning and development for adaptation to climate change.

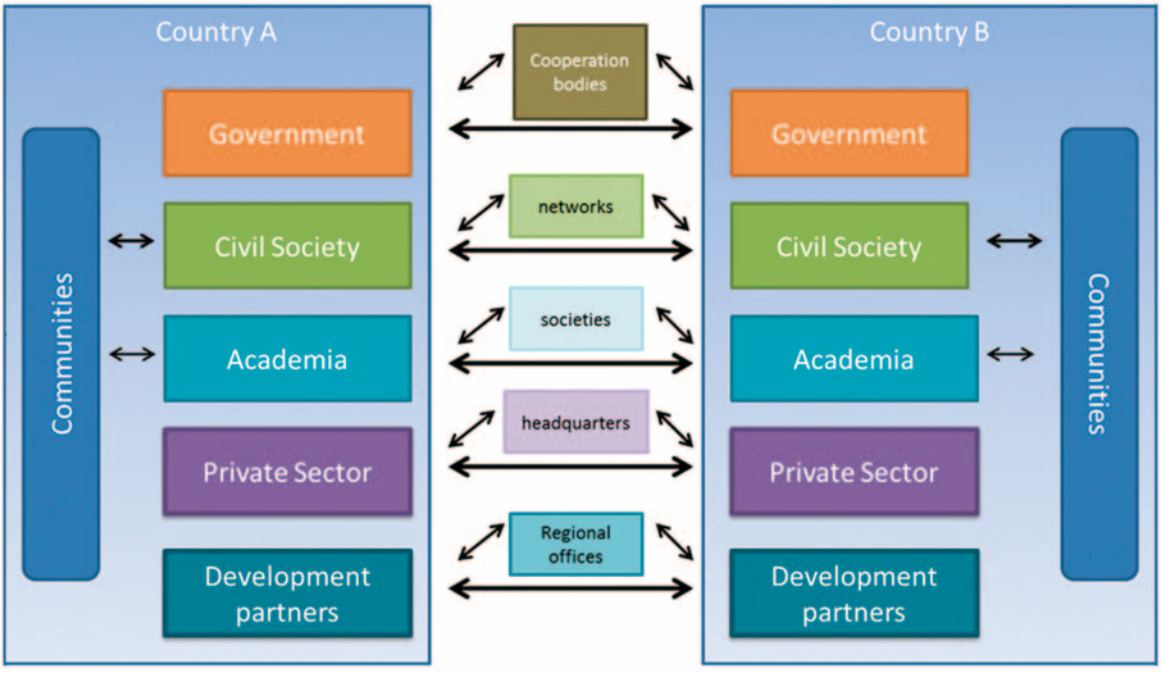


Figure I Schematic of the South-South learning and development between different stakeholders.

Existing Learning and Development Networks

Although there is a wide range of South-South learning activities underway, in different sectors and at different scales, they are not well documented and dissemination is limited.

Recently, a number of regional Southern knowledge hubs have been established to fill this gap, including Africa Adapt, the Africa Climate Policy Centre (ACPC), the African Climate and Development Initiative (ACDI), the online Regional Climate Adaptation Knowledge Platform for Asia, the Asia-Pacific Adaptation Network (APAN); the International Centre for Climate Change and Development (ICCCAD) and the Caribbean Community Climate Change Centre (CCCCC).

Additionally, there are a number of global NGO networks that facilitate South-South learning on climate change, including the Third World Network (TWN), Climate Action Network (CAN) and the Pan African Climate Justice Network (PACJA), as well as national networks in each country. While they play a significant role in promoting South-South learning and cooperation, their activities are not interconnected and, except for TWN, they focus on their own specific region.

Accordingly, there is a patent need to interconnect knowledge sharing and engagement both within and across regions through existing and potential South-South networks.

Common Challenges for South-South Learning

The current status quo of learning, cooperation and development is North-South or North-South-South, with the most common engagement being one-way learning from North to South. Expanding South-South learning and development on adaptation faces the common challenges of a lack of institutional infrastructure (as identified above) and the long history of North-South relationships. The current state of play is also compounded by the North as the main source of funding, though even for South-South cooperation the North is widely expected to remain the major donor. Other important common challenges are limited publications and online resources, and the language barriers and cultural differences between Global South countries.

Consequently, there is a clear necessity for an institutional framework for global South-South learning on adaptation as well as an innovative means of communication to overcome language barriers and related challenges. There is also a need to improve understanding of the challenges relating to the culture, history, politics, accountability and public opinion of South-South learning. Each country has its own context in which it operates and this needs to be well understood if countries are to learn from each other and understand what are the most relevant and applicable lessons for themselves.

Opportunities to Develop a Learning-Centred Approach

In order to upscale existing programmes, build on and coordinate the solid work of knowledge platforms and face the gaps and needs identified above, there is a patent need for a coherent, robust and further developed institutional framework for South-South learning on adaptation . To achieve this, this report recommends pursuing the following learning-centred approach.

In the first phase a comprehensive report and database on South-South learning and development on climate change adaptation in all its forms should be developed, building on this scoping study and other South-South cooperation analyses. This should include the design, implementation and evaluation of South-South learning and development programmes and the organisations and stakeholders involved. This process would identify good practice in climate change adaptation and exchange and promote examples of successful South-South learning

cooperation on adaptation.

This in-depth report and database should be complemented by filling the needs and gaps outlined above and would be supplemented and supported by the implementation of a range of pragmatic and effective adaptation projects encompassing South-South regions, countries and communities.

Activities in the projects would be focused on key priority sectors identified during the study - water, agriculture, health, infrastructure, disaster risk reduction, coastal zones, forestry, tourism and biodiversity - and would be driven by the recommendations stated in the Section 4 on "Opportunities & Recommendations for South-South Adaptation, Learning and Development".

3. China and South-South Cooperation on Climate Change Adaptation

The key findings of this section examine, analyse and report the regions' and countries existing relationships with China and their potential to work with China on climate compatible development. It is clear from the study's findings that China has a strong and eagerly anticipated role to play in both South-South learning and climate compatible development.

China's Role in South-South Learning and Climate Compatible Development

China is recognised and respected as a global economic power among developing countries, many of whom seek to learn from the rapid success in poverty reduction that has occurred in the past 30 years in China, there is a leading role for China to play in developing South-South cooperation, learning and development.

This is particularly true for the climate change adaptation agenda, where China is already particularly active. China is already involved in cooperation with many developing countries through bilateral and multilateral agreements, institutions and programmes, including: the Chinese Academy of Science and Technology for Development (CASTED), the China Council for International Cooperation on Environment and Development (CCICED), the Forum on China-Africa Cooperation (FOCAC), the Technology Manuals published by the Chinese Ministry of Science and Technology (MOST) and partners, the Network/Platform for International Science and Technology Cooperation launched by the China Science and Technology Exchange Centre (CSTEC) and partners, and China's South-South Cooperation Programme on Climate Change. These initiatives can be used as platforms for promoting cooperation on climate change adaptation and allow China to play a leading role in promoting and supporting South-South cooperation, learning and development.

China's Support in South-South Learning and Climate Compatible Development

In the study, all ten countries welcomed Chinese support of South-South learning, cooperation and development. China is well-respected by the participant countries in many fields of expertise pivotal to climate change adaptation, highlighted in the following section.

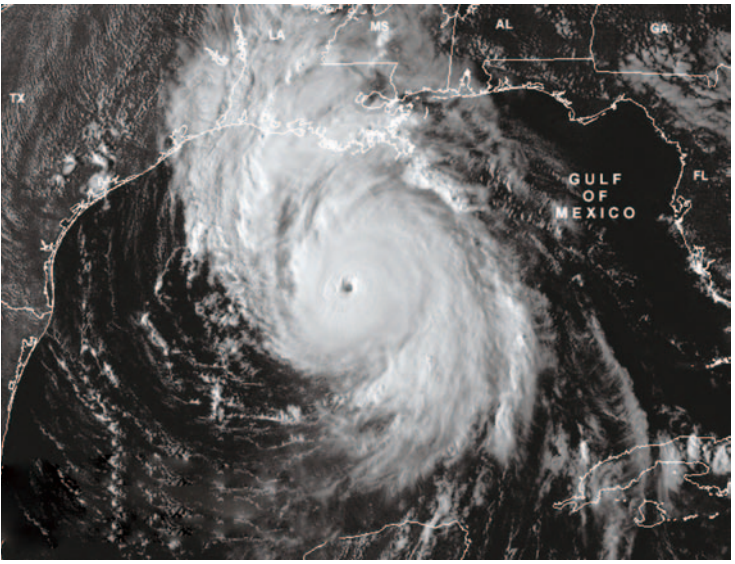
Countries stressed that two-way learning and mutual respect is important and that all developing countries have knowledge to share. It was agreed that support for climate change adaptation should be in line with each country's development goals and adaptation strategies and the support should have clear long-term goals to ensure sustainability. Many stakeholders highlighted the importance of local and indigenous knowledge being integrated into adaptation solutions and they supported a participatory approach where government, private sector, NGOs, academics and communities work together.

China's existing support and cooperation to the participant countries varied as Asian countries have stronger historical and cultural ties with China than do Africa or the Caribbean. Furthermore, while the Caribbean has higher income levels, Asia has higher technical capacity in general and South Africa and Indonesia have stronger economies. It should be noted, however, that none of the ten countries currently have sufficient funds or capacity to implement their development plans with the additional costs and requirements that effective adaptation demands and they will continue to require assistance from donor agencies and partner countries for implementation.

4. Opportunities and Recommendations for China and South-South Cooperation on Climate Change Adaptation

This final section provides recommendations for pragmatic activities across South-South regions and communities, and identifies how international development agencies and other donors can engage with countries and channel resources most effectively. For each country, the stakeholders identified specific opportunities and made recommendations on South-South learning and engagement with China. Many of the areas to consider relate to science and technology, where China is recognised as a leader in the field, and countries specifically encouraged China to research breakthrough technologies for the South, as they felt that this could make a significant difference to future adaptation and development. There was also broad support for knowledge exchanges, knowledge infrastructure, networks, scholarships from Chinese academic institutes and joint research.

The major recommendations, opportunities and key identified areas of China-South-South cooperation, learning and development on climate change adaptation are detailed below.



1. Systematic Observation and Meteorological Services

Plainly identified was the fact that without robust meteorological data to enable accurate climate projections, it is very difficult to design effective adaptation policies and measures.

Recommended activities include: improved meteorological stations, software, technology and technical expertise to better understand climate change and the risks and vulnerabilities associated with it; provision of satellite observations for centres of excellence for climate impact modelling and projections; ocean monitoring in the Pacific to improve the understanding of and predictions for El Nino in Africa; joint research and engagement with regional centres of excellence.

2. Early Warning Systems and Disaster Management

Early Warning Systems and disaster management are particularly important for low-income countries with high vulnerability to climate change. Some of the participant countries have excellent systems and practices, whereas others have particular needs to build and establish their disaster management work.

Recommended activities include: technical training in forecasting, flood modelling and Geographical Information Systems to enable countries to improve forecasts warnings and the planning processes; risk assessments and vulnerability mapping to improve the systems which require enhanced data collection analysis and modelling.

3. Climate Resilient Infrastructure

A common theme is China's involvement and contribution to infrastructure in developing countries, which provides an opportunity to climate proof this existing work.

Recommended activities include: climate resilience being incorporated into the design and management of infrastructure projects; including additional infrastructure such as flood embankments, cyclone shelters and coastal polders, road and rail and 'green' hotels.

4. Agriculture

China's expertise in the development of crop varieties that are more resistant to climate change was identified and acknowledged by many of the participating countries as a key area for learning and development.As a result there was widespread interest in support for partnerships working on all aspects of agricultural resilience.

Recommended activities include: identifying, preserving and developing local varieties, especially those suited to the needs of poor farmers; diversifying rain-fed agriculture and exploring irrigation technologies; expert visits to Chinese pest management units; R&D of new or alternative practices to reduce the spread of diseases among livestock and fisheries.

5. Health

Developing countries and China share common climate-related challenges for public health, including combating vector-borne diseases, such as malaria and dengue fever.

Recommended activities include: early warning systems for diseases including improved data gathering and technical support; partnerships between academic institutions, NGOs and governments in the countries to assist in the R&D of medicines and preventative measures; regional research institutions engaging and partnering with Chinese research institutions.

6. Water

Water is a priority sector for all countries.

Recommended activities include: expertise and technology sharing in water conservation, harvesting and integrated planning; capacity building; efficient irrigation practices; waste water recycling; hydrological modelling to improve strategies; water quantity and quality monitoring and collation.

7. Coastal Zones

Coastal zones are home to millions of people, through the rural poor, and hundreds of major cities. These areas are highly vulnerable to sea level rise, storm surges and tropical cyclones. Coastal zones are also a prime area of natural assets for many South-South nations and communities, and these assets

e.g. fisheries, coral and mangroves, are under severe threat. The projected loss and damage and the potential human and financial costs of inaction make adaptation in coastal zones a key issue.

Recommended activities include: for China and South-South nations to foster knowledge exchange, and support the development and dissemination of appropriate technology and activities for coastal zone and asset management, particularly in SIDS and LDCs.

8. Ecosystems Based Approach to Adaptation

There is strong interest in developing ecosystems based adaptation approaches (terrestrial and marine) together with China and to learn lessons from success stories like the Loess Plateau in China.

Recommended activities include: embracing techniques of sustainable management,conservation and restoration to enable people to better adapt to the impacts of climate change, and sharing China's experience on management and mainstreaming and integrating these into country and community-specific approaches.

9. Local Adaptation Plans

Nepal's pioneering framework on Local Adaptation Plans of Action (LAPAs) reflects the importance of including local communities in the design and planning of adaptation activities and provides a tool that can be adjusted to suit other national contexts.

Recommended activities include: replicating the Nepalese framework in many other countries and communities around the world, including in China. The involvement of communities in the development and implementation of effective and pragmaticadaptation strategies will also be beneficial when knowledge is shared across communities in different South-South regions and countries.

10. Mainstreaming Climate Knowledge into Development Planning

China's experience could produce vital lessons on international scientific knowledge sharing and how best to feed this into the policy-making procedure.

Recommended activities include: for government officials in the countries to benefit from climate training and sharing, to enable them to mainstream climate considerations into development planning.

11. Architecture for South-South Learning and Development

The lack of institutional architecture for South-South learning and development for climatechange adaptation is a key constraint. An architecture that includes a monitoring and evaluation framework for adaptation and builds upon what other institutions have already achieved, would be particularly helpful for facilitating collaboration between South-South governments and academics, as well as enabling South-South universities to examine and expand national and international programmes. Also, relevant data and information should be compiled into targeted reports that inform policy makers and enable them to develop, choose and implement policies and strategies that have the most positive impact.

Recommendations for a South-South learning framework can be summarised as: i) Report, database and matrices on South-South learning on climate change adaptation ii) Architecture for South-South learning on climate change adaptation iii) Expert Panel for South-South learning on climate change adaptation.

Recommended activities include: undergoing a detailed mapping exercise of relevant institutions and

their activities as an important starting point of the above processes.

12. Expert Panel and Finance for South-South Adaptation, Learning and Development

Experts from the South have the advantage of grassroots experience and understanding. The Centres of Excellence that already exist in Africa, Asia and the Small Island Developing States can provide a platform for the experts, who exist in NGOs, academia, government, the private sector and development agencies to cooperate, exchange knowledge, and enhance implementation.

Leverage of finance and the involvement of financial institutions in South-South Adaptation, Learning and Development will be vital to ensure sustainable, effective and practical strategies are implemented. The involvement of key financial institutions should be considered as fundamental in both the establishment of the Expert Panel and also in future work going forward to fortify adaptation and development in South-South regions.

Recommended activities include: establishing an expert panel of South-South stakeholders to drive South-South learning on climate change adaption and establishing a network of financial institutions including development banks, insurance companies, national and sub-national banks to strengthen and provide advice and support for adaptation, learning and development in the South-South on a regional, national and local basis.

Conclusion

It is clear that all participant countries could benefit from South-South learning and collaboration with China on climate compatible development and adaptation. But to enable them to do this, there are several areas which need strengthening, further improvement and project implementation, and significant gaps which need to be addressed. Two of the strongest recommendations that came from the study were that work should be demand-driven, and that funding needs to be targeted at long-term sustainability if adaptation is to be successful. International development agencies and governments are in a strong position to assist in facilitating the recommendations and opportunities stated in this report and Executive Summary, and to channel resources in a focused way for the benefit, not only of the ten identified countries and China, but also for all South-South regions, countries and communities.

1.Introduction

Countries in the global South that face similar challenges from climate change are increasingly seeking to learn from each other about how to adapt. China has a significant role to play in this South-South learning, and has begun formulating specific plans to connect knowledge and resources with needs across the developing world.

Climate change hits first and hardest in the vulnerable developing nations of the global South. But some of these countries are also at the forefront of planning and implementing adaptive responses – often several steps ahead of the North. Momentum is building around the world for Southern countries who share similar challenges and contexts to cooperate and learn from one another about how to adapt to climate change impacts. Now that the potential for South-South learning is widely recognized by developing nations, development donors and NGOs, it is time to start forming strategic plans that connect specific knowledge and resources with concrete needs across the South.

China has a significant role to play in this South-South cooperation. Chinese ministries are working with other Southern countries on strategies and technologies for adaptation and climate-compatible development across a range of sectors. During its 11th Five-Year Plan period (2006-2010), China established 121 assistance programmes for implementing climate change policy in developing countries, and provided capacity building to over 207,000 personnel. The 12th Five-Year Plan includes provisions to go further in assisting other developing countries to address climate change.

From 2006 to 2010, China provided capacity building to over 207,000 personnel in 121 assistance programs for developing countries implementing climate change policy. Going forward, China has pledged RMB 200 million to support South-South cooperation on climate change.

At the Rio+20 conference in June 2012, Premier Wen Jiabao pledged RMB 200 million for South-South climate change cooperation. This followed an announcement at the 2011 UN climate change conference in Durban, where Xie Zhenhua, head of the Chinese delegation and Vice Minister of China's National Development and Reform Commission, laid out four major areas of investment in South-South collaboration:

1.Help the developing countries most vulnerable to extreme weather develop weather forecasting, disaster-prediction capacity, and improved early-warning capacities;
2.Promote technology for climate change adaptation, including sustainable agriculture assistance and technology for drought resistance, water conservation and biodiversity management;
3.Disseminate and donate technology in energy conservation, water conservation and renewable energy to small island developing states and least developed countries;
4.Continue capacity building programs for developing countries. In the next three years, China plans to train 1,000 Southern officials.

The project 'China and South-South Scoping Assessment for Adaptation Learning and Development' (CASSALD) has examined some of the needs that might be filled by South-South learning with China. This report, commissioned by the UK- and Swiss-funded Adapting to Climate Change in China (ACCC) project and delivered by the INTASAVE Partnership, reviews the findings and highlights opportunities for international development agencies to get involved.

1.1. About This Research

This study looks for the best opportunities to channel resources toward South-South learning on climate adaptation and development.

CASSALD is a scoping study in ten developing countries, looking at their climate adaptation needs and their potential for South-South learning with China. The aim is to identify key opportunities and determine how best to channel resources to share experiences of integrating climate adaptation into the development process. In Africa, we studied Angola, Ethiopia, Kenya, South Africa and Rwanda; in Asia, Bangladesh, Nepal and Indonesia; and in the Caribbean, Grenada and Jamaica (Figure 1.1). The study also seeks to understand South-South learning on adaptation more broadly and provide recommendations for expanding and improving upon current work.

Figure 1.1 Ten developing countries selected for the scoping study (shown in blue).

The project has six key objectives:

1.Identify priority countries and regional and national partners in Southern regions.

2.Identify how development and adaptation are linked in the selected countries.

3.Establish a framework for South-South learning. The framework should support a learning-centred approach across regions and countries for South-South learning and collaboration with China on climate-compatible development.

4.Identify the gaps and needs of each country and region in relationship to their existing practice and experience.

5.Examine the regions' and countries' existing relationships with China and their potential to work with China on climate-compatible development.

6.Recommend how international development agencies can engage with these countries to channel resources most effectively.

1.2. Methodology

The ten priority countries were selected by ACCC and INTASAVE based on their vulnerability to climate change, leadership in climate change action, strategic importance and links with China. A scoping assessment was conducted for each priority country, and the ten scoping reports form the appendix to this synthesis report. They cover four areas:

- Framework for assessment – a review of national adaptation strategies and capacity, the main actors and their responsibilities, and mainstreaming of

adaptation into decision-making processes.

- Needs assessment – a review of climate impacts and adaptation priorities, needs for external inputs, potential benefits of Chinese engagement, and how international sharing is being implemented.
- Attitudinal assessment – a review of the political will to act on climate change, political drivers, development priorities, policy makers' information sources, and the country's perspective on working with China.
- Existing links evaluation – a review of current involvement of the Chinese and South-South learning already underway.

The country reports were primarily based on desk research and input from key stakeholders via email and telephone interviews. Drafts of the country scoping reports were circulated for review to country stakeholders, and the feedback was integrated into the final reports. In addition, two regional workshops were organised: one in Addis Ababa, Ethiopia, for the five African countries, and one in Kathmandu, Nepal, for the three Asian countries. These provided significant contributions to this synthesis report as well as to the relevant country reports.

Over 70 stakeholders were engaged in the study, including senior government officials from all ten countries (Ministers, Permanent Secretaries, Directors, Division Chiefs, etc.), academics in over ten countries, development partners and think tanks – including DFID, the International Food Policy Research Institute (IFPRI), the International Institute for Environment and Development (IIED), the International Livestock Research Institute (ILRI) and the Africa Climate Policy Centre (ACPC) – and the international NGOs WWF, Oxfam, the Red Cross and Li-Bird.

The research team were also engaged with the United Nations Framework Convention on Climate Change (UNFCCC) Loss and Damage Work Programme, which has involved regional expert meetings in Addis Ababa in June 2012, Mexico City in July 2012 and Bangkok in August 2012. These provided an opportunity to identify case studies and good practices, as well as to interview key stakeholders.

1.3. In This Report

While the bulk of the research from CASSALD is contained in the ten country reports available separately to this report, this report synthesises the country findings and discusses broader lessons about South-South learning. Chapter 2 reviews current modes of South-South cooperation and learning, and the stakeholders involved. Chapter 3 summarises the ten country scoping reports and explores their similarities and differences. Chapter 4 identifies key findings from the CASSALD project as a whole, and Chapter 5 highlights current opportunities and challenges for South-South learning and recommends ways for China and international development organisations to facilitate South-South learning on adaptation.

2. Existing Resources for South-South Cooperation and Learning

South-South cooperation and learning on climate change adaptation is in its infancy, but opportunities for Southern countries to work together are widespread and growing. Key trends include:

- **Significant new commitments in China**
- **Potential for learning in the private sector**
- **A need for communication and coordination among fast-multiplying programmes.**

South-South cooperation is on the rise worldwide, seen as a means to decrease dependence on aid from developed countries and arrive at solutions to shared development challenges. Its potential was recognised in the 2008 Accra Agenda for Action on development aid effectiveness, one of many frameworks, programmes and multilateral bodies that have lined up to promote South-South links.

> South-South cooperation is defined by the United Nations (UN) as 'the process by which two or more developing countries initiate and pursue development through the cooperative exchange of multi-dimensional knowledge, resources, skills and technical know-how through different types of cooperation' (UNDP, 2012).

This chapter reviews the South-South cooperation and learning that is underway today, focusing particularly on climate change adaptation, China and the ten priority countries selected for this study.

2.1. Climate Change Adaptation Policy: Opportunities and Limitations for Learning

Many Southern governments are not yet sharing their experiences with climate change adaptation because they are still in the thick of a lengthy policy process.

Most work on adaptation in the South has been focused on national policy making. For the Least Developed Countries (LDCs), this takes the form of UNFCCC-supported National Adaptation Programmes of Action (NAPAs), and more recently the longer-term National Adaptation Plans (NAPs), along with other country-level efforts to 'mainstream' climate change issues by integrating them into development strategies across many sectors.

Whether they use NAPA, NAP or another planning framework, many Southern countries are not yet sharing their experiences because they are still in the thick of a lengthy policy process (Figure 2.1). The process starts with the government recognising climate-related risks to the economy and wellbeing. This leads to research and development of a national strategy or policy, then sectoral plans and programmes. Most developing countries must approach funding agencies for resources to support adaptation efforts, and a few, such as Bangladesh, Indonesia and Rwanda, have established basket funds to efficiently channel climate finance into priority projects. Usually, it is only after specific projects are defined, budgeted, funded, implemented and evaluated that countries can be expected to make an effort to communicate their learning internationally. South-South learning can and does happen earlier in this process, but on a limited scale and not in any structured way.

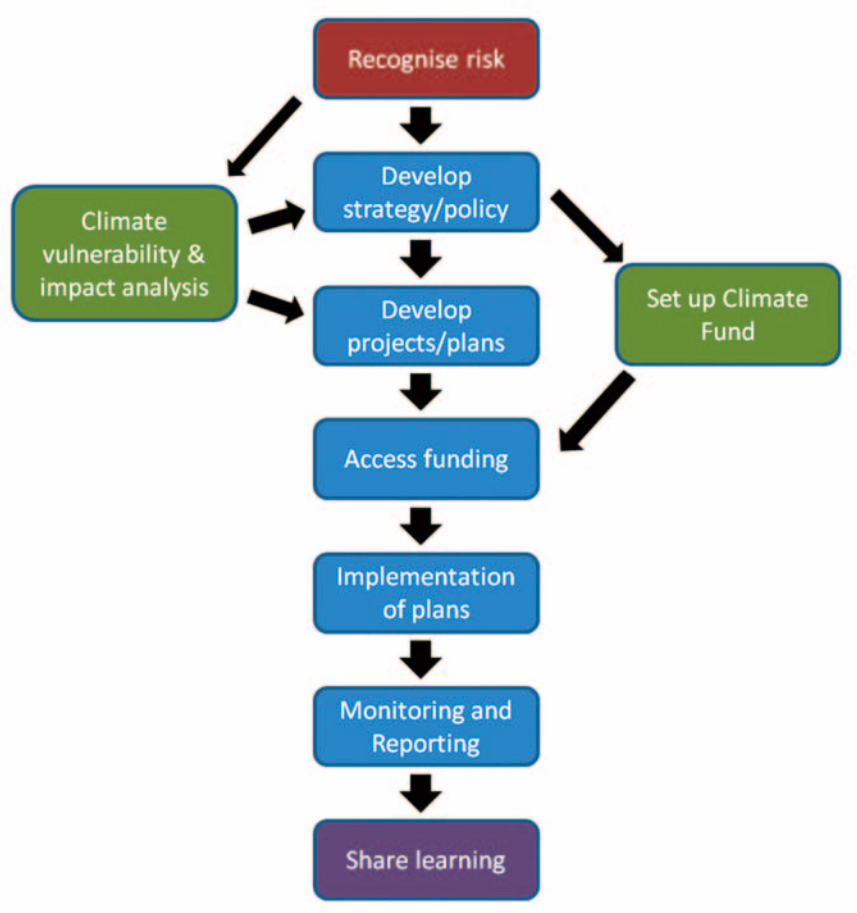


Figure 2.1 Schematic of the adaptation policy and implementation process.

Figure 2.2 shows that funding and implementation of NAPAs has only taken off in the last four years. Most developing countries today have a national strategy for adaptation but have not mainstreamed it into sectoral plans and have not been able to access much funding. It is not surprising, then, that in the area of climate change adaptation there is little organised South-South learning underway.

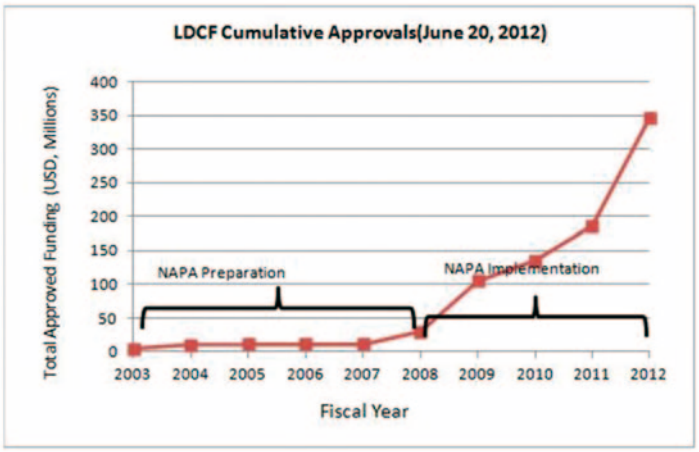


Figure 2.2 Cumulative funding approved by the UNFCCC's Least Developed Countries Fund (GEF, 2012).

2.2.Platforms for Expanding South-South Learning

Regional and multilateral organisations, civil society and the private sector all offer channels for growing South-South cooperation. The range of programmes shows that South-South learning is widely supported in the North and South, but these initiatives need to be better connected and streamlined to make the most of limited resources.

Although learning from national climate change policy initiatives is still at a very early stage, other forms of South-South learning and cooperation are thriving around the world. Information, technology, finance and political support for climate change resilience have begun flowing through a variety of channels – government, civil society and private sector.

This section describes a range of platforms for sharing knowledge and resources across the South. Formal South-South cooperation between national governments focuses on economic development and other areas of common interest and is primarily mediated through regional and global inter-governmental bodies, but can also include bilateral and multilateral agreements. Cooperation also takes place at sub-national levels such as between major cities. Currently, much of the learning on climate change adaptation is happening within civil society, in multilateral institutions, non-governmental organisations (NGOs) and academia. In the future, multinational businesses could also become a key arena for South-South learning as they begin to address climate change impacts.

The diversity of programmes shows that the concept of South-South learning is widely supported both in the North and the South. However, the lack of connections among these initiatives causes overlaps and gaps, and can burden the already over-stretched staff in developing countries. There are opportunities for greater streamlining and improved communication.

2.2.1.Regional Bodies

Africa, Asia, the Caribbean and Latin America each have a number of regional inter-governmental bodies that allow countries to cooperate on issues of common concern, typically trade and economic development, and often promote regional integration. These bodies are already beginning to facilitate South-South cooperation on climate-related issues shared by nearby countries. In Africa, for example, the East African Community (EAC) has developed a Climate Change Policy and Master Plan, the Southern African Development Community (SADC) has a Regional Climate Change Plan, and the Common Market for Eastern and Southern Africa (COMESA) is supporting research and technology related to climate change in its member states.

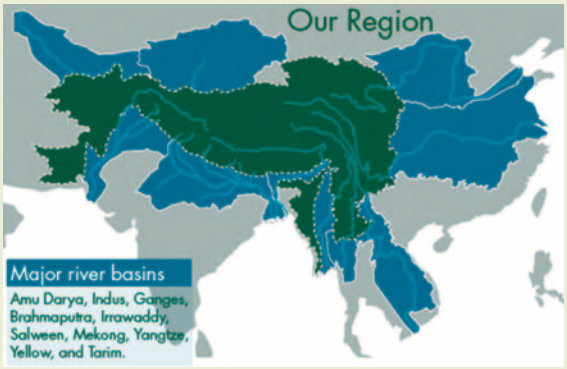
In addition, there are regional inter-governmental organisations that focus on a specific sector or aspect of development, such as water security or energy supply. A good example for climate change cooperation is the International Centre for Integrated Mountain Development (ICIMOD), a regional inter-governmental knowledge hub serving eight member countries in the Hindu Kush Himalayas (see Box 2.1). Other relevant bodies include the East African Power Pool (EAPP), which coordinates electricity resources in nine states, and the Nile Basin Initiative (NBI), dedicated to equitable and sustainable management and development of the shared water resources of the Nile Basin. At the African Ministerial Conference on the Environment (AMCEN), African ministers of the environment meet every two years to discuss the continent's environmental issues, including climate change.

The South Asian Association for Regional Cooperation (SAARC)[1] and the Association of South East Asian Nations (ASEAN)[2] are important facilitators of cooperation in Asia and the Caribbean Community (CARICOM)[3] on issues specific to small islands, which necessarily both developed and developing country islands.

1. SAARC member states are: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
2. ASEAN member states are: Brunei Darussalam, Cambodia, Indonesia, Lao DPR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.
3. CARICOM was established in 1973 and has 15 member states and 5 associate members.

Box 2.1. International Centre for Integrated Mountain Development (ICIMOD)

ICIMOD is a regional inter-governmental learning and knowledge sharing centre based in Kathmandu, Nepal serving the eight regional member countries of the Hindu Kush Himalayas – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan. It aims to assist mountain people to understand and adapt to changes, brought about by climate change and globalisation. It does this by supporting regional trans-boundary programmes through partnerships with regional partner institutions, facilitating exchanges, and strengthening networking among regional and global centres of excellence (ICIMOD, 2012).



2.2.2.Global Alliances and Organisations

Global cooperation between developing countries has been growing since the 1960s, and includes the Group of 77 (G77), established in 1964 within the UN; the Non Aligned Movement established in 1961; and the Inter-governmental Group of 24 (G-24) established in 1971. There are also Southern-led inter-governmental think tanks with global scope, notably the Geneva-based South Centre and the Islamabad-based Commission on Science and Technology for Sustainable Development in the South (COMSATS). Research and publications from these organisations analyse a wide range of topics, including climate change.

2.2.3.Climate Change Negotiations, Multilateral Institutions and Development Agencies

The most obvious forum for South-South learning and cooperation on climate change is the UN Framework Convention on Climate Change (UNFCCC), where international negotiations have been underway since 1991. Though countries are formally organised into five traditional regional groups, they often negotiate in other groupings that better reflect their interests. South-South alliances include the G77; the Alliance of Small Island States (AOSIS), united by climatic threats to their existence; the Least Developed Countries (LDCs), highly vulnerable and in need of adaptation support; and the Bolivarian Alliance for the Peoples of Our America (ALBA), associated with some of the most radical positions in the negotiations. Over recent years such Southern cooperation has helped to shift dynamics and priorities in the talks, resulting in the establishment of the Green Climate Fund, a Loss and Damage work programme, a technology transfer mechanism, the Cancun Adaptation Framework and the Durban Platform.

Outside the UNFCCC, other multilateral institutions and development agencies are actively supporting South-South cooperation. Some of the important players:

- UNDP's Special Unit for South-South Cooperation (SU/SSC), established in 1978, has a mandate to mainstream South-South cooperation across the UN system and the international development community. Engaging a wide range of partners across government, civil society and the private sector, it showcases and transfers forward-thinking Southern development solutions to other countries and enables developing countries to work together.
- The UN Environment Programme (UNEP) has a South-South Cooperation (SSC) Coordination Unit. UNEP sees SSC as 'an integral cross-cutting mechanism for the delivery of capacity building components of relevant project activities. South-South Cooperation is therefore a means to an end

as opposed to being an end in itself' (UNEP, 2012).

- The South-South Experience Exchange Facility, part of the World Bank system, was set up in 2008 to provide funding for sharing knowledge and expertise among developing countries. The Facility works with over 100 countries and nurtures an active community of practitioners at the website www.southsouth.info.
- The **South-South Cooperation Trust Fund (SSCTF)**, established in 2011 at the African Development Bank (AfDB) in collaboration with Brazil (AfDB, 2012), supports African countries in mobilising and taking advantage of development solutions and technical expertise available in the South. The Fund will also seek to promote South-South partnerships and knowledge sharing in Africa.
- The Japan International Cooperation Agency (JICA) has supported South-South Cooperation since 1975, and launched the **Asia-Africa Knowledge Co-Creation Programme (AAKCP)** in 2005. AAKCP creates a forum for Asian and African countries to share experience and knowledge and helps African countries to create individual developmental strategies best suited to their needs. In 2009, JICA set up the Japan-Southeast Asian Meeting for South-South Cooperation (J-SEAM), which focuses on the development of policies and planning in Southeast Asia as well as JICA's cooperation priorities for each country (JICA, 2012).

Box 2.2 UNDP's South-South Facility in China

Launched in 2006 by UNDP, the South-South Global Assets and Technology Exchange (SS-GATE) is a virtual and physical platform where entrepreneurs in developing countries can interact and obtain needed technology, assets and finance in a secure environment. SS-GATE facilitates the realization of actual business transactions through a market mechanism, offering both online and offline beginning-to-end supporting services. It operates through a global network of participating organizations and institutional members.

SS-GATE aims to be the first of its kind in providing a transparent, fair, transactional and sustainable development exchange platform that benefits all Southern countries and contributes to achieving the Millennium Development Goals. It is based in Shanghai, China, and operated in partnership with the Shanghai United Asset and Equity Exchange. (SS-GATE, 2012).

2.2.4.City-Led Initiatives

Cities are in a strong position to act on climate change adaptation and to engage and learn from one another. At the centre of economic development and less concerned about geopolitics, municipal governments feel the pressure from climate impacts and can get things done at a local level.

The C40 Climate Leadership Group is one city-to-city network that is encouraging South-South exchanges on climate change. The group comprises 58 megacities around the world – both North and South – that account for over 8% of the world's population and 18% of global GDP (Figure 2.3). Member cities are helped to connect with each other and share technical expertise on best practices for reducing greenhouse gas emissions and increasing energy efficiency (C40Cities, 2012). There is potential to expand or replicate this initiative to address adaptation.

Figure 2.3 Cities involved in C40 (C40Cities, 2012).

A related initiative at the regional scale is the Asian Cities Climate Change Resilience Network (ACCCRN), a network of ten cities in India, Indonesia, Thailand and Vietnam, working on climate change, vulnerable and poor communities, and urbanisation. Like C40, ACCCRN is facilitating South-South learning, but it is more focused on the poor and vulnerable, and incorporates adaptation as well as mitigation. Box 2.3 gives a brief overview of the work being done in Indonesia.

Box 2.3 ACCCRN initiatives in Indonesia

Bandar Lampung, on the southern tip of Sumatra, was selected as a city for ACCCRN based on its high risks from climate change, a supportive local government, and the presence of NGOs that can help implement resilience projects. ACCCRN is conducting two sector studies and two pilot projects to better understand the city's vulnerability to climate change and to devise and deliver a city resilience strategy.

ACCCRN chose to work with Semarang, on the northern coast of central Java, due to stakeholders' strong awareness of climate change issues and political will for city-level action. The ACCCRN local city team has conducted a series of stakeholder meetings investigating climate impacts in the area and analysing different sectors and vulnerabilities. A city resilience strategy has been prepared and the team is in the process of implementing its first intervention project (ACCCRN, 2012).

2.2.5. Civil Society

In civil society, large international NGOs as well as Southern-based indigenous and grassroots organisations have major roles to play in South-South learning. International NGOs have access to funding via their secretariats based in the North, but also work at multiple levels via regional offices and hundreds of country or programme offices in the South. These offices are making significant contributions to climate change adaptation, and they encourage South-South learning by employing local staff, who gain experience and create networks with other Southerners, and by partnering with local and indigenous organisations so that knowledge rooted in local contexts can spread.

In the South, many development-related NGOs and networks established in the past few decades are enriching the dialogue on adaptation. For example, the Third World Network (TWN), an international network of organisations and individuals involved in issues relating to the environment, development and North-South issues, has made a number of submissions to the UNFCCC.

Other Southern networks focus particularly on climate change. Climate Action Network (CAN) is a worldwide network of over 700 NGOs in over 90 countries that supports 'information exchange and the coordinated development of NGO strategy on international, regional, and national climate issues' (CAN, 2012). CAN also has regional networks throughout the North and South. In Africa, the leading NGO network on climate change is the Pan African Climate Justice Alliance (PACJA), a coalition of civil society organisations in 43 countries across Africa.

2.2.6. Academia

Universities and research organisations are natural facilitators of South-South learning on adaptation. They have a long-term focus, recording and building on the lessons from decades of work, and they readily cross national boundaries in search of knowledge. In the area of climate change, Southern universities are contributing to global understanding of climate science and impacts, as well as vulnerability assessments, adaptive capacity and community-based adaptation. Many Southern academics have first-hand knowledge of the issues they study and are closer to their research subjects than their Northern counterparts. They are often asked by their governments to support the national policy making process and may be involved in climate change negotiations.

Beyond the regular flow of South-South learning in academia, there are also deliberate initiatives to increase capacity in the South. These include exchanges, where academics or students spend time learning from their colleagues at an academic institution in another developing country, and scholarships in countries like India that support graduate students from less developed countries.

2.2.7. Southern Knowledge Hubs for Climate Adaptation

Although the majority of non-governmental work on South-South learning and climate change knowledge-sharing is being led by Northern organisations, there are a number of knowledge hubs operating online and in Southern countries. In Africa, some key organisations are Africa Adapt, based in Dakar, Senegal; the Africa Climate Policy Centre (ACPC) in Addis Ababa, Ethiopia (see Box 2.4); and the African Climate and Development Initiative (ACDI) in Cape Town, South Africa. Major organisations in Asia include the online Regional Climate Adaptation Knowledge Platform for Asia (www.climateadapt.asia); the Asia-Pacific Adaptation Network (APAN) in Bangkok, Thailand; and the International Centre for Climate Change and Development (ICCCAD) based in Dhaka, Bangladesh (see Box 2.5). In the Caribbean, the Caribbean Community Climate Change Centre (CCCCC), based in Kingston, Jamaica, is the focal point for climate change activities.

Box 2.4 Africa Climate Policy Centre (ACPC)

The Ethiopia-based ACPC is the knowledge-management and policy-facilitation arm of the Climate for Development (ClimDev) Africa Programme. Established by the Economic Commission for Africa (ECA) in 2010, it focuses on adaptation and mitigation in Africa and effective climate negotiations. The ACPC's specific objectives are to assist in:

- Strengthening the capacity of African countries to participate more effectively in international climate negotiations, and to benefit from carbon trading and adaptation/mitigation financing;
- Enhancing the capacity of African countries to develop coherent policy frameworks for coordinating adaptation and mitigation investment and climate information and knowledge;
- Improving the capacity of member States and Regional Economic Communities for mainstreaming climate related concerns in their development policies, frameworks and plans;
- Ensuring a solid foundation of applied climate science and assessments of climate vulnerability, risks and impacts; and
- Identifying sectoral priorities and responses for managing climate risks, and guiding the related investment process over the next several decades.

Box 2.5 International Centre for Climate Change and Development (ICCCAD)

The International Centre for Climate Change and Development, recently established in Dhaka, aims to develop a world-class institution that is closely related to local experience, knowledge and research in Bangladesh, one of the countries most affected by climate change. ICCCAD is intended to support growing capacity of Bangladesh stakeholders, while enabling people and organisations from outside to benefit from exposure to adaptation 'experiments' and increasing knowledge around the country.

ICCCAD is linked with Independent University of Bangladesh (IUB), the International Institute for Environment and Development (IIED) and the Bangladesh Centre for Advanced Studies. It has three main roles:

- Capacity building of professionals (global)
- Master's degree programme in Climate Change and Development with IUB
- Research programme hosting PhD students from around the world

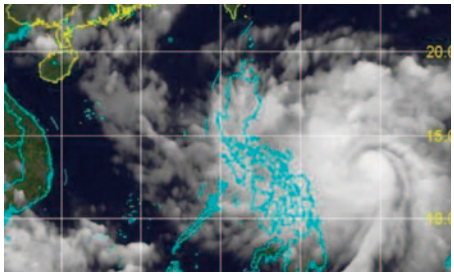
Its major objectives are:

- Long-term South-South network building
- Promotion of Southern Institutions
- Climate change capacity building

2.2.8. Private Sector

Although very little is being done on adaptation in the private sector, the structure of multinational companies ensures there is much South-South learning underway. With head offices in the North and the South, many multinationals have regional and national offices, and operations in more than one developing country. These offices and operations use the same tools and protocols, and share the company's vision and values. Southerners within the company are exposed to operations in other countries and have the opportunity to visit and learn from their experiences.

These experiences may include mitigation measures being developed and rolled out in the South. Multinational companies have recognised the threats and opportunities of climate change – notably in the 2010 Cancun Communiqué, a three-page statement from over 250 global companies. Particularly in high-carbon sectors like mining and oil and gas, many are implementing energy efficiency programmes and funding research into renewable energy and carbon capture and storage. With its breadth, depth and extensive resources, the private sector will be an important engine for in South-South learning on climate change.



2.3.China's Drive for South-South Learning

China has been involved for decades in South-South cooperation to address development challenges, and there are several new initiatives for climate change learning.

As noted earlier, China has recently declared strong support for South-South cooperation on climate change, announcing four areas of investment and pledging RMB 200 million. The country has a robust base for these efforts. China has been involved for over three decades in South-South cooperation on science and technology for socio-economic development, particularly through the China Science and Technology Exchange Center (CSTEC). A number of Chinese institutions are engaged in South-South cooperation to address development challenges. There are commitments to share knowledge as well as to learn from other countries:

- The Chinese Academy of Science and Technology for Development (CASTED) seeks to share cutting-edge research and technology with developing countries. In the last 20 years Chinese ministries have partnered with research organisations in Africa and Asia in numerous projects to facilitate technology transfer for renewable energy, agriculture, forestry and housing.

- The China Council for International Cooperation on Environment and Development (CCICED) is a high-level, non-profit international advisory body established in 1992 upon the approval of

the Chinese Government. Supported by developed countries, international organisations, NGOs and transnational companies, CCICED environment and development issues in China and invites international experts to share their experience and contribute to policy recommendations (CCICED, 2012).

- The third summit of the Forum on China-Africa Cooperation (FOCAC), held in Beijing in July 2012, produced a statement in support of strategic partnership between China and Africa, as well as an action plan committing the parties to further cooperation. The statement comments on climate change and Rio+20 commitments, among other key issues for this South-South alliance.

In the last three years, China has begun several new cooperation initiatives that specifically deal with climate change:

- In December 2010, the Chinese Ministry of Science and Technology (MOST) released the first editions of the 'Applicable Technology Manual for South-South Cooperation on Science and Technology to Address Climate Change' and the 'Applicable Technology Manual: Water Resource and Environmental Protection' at the UNFCCC negotiations in Cancun. The manuals were compiled together with UNDP, UNEP, UNESCO, the South Centre and TWN, and include a range of mature technologies in key areas including water resources, agriculture and forestry, health, ecological preservation and environmental protection, disaster prevention and mitigation, energy conservation, new energy, and renewable energy.

- In October 2011, MOST and its partners from the technology manual project organised a workshop in Beijing on South-South Cooperation on Science and Technology to Address Climate Change. Delegates from developing countries, international organisations and the UNFCCC Secretariat discussed technology needs in developing countries, best practices and potential mechanisms for cooperation. The workshop led to the launch of an open, non-profit Network/ Platform for International Science and Technology Cooperation (www.actc.org.cn), administered by CSTEC in China. The platform provides information on joint R&D (potential partners and technology), technology transfer (demand and supply), capacity building, and consulting and evaluation.

- In 2012, China established the South-South Cooperation Programme on Climate Change, an NDRC initiative developed with the UNEP to assist in capacity building and technology transfer for climate change action in the South. China will provide essential technical and financial assistance to LDCs and Small Island Developing States (SIDS) while UNEP's South-South Cooperation Coordination Unit will provide technical support for implementation.

- As part of the South-South Cooperation Programme on Climate Change, China has applied for USD 23 million in Global Environment Facility (GEF) funds for a 2-year project on 'Enhancing capacity and knowledge and technology support to build climate resilience of vulnerable developing countries'. The concept note has been approved and the final proposal is due at the end of November 2012. This South-South learning project will support adaptation via the 'ecosystem management' approach in three pilot countries – Nepal, Mauritania and Seychelles.

3. Scoping Summary of Priority Countries

The CASSALD project included scoping studies of Angola, Ethiopia, Kenya, South Africa, Rwanda, Bangladesh, Nepal, Indonesia, Grenada and Jamaica – all promising partners for cooperation with China on climate change adaptation.

This chapter summarises the ten in-depth country scoping reports, which are available on request from INTASAVE and ACCC. These ten countries vary in terms of their development and resilience to climate change, as measured by key indicators such as GDP, climate vulnerability and readiness, and adaptation funding (Table 3.1). But all have good potential to cooperate with China on climate change adaptation.

Table 3.1 Development indicators in 2011, climate change index and Adaptation Fund disbursements to date

Country	GDP per capita (PPP in USD)	Population (millions)	Human Development Index (HDI)	Gini coefficient (0=equal, 1=unequal)	GAIN index (climate change vulnerability and readiness)*	Adaptation Fund disbursements (USD million)
Angola	5,930	20.6	0.486 (low)	0.59	42.7	0.2
Bangladesh	1,788	152.5	0.500 (low)	0.31	49.4	3.5
Ethiopia	1,116	84.3	0.363 (low)	0.30	40.4	5.38
Grenada	11,180	0.1	0.748 (high)	-	-	0.27
Indonesia	4,668	237.6	0.617 (med.)	0.37	62.6	0
Jamaica	8,065	2.7	0.727 (high)	0.46	63.5	6.03
Kenya	1,718	38.6	0.509 (low)	0.48	48.1	6.5
Nepal	1,256	26.6	0.458 (low)	0.47	48.4	12.11
Rwanda	1,251	10.7	0.429 (low)	0.53	49.4	6.49
South Africa	11,035	50.6	0.619 (med.)	0.67	61.2	3.54

Note: HDI is from the UN HDI Report 2011, GDP and Gini coefficient from World Bank data, population from Wikipedia (multiple sources), Adaptation Fund disbursements from climatefundingsources.com. Countries are listed alphabetically and are not ranked.

As described in the country profiles below, all ten countries are already engaged with China, though only a few on projects related to adaptation. They all support cooperation in principle and all lack the capacity and funds to fully address climate change. Each country has outlined its priorities and needs in a national strategy or policy, and these should be used by China and development agencies for prioritising programmes.

Tables 3.3–3.6 compare the climate threats and responses in each country. Needs vary in urgency and volume due to differing socio-economic conditions, but common sectors can be targeted. 'National Focal Points' for climate change policy – a designation for the domestic government body tasked with coordinating international commitments under the UNFCCC –are the natural entry point for engagement.

Table 3.3 Direct climate impacts

Country	Temperature rise	Sea level rise	Flooding	Drought	Cyclone/ Hurricane	Rainfall change
Angola	√	√	√	√		√
Bangladesh	√	√	√	√	√	√
Ethiopia	√		√	√		√
Grenada	√	√	√	√	√	√
Indonesia	√	√	√	√	√	√
Jamaica	√	√	√	√	√	√
Kenya	√	√	√	√		√
Nepal	√		√	√		√
Rwanda	√		√	√		√
South Africa	√	√	√	√		√

Table 3.4 Priority sectors

Country	Water	Health	Agriculture	Fisheries/ Coasts	Forestry	Infrastru cture	Bio- diversity	Tourism	Disaster Manage ment
Angola	√	√	√	√		√	√		√
Bangladesh	√	√	√	√		√			√
Ethiopia*	√	√	√						
Grenada	√	√	√	√		√		√	√
Indonesia	√	√	√	√	√	√	√		
Jamaica	√	√	√	√		√		√	√
Kenya*	√	√	√	√			√	√	
Nepal	√	√	√					√	√
Rwanda	√	√	√		√	√	√		√
South Africa	√	√	√	√		√	√	√	

*New national documents may change the priorities.

Table 3.5 National climate change documentation and year submitted to UNFCCC or published

Country	UNFCCC submissions				National documents	
	NAPA	INC	SNC	TNA	Strategy	Action Plan
Angola	2011	2012	-	-	-	-
Bangladesh	2005, 2009	2002	-	-	BCCSAP, 2009	
Ethiopia	2008	2001	-	2007	In prep.	EPACC
Grenada	N/A	2000	In prep.	-	NCCP, 2007	SPCR, 2011
Indonesia	N/A	1999	2010	2001, 2010	ICCRS	RAN-PI, 2007
Jamaica	N/A	2000	2011	2004	In prep.	SPCR, 2011
Kenya	N/A	2002	-	2005	NCCRS, 2010	KCCAP, in prep.
Nepal	2010	2004	In prep.	In prep.	CCP, 2011	SPCR, 2012
Rwanda	2007	2005	2012	In prep.	GGCR, 2011	-
South Africa	N/A	2003	2011	2007	LTMS, 2008	NCCWP, 2011

Table 3.6 Institutional arrangements

Country	Lead Ministry	Climate Fund/s	Development Strategy	Regional Membership
Angola	Ministry of Environment	–	Long-term Development Strategy 2025	SADC, COMESA, ECCAS
Bangladesh	Ministry of Environment and Forests	Climate Change Resilience Fund; Multi Donor Trust Fund	Vision 2021	SAARC, BIMSTEC
Ethiopia	Environmental Protection Authority	Strategic Climate Change Facility	Growth and Transformation Plan	COMESA, IGAD
Grenada	Ministry of Environment, Foreign Trade and Export Development	–	National Strategic Development Strategy	CARICOM, OECS
Indonesia	Ministry of National Development Planning	Climate Change Trust Fund	RPJPN (National Long-Term Development Planning) 2025	ASEAN
Jamaica	Ministry of Water, Environment and Climate Change	Strategic Climate Fund	Vision 2030: National Development Plan	CARICOM
Kenya	Ministry of Environment and Mineral Resources	–	Vision 2030	EAC, COMESA, IGAD
Nepal	Ministry of Environment, Science and Technology	–	Sustainable Development Agenda for Nepal	SAARC, BIMSTEC
Rwanda	Ministry of Natural Resources	Climate Change and Environment Fund	Vision 2020	EAC, COMESA
South Africa	Ministry of Water and Environmental Affairs	–	National Development Plan 2030	SADC, COMESA

Based on documentation submitted to national and international bodies (Table 3.5), Bangladesh and Rwanda have been leaders in adaptation planning, while Grenada and South Africa have led the way with national strategies. These ten countries can also contribute to South-South cooperation via their UNFCCC alliances.

3.1. Africa

Five African countries were assessed: Angola, Ethiopia, Kenya, Rwanda and South Africa.

3.1.1. Angola

As Angola rebuilds after a 27-year civil war, climate change risks are becoming a factor in planning and infrastructure development. But there is still no specific strategy for adaptation, and this will require increased capacity and information. Close economic ties between China and Angola set the stage for cooperation.

Source: Ezilon maps, 2012.

Angola, located on the south-west coast of sub-Saharan Africa, is the sixth largest country on the continent (Figure 3.1). After gaining independence from Portugal in 1975, Angola experienced a civil war that lasted 27 years, ending in 2002. The country is undergoing a reconstruction and rebuilding process. The Angolan economy is one of the fastest growing in the world, mainly due to the oil sector, which represents 55% of the GDP and 95% of all exports. The country still has high levels of poverty and inequality and a low human development index (HDI), and is only starting to address climate change.

National Development and Adaptation Strategies

Due to the damage from the civil war, one of Angola's key development strategies is infrastructure development. In 2003, the Inter-ministerial Commission established by Angola's Council of Ministers developed the Poverty Reduction Strategy (PRS) and the Long-term Development Strategy 2025. These strategies lay out sectoral programmes for post-conflict Angola and seek to consolidate peace and promote national economic stabilisation, structural reform and poverty reduction. The PRS incorporates the Millennium Development Goals (MDGs) and the New Partnership for Africa's Development (NEPAD) and Southern African Development Community (SADC) goals (Government of Angola, 2003). The Angolan Long-term Development Strategy 2025 has five dimensions – Human Development, Economic Development, Socio-Cultural Development, Scientific and Technological Development and Political and Institutional Development – with the guiding principle of sustainable use of resources.

In late 2011, Angola submitted its Initial National Communication (INC) and National Adaptation Programme of Action (NAPA) to the UNFCCC. Angola seeks to strengthen its capacity to address climate change variability in a way that does not interfere with development goals. Climate change strategies include:

- establishing a national greenhouse gas inventory
- creating conditions for the implementation of appropriate measures to facilitate adaptation to adverse impacts of climate change
- mitigating greenhouse gas emissions consistent with the sustainable development objectives of Angola
- initiating the transfer of environmentally sound technologies
- systematic observation and integration of climate change-related issues into development plans and programmes
- evaluating Angola's capacity to deal with external climate events.

Adaptation is a relatively new concept in Angola, hence specific adaptation strategies still need to be developed. However, the government is increasingly realising the importance of incorporating climate change risk into planning and infrastructure development.

Key Stakeholders

The Ministry of Environment is responsible for climate change policy development and for sourcing and harnessing environmentally sound technologies. The Angolan government welcomes support and participation from the private sector, which is significantly involved in climate change activities such as drafting policies, developing alternative energy sources and green technology. Civil society groups are active on climate change issues and are involved in environmental education and public awareness programmes run by the government and other agencies. Academic institutions contributed towards the development of the INC and play a critical role in supplying knowledge to the government and various organisations concerning climate change issues. Some development partners supported the INC process through funding and investment in sustainability projects. Development partners have been involved in integrating climate change risks into planning as well as incorporating the environment and climate change into all development programmes.

Climate Impacts

There is limited understanding of climate change and variability in Angola, and climate models being developed are at an early stage. Climate variability in Angola is closely tied to conditions in the Atlantic Ocean, such as changes in the Benguela Current, the movements of the Inter-tropical Convergence Zone and the atmospheric and sea temperature conditions in the South Atlantic. The INC identified the following major climate change impacts: soil erosion due to increased rainfall; changes to coastal fishing; changes to river and lake fishing; sea level rise affecting maritime coast currents and coastal erosion; damage to or relocation of industry, oil installations and ports; and human settlements requiring cooling and protection from flooding and erosion.

Priority Sectors and Needs

During the NAPA consultation, vulnerability studies in six provinces identified biodiversity loss, water resources, health, infrastructure, fisheries, and agriculture and food security as priority issues. Specific priorities are to improve and expand the hydrological and meteorological observation networks, to research climate change and human vulnerability, to build institutional capacity and to raise awareness about adaptation. The country also needs to investigate why fishing scarcities are worsening, research changes to tropical endemic diseases and develop projects or programmes to combat preventable water-based endemic diseases.

Angola has low levels of existing adaptation planning and limited human and technological capacity. Little is known about the vulnerability of different sectors, and the lack of climate information hinders the development of early warning systems and disaster risk management. In terms of development, the country's first priority has been basic infrastructure such as access roads, energy production, telecommunications, new human settlements and social equipment for general, technical, superior and healthcare education. Angolan officials recognise the need to incorporate climate change issues into the country's development policies.

Existing Chinese Links

Angola is China's biggest trading partner in Africa, and China has played a key role in Angola's post-war construction and infrastructure development. Since 2004, Angola has taken out USD 8-12 billion in loans from China to rebuild its infrastructure and revive its agricultural sector. The Angolan government is paying off these loans with oil (Horta, 2011) and Angola is China's largest source of oil in Africa (Zhao, 2011). China has helped Angola transform in eight years from a war-torn country to one of the world's most rapidly growing economies. However, the agreement between Angola and China specifies that 70% of tenders for public works must go to Chinese firms, which have spread in Angola over the last decade. This has caused some tension in local communities.

The governments of China and Angola have a stable relationship that has become more powerful and diverse over the years. Both governments conceive development as modernisation and believe that Angola can learn from (and potentially seek to replicate) China's development process. About two years ago the Angolan Minister of Environment signed a memorandum of understanding (MOU) with China on climate change adaptation. There is therefore a solid platform on which China and Angola can continue to work together.

South-South Cooperation and Learning

Angola is a member of three of Africa's Regional Economic Communities – SADC, COMESA and ECCAS – and has participated in the SADC Regional Climate Change Programme and information systems. Angola has also made efforts to cooperate with AMCEN and the African Union on strategy implementation. There bilateral exchanges between Angola and Brazil through the Portuguese Speaking Expert Network on Climate Change (RELAC)[1] , and Angola also works with other Portuguese-speaking countries such as Portugal and Mozambique, although this is often through the UNDP.

1. Portuguese speaking countries are: Portugal, Brazil, Angola, Cape Verde, Guinea-Bissau, Mozambique, São Tomé and Príncipe, and East Timor.

One of Angola's key challenges with regards to South-South learning is the language barrier between Angola and other non-Portuguese speaking countries. Nonetheless, the country is involved in several trans-boundary initiatives in Africa:

- The Mayombe Forest Transboundary Initiative seeks to protect and conserve the Mayombe Forest, the second largest in the world. The forest is a biodiversity hotspot covering three protected areas: the Luki Reserve in DRC, the Dimonika Reserve in Congo and Cacongo in Angola (CBFP, 2012).
- In the Kaza Project, Angola, Namibia, Botswana and South Africa are jointly implementing wetlands conservation.
- Angola is collaborating with Zambia, Mozambique, Malawi and Zimbabwe to manage the Zambezi River Basin and particularly to incorporate adaptation strategies.
- Angola, Namibia and Botswana are collaborating in the Okavango and Cunene River Basins to create a trans-frontier park and initiating conservation strategies in the area.
- Angola, Namibia and Zambia have developed a Regional Flood Management Plan.

Recommendations

As Angola is new to adaptation planning, it needs to build capacity in this area. Angola is eager to learn about how other developing countries are dealing with climate change adaptation. A learning exchange with countries such as South Africa and Bangladesh, whose strategies, policies and plans are well developed, would be very beneficial. If possible, learning exchanges with other Portuguese-speaking countries should be facilitated.

To develop effective strategies, however, Angola also needs better understanding of its vulnerabilities across sectors and locations. This requires both climate modelling and community-based assessments. Angola could receive help from South Africa on the former and Bangladesh or Indonesia on the latter. Angola lacks robust early warning systems and disaster risk management, and China could support Angola with the necessary technology to address this. China could also support Angola in building up local research and development. Incorporating climate resilience into infrastructure development undertaken by China would provide Angola with a strong base in the long term.

3.1.2. Ethiopia

A crossroads of South-South activity, Ethiopia has taken large steps towards mainstreaming climate change issues into development policy. Its cutting-edge work on risk management offers lessons for other countries, and detailed adaptation strategies due out in 2013 will provide a roadmap for cooperation.

Source: Ezilon maps, 2012.

Ethiopia, located in the Horn of Africa (Figure 3.2), is the most populous landlocked country in the world with over 84 million people. Its capital, Addis Ababa, is known as 'the political capital of Africa' and is the home of the African Union. Despite having a low HDI, it is one of the fastest growing economies globally and the biggest economy by GDP in East Africa and Central Africa. This is partly due to strong leadership from the late Prime Minister Meles Zenawi, who put climate change high on his agenda.

National Development and Adaptation Strategies

Ethiopia's Growth and Transformation Plan (GTP) is a medium-term strategic framework for the five-year period 2010/11-2014/15, which follows on from the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), the First Five Year Phase to attain the goals and targets set in the MDGs. The National Environmental Policy of 1994 and 1997, which includes a sectoral policy on Climate Change and Air Pollution, first introduced climate change into Ethiopian policies. However, more recent frameworks – Ethiopia's Programme of Adaptation to Climate Change (EPACC) and the Climate Resilient Green Economy (CRGE) Strategy – have been the main steps towards mainstreaming climate change adaptation and mitigation into both federal and state policy (Government of Ethiopia, 2011). The country is involved in the UNFCCC process and submitted its Initial National Communication in 2001 (a second is in preparation), a NAPA in 2008, a Technical Needs Assessment in 2007 and Nationally Appropriate Mitigation Actions (NAMA) in 2009.

The CRGE Strategy aims to foster economic development and growth, to ensure abatement and avoidance of future emissions, and to improve resilience to climate change. The strategy is half-complete; a Green Economy section dealing with mitigation has been published, and a Climate Resilience section, including sectoral, regional and urban adaptation strategies, is expected to be released in March 2013, after which implementation plans will be drawn up.

Key Stakeholders

Leadership on climate policies came from the recently deceased Prime Minister Meles Zenawi, but the new prime minister, Hallemariam Desalegn, has indicated he will continue to follow existing policies. The prime minister's office has overall responsibility for the policies, with the Environmental Protection Agency taking the lead in EPACC and CRGE formulation and implementation. Various other ministries assume appropriate responsibilities for their sectors. The federal system of government is replicated at the state level, and each state is preparing its own plans under EPACC and CRGE.

Numerous other organisations, including various civil society organisations (CSOs) and development partners, are working on adaptation in Ethiopia. The government is encouraging private sector participation through a gold/silver/bronze standard awards scheme. Academic involvement in the universities appears to be somewhat limited at present, but growing, with most of the science input to date provided by government agencies.

Climate Impacts

Limited data and limited research both restrict the level of detail available on Ethiopia's past and current climate and climate change impacts, and there is uncertainty in projections from climate models. The most significant impacts are likely to be changes in rainfall patterns which affect agricultural yields and food security; more severe droughts and floods; and threats to energy and water security, particularly due to Ethiopia's location within the Nile Basin.

Priority Sectors and Needs

The CRGE will determine the government's priorities in the medium term. Mitigation has taken the lead so far in CRGE planning, but the importance of adaptation in development is fully recognised. The government has selected priorities appropriate to a developing country substantially dependent upon subsistence agriculture, namely water, agriculture and health. Energy is also a critical issue, with many of the population reliant on wood and dung, as is degradation of the environment.

Gap analyses reveal substantial needs in many areas, including capacity building at all levels – public education, service provision, information collection and circulation, equipment, etc. Resources at state level tend to be weaker than those at federal level. Nevertheless, state officials recognise the issue of climate change adaptation and have drawn up initial lists of best practices. It appears that constraints include lack of coordination and at times policy conflicts between institutions, a general lack of awareness of issues across all levels, and limited capacity for implementation and up-scaling.

Existing Links with China

Cooperation between Ethiopia and China is long-standing, dating back to the 1950s, but was strengthened in 2000 with the establishment of the Forum on China-Africa Cooperation (FOCAC). China has supported infrastructure projects and the formation of a Special Economic Zone in Ethiopia. On 17 April 2012, Ethiopia, China and the UN Food and Agriculture Organisation (FAO, under the Special Programme for Food Security) signed a South-South Cooperation Agreement covering technical assistance.

South-South Cooperation and Learning

As the headquarters of the African Union and a number of UN bodies, Ethiopia regularly plays host to South-South conferences and meetings. It therefore has the opportunity to share its experiences with other countries more often than most. It is a member of two African Regional Economic Communities – COMESA and IGAD – and is part of the Eastern African Power Pool and the Nile Basin Initiative, as well as a member of the G24. Five Ethiopian organisations are currently involved in the FK Norway South-South Exchange

Programme. Cooperation agreements have been signed with Brazil, including agreements on capacity building. As far as has been determined there has been limited South-South learning activity regarding adaptation in Ethiopia so far.

Opportunities

There are extensive opportunities to cooperate with Ethiopia on adaptation efforts at both the federal and state levels. The forthcoming strategies and implementation plans for EPACC and the CRGE will clarify how partners can approach these opportunities in a structured way rather than ad hoc. Development partners already cooperating in a number of adaptation activities, including preparation of the CRGE Strategy, can be expected to continue contributing. In the course of preparing reports to the UNFCCC, the EPACC and the CRGE, Ethiopia has created several lists of priorities and needs (see the Ethiopia Country Report), and these indicate what might be the government's preferred areas for cooperation. Opportunities extend beyond these lists, however, and include activities to address the gaps summarised above.

Recommendations

Initiatives for Ethiopian cooperation with China should take into account existing bilateral activities and the developing structures of EPACC and the CRGE Strategy, although this need not exclude efforts to address gaps that lie outside the scope of Ethiopia's current policy initiatives. Differences between the two countries in climate, health issues, agricultural practices and social aspects will need to be respected.

Until the CRGE is completed, it is impossible to define priorities for support for Ethiopia. There clearly are opportunities in the areas of climate science and vulnerability assessments, agriculture and health. Capacity building, management of adaptation projects and public education will also be needed.

China may also be able to learn from Ethiopia. The country's work on risk management (Box 3.1) provides an example of best practice and has been shared in regional fora in Africa.

Box 3.1 Risk Management in Ethiopia

Ethiopia has a number of innovation initiatives underway with huge potential for replication in other countries vulnerable to climate change. Risk management has four components: risk reduction, risk transfer, risk taking and risk reserves. They are addressed in different ways in the following programmes:

Horn of Africa Risk Transfer for Adaptation (HARITA), led by Oxfam, consists of risk reduction, risk transfer, and prudent risk taking. The project has broken new ground in the field of climate change resilience and microinsurance by addressing the needs of smallholder producers through an unusual mix of risk reduction, drought insurance and credit.

The Productive Safety Net Program (PSNP), established in 2004 by the Government of Ethiopia, provides guaranteed multi-year assistance to address chronic food insecurity and is currently assisting 7.8 million people in 319 districts in Ethiopia.

Livelihoods, Early Assessment and Protection (LEAP) is a government-owned food security early warning tool that converts satellite and ground-based agrometeorological data into crop or rangeland production estimates and ultimately into livelihood protection requirements. It quantifies the financial resources needed to scale up PSNP in case of a major drought, and provides a transparent and verifiable way to trigger contingent funds to enable early response.

3.1.3. Kenya

Source: Ezilon maps, 2012.

Kenya has a stronger economy than other countries in the region, but its ambitious development strategy did not start to consider climate change until recently. A forthcoming action plan will clarify adaptation needs and opportunities for South-South learning.

Kenya, located in East Africa, straddles the equator and borders the Indian Ocean (Figure 3.3). It has been the strongest economy in the region, dominated by services but known for exports of tea and coffee. Its capital, Nairobi, is home to countless multinational organisations, NGOs and development agencies. With the second highest mountain in Africa, Mount Kenya, and its vast savannah, it is a top tourist destination in Africa. Its population of 48 million has a low HDI and is vulnerable to frequent droughts and food insecurity.

National Development and Adaptation Strategies

Vision 2030 is a multi-sectoral programme to lift Kenya to middle-income status by 2030. It has three pillars, anchored on macroeconomic stability, continuity in governance reforms, and enhanced equity and wealth creation opportunities for the poor. The Economic Pillar aims at a 10% GDP growth rate by 2012, and within the Medium Term Plan for 2008-2012, six priority sectors were targeted: tourism, agriculture, wholesale and retail trade, manufacturing, information technology-enabled services and financial services. The Social Pillar targets a cross-section of human and social welfare projects and programmes, including education, health, environment and housing and urbanisation. The Political Pillar envisions a democratic system that is issue based, people centred, results oriented and accountable to the public (Government of Kenya, 2011).

However, climate change was not considered in creating Vision 2030, even though projected changes could undermine multiple aspects of the plan. Indeed, although the country has environmental policy frameworks such as the National Environment Action Plan of 1994 and related legislation, Kenyan policies have hardly noted the obstacles that climate variability and change pose for social and economic development.

The first stage in recognising and correcting this omission was the preparation of the National Climate Change Response Strategy (NCCRS) in 2010, which covers many aspects including adaptation and mitigation. To translate the NCCRS into practice, the Kenya Climate Change Action Plan (KCCAP) is currently in preparation. The project involves nine subcomponents ranging from management through policy to mitigation and adaptation; adaptation itself lies under Subcomponent 3. One anticipated outcome of the KCCAP drafting is the mainstreaming of climate change into all pertinent government policies in Kenya. Full details of the KKCAP are unavailable at the time of this writing; especially those dealing with adaptation under Subcomponent 3, but most Subcomponents are expected to report imminently.

Kenya submitted its Initial National Communication to the UNFCCC in 2002 and a Technical Needs Assessment in 2005. A National Adaptation Plan (NAP) and NAMA are in preparation.

Key Stakeholders

The main stakeholders within the government are the Office of the Prime Minister and the Ministry of Environment and Mineral Resources (MEMR); one agency under MEMR particularly relevant to the NCCRS and KCCAP is the National Environment Management Authority, with a broad range of responsibilities in environmental matters. A number

of other ministries retain responsibilities for their own sectors. Currently it is not possible to describe the key government structures responsible for implementing KCCAP in greater detail, as these are under discussion and it is likely that any published proposed governance structures will be replaced by a new structure yet to be determined.

Many other organisations, including various CSOs and development partners, are working on adaptation in the country. Indeed, adaptation partners have played important roles in supporting the creation of NCCRS and KCCAP. A broad range of research institutes work under the government in areas relevant to adaptation, together with a small but growing number of university departments (and universities per se) working in areas of climate and/or adaptation science.

Climate Impacts

Trend analysis shows that minimum and maximum temperatures have increased and slight decreases in rainfall have occurred, mainly through the 'Long Rains' in March to May, offset to an extent by an increase in the amount and length of the 'Short Rains' in October to December. There is also evidence of a weak decreasing trend in heavy rainfall events, apart from along the coastal belt and over northern areas, where these events have become more intense. Climate projections indicate that temperature will increase and that rainfall is likely to increase, though there is much uncertainty. Heavy rainfall events, floods and droughts are likely to increase in frequency and severity, though rainfall seasons are unlikely to change significantly. Sea level rise will impact Kenya's coast, the spread of vector-borne diseases may impact health, and higher temperatures may reduce tea and coffee yields.

Priority Sectors and Needs

Both the government and development partners have seen mitigation as a priority, but adaptation is getting increasing attention. Much of Kenyan society still relies upon subsistence agriculture, and thus on climate, so it is important to adopt appropriate adaptation policies as Vision 2030 is implemented. Thus priority sectors include water, agriculture and health, and also energy, as many Kenyans depend on wood and biomass for burning. In addition, tourism contributes significantly to the Kenyan economy, and therefore priorities must also include infrastructure the environment itself, both on land and at sea, notwithstanding the ecological services it provides.

Despite Kenya's relatively strong economy in comparison to other countries in the region, there are still numerous gaps in Kenyan resources, with needs including capacity building at all levels, for example in public education, service provision, information collection and circulation, and equipment. Under Vision 2030, the NCCRS and KCCAP, these needs are starting to be addressed. There appears to be some lack of coordination between institutes as well as limited capacity in implementation and up-scaling.

Existing Links with China

China's ties with Kenya date back to 1963, when China became the fourth country to open an embassy in Nairobi following Kenyan independence. There has been extensive bilateral activity between Kenya and China, including in the military, mining and infrastructure development. In 2010 the Chinese government established a loan facility to assist in the development of renewable energy in Kenya – an initial bilateral activity pertinent to climate change adaptation and mitigation.

South-South Cooperation and Learning

Kenya is a member of three African Regional Economic Communities – EAC, COMESA and IGAD – and is part of the Eastern African Power Pool and the Nile Basin Initiative. It contributed to the EAC Climate Change Policy and Master Plan. Under the auspices of the World Bank Institute, Kenya is engaged in seven South-South learning initiatives, including gender mainstreaming with India; business skills development with Sub-Saharan African countries and Singapore; and skills in information and communications technology with India, Korea and the Philippines. The remaining four projects are all with China: 'Improving infrastructure and special economic zones in Africa', 'Africa learns best practices on special economic zones', 'Improving water and soil conservation in Africa to enhance sustainable agriculture and poverty reduction efforts', and 'Increasing capacity to generate certified emissions reduction credits through registering projects for Kyoto Protocol's Clean Development Mechanism'. Two of these projects are related to climate change and one to adaptation.

Kenya is one of 15 African countries involved in the 'Total Quality Management for better hospital services' programme within the Asia-Africa Knowledge Co-Creation Programme (AAKCP) hosted by JICA. It is also involved in competence sharing amongst NGO partners in South and East Africa, agriculture practice learning with South Africa, educational reforms with Tanzania and water management with India.

Opportunities

Opportunities for cooperation with Kenya are extensive, but cannot be fully assessed until the adaptation programme under KCCAP has been defined. It can be expected that development partners already cooperating with Kenya in a number of adaptation activities, including preparation of the NCCRS and KCCAP, will continue to contribute.

Recommendations

For Kenyan learning with China, proposals should give consideration to existing bilateral activities and particularly to the developing structure of EPACC. Although opportunities for activities will exist beyond KCAPP, this in-preparation Action Plan is likely to define the government's highest priorities for cooperation. Initiatives should respect differences between the two countries in terms of climate, health issues, agricultural practices and social aspects.

The main opportunities appear to lie in the areas of climate science and vulnerability assessments, with less potential for cooperation in agriculture and health because of limited synergies between the situations in the two countries. There are additional opportunities as identified in the gap analyses, including capacity building, management of adaptation projects and public education. Activities in these latter areas may also allow China to learn from Kenya.

3.1.4. Rwanda

Source: Ezilon maps, 2012.

Climate-related events such as flooding and landslides are already taking their toll in densely populated Rwanda, but the country needs better data to project future impacts and prepare for adaptation. China could offer technical assistance in areas such as weather monitoring, risk analysis, agriculture and water management.

Rwanda is a small, hilly, landlocked country in equatorial Africa (Figure 3.4.). It has the largest population density in Africa with 11 million people, 10% of whom live in the capital city, Kigali. It has seen rapid economic growth in the past 10 years, averaging 8% GDP growth per year. Since 2005, one million people have been raised out of poverty (World Bank, 2012b). The progress is largely due to good governance and strong leadership from President Paul Kagame. Rwanda is largely dependent on exports of minerals, coffee and tea but has a strong culture of tertiary education which supports its growing services.

National Development and Adaptation Strategies

Rwanda's priorities are economic growth and poverty alleviation. The policy paper 'Vision 2020' sets out national priorities, long-term development goals and development strategy (Government of Rwanda, 2000), proposing a transformation from a subsistence agriculture economy to a knowledge-based middle-income economy with a per capita nominal GDP of USD 900, positioned to become a regional services hub. To realise Vision 2020 the Government of Rwanda aims to develop a strong private sector which will drive growth and economic diversification. National priorities will be achieved through good governance, human resource development, growth of the private sector, infrastructure development, productive agriculture and regional and international integration. The Economic Development and Poverty Reduction Strategy (EDPRS), covering the period from 2008 to 2012, sets out the medium-term strategy for reaching Vision 2020 and the MDGs. EDPRS II, for 2013 to 2017, is currently being produced.

There is strong political will behind action on climate change in Rwanda. Under the UNFCCC process, the country has submitted two national communications, in 2005 and 2012, and a National Programme of Action (NAPA) in 2007. In recognition of climate change threats to the country, Rwanda has also produced a National Strategy for Climate Change and Low-Carbon Development, or Green Growth and Climate Resilience (GGCR). As the title suggests, this strategy considers mitigation actions in addition to adaptation, despite the country's extremely low per capita emissions. Recommendations from the strategy are currently being mainstreamed into EDPRS II. A number of adaptation projects in line with the NAPA and national strategy have been and are being implemented. Rwanda is also in the process of establishing a

National Fund for Climate and the Environment (FONERWA); the design phase was completed in July 2012.

Key Stakeholders

The Ministry of Natural Resources is responsible for state policy related to environmental protection, conservation and management, and climate change. The Rwanda Environment Management Authority is the official implementing agency for this policy. As climate change challenges are multi-sectoral, implementation of adaptation measures must also involve a much wider range of ministries, including the Ministry of Infrastructure, in charge of water, sanitation, energy, transportation, housing and the Rwanda Meteorological Service; the Ministry of Agriculture and Animal Resources; the Ministry of Finance and Economic Planning; the Ministry of Foreign Affairs and Cooperation; the Ministry of Disaster Management and Refugee Affairs; the National Forestry Authority; Rwanda Agricultural Development Authority; Rwanda Horticulture Development Authority; Rwanda Animal Resources Development Authority; and the Rwanda Development Board.

A number of research institutions in Rwanda conduct research relevant to the country's adaptation needs: Kigali Institute of Education, Kigali Health Institute, Rwanda Agricultural Research Institute, the National University of Rwanda and Kigali Institute of Science and Technology (KIST).

Climate Impacts

Future climate changes are difficult to predict in Rwanda due to its location between two climatic regions, East Africa and Central Africa. A lack of meteorological data in equatorial Africa also hinders modelling simulations. Observed temperatures in Rwanda rose between 1971 and 2010 by 0.35°C per decade, a steeper trend than the global average of 0.27°C (IPCC, 2007a). Climate projections for Rwanda indicate that further warming will occur, with a likely increase in precipitation, though there is much more uncertainty in the latter. It is estimated that annual precipitation will increase by up to 20% by the 2050s and 30% by the 2080s. An increase in intensity of both rainy seasons is anticipated (Shongwe et al., 2010).

Rwanda's topography, population density, socio-economic indicators and high dependency upon natural resources make the country vulnerable to climate change and climate variability. Existing climate variability in Rwanda already creates significant economic costs. Rwanda is affected by landslides, flooding, storms, vector- and water-borne diseases, and droughts. These will decrease the productivity of agriculture, impact water availability, and harm human health, the energy sector, and livelihoods, particularly within poor communities.

Priority Sectors and Needs

The priority sectors in Rwanda, as identified by Rwanda's NAPA and national strategy, are the inextricably linked sectors of water, agriculture and animal husbandry, health, forestry and lands. Both the NAPA and national strategy made clear that successful implementation of adaptation measures in the priority sectors depends upon several enabling factors: strengthened institutional arrangements; finance; capacity building and knowledge management; technology, innovation and infrastructure; and integrated planning and data management.

The need for increased monitoring and management of these sectors is also recognised as a priority. Rwanda's NAPA highlights weaknesses in observation, description and evaluation of climate and hydrological processes, and their impacts on social and ecological systems within both Rwanda and the region. There is not enough data and information to enable people who rely on vulnerable resources to adapt to climate change. Research is vital to ensure effective technologies and methods are utilised. Aside from the resource requirements, the greatest constraint to carrying out adaptation in Rwanda is low awareness among both civil society and decision-makers.

Existing Links with China

Rwanda and China already have substantial links: China is the largest non-OECD development partner in Rwanda, and the trade links between the two countries have grown substantially in the past few years. China provides support to Rwanda across the key sectors of infrastructure, education, health and agriculture. There is significant potential for further assistance from China in the area of adaptation. Both countries face similar challenges from climate change, and China has gained experience in building adaptive capacity in a number of Rwanda's priority sectors.

South-South Cooperation and Learning

Rwanda is a member of two African Regional Economic Communities – the EAC and COMESA – and its other Southern development partners include India, Kuwait, Saudi Arabia, Egypt, Cuba, South Africa and Nigeria. It is part of the Eastern African Power Pool and the Nile Basin Initiative. Rwanda contributed to the EAC Climate Change Policy and Master Plan, will host COMESA's planned Climate Observatory on Mount Karisimbi, and belongs to a number of regional networks focused on climate change adaptation that aim to share knowledge and experience.

In addition, outside the area of adaptation, Rwanda has undertaken South-South learning on public services with South Africa and Cuba, and has participated in

South-South exchanges facilitated by the World Bank South-South Experience Exchange Facility. Thus far, Rwanda's experiences with South-South learning have reportedly been positive. The exchanges largely involve regional sharing with support from multilateral agencies or international NGOs, and the country has been able to both contribute and receive knowledge.

Recommendations

Rwanda could work with China to gather adaptation lessons and experiences as well as useful adaptation tools, methods and technologies. The country's national strategy and NAPA outline a wide range of opportunities and detail potential stakeholders and implementing agencies that could make good partners. Partnerships between academic and other research institutions in Rwanda and China would allow for the exchange of expertise. There are several specific areas where cooperation would bring benefits based on China's expertise and experience:

- **Systematic observation and meteorological services:** Rwanda needs meteorological stations, software and technology, technical expertise, research and engagement with regional and international centres of excellence to better understand its projected climate change.
- **Climate knowledge mainstreaming:** Government officials would benefit from training to enable them to identify climate considerations in the development process. Short courses, placements and expert exchanges with other countries would be helpful. Scholarships from Chinese academic institutes would greatly assist in knowledge sharing.
- **Comprehensive disaster management:** Risk assessments, vulnerability mapping, integrated early warning systems and disaster response plans are needed, which require enhanced data collection, analysis and modelling.
- **Agriculture:** Rwanda needs alternatives to rain-fed agriculture. Drought- and flood-resistant crop strains are key adaptation tools that would strengthen resilience.
- **Water:** Expertise and technology sharing in water conservation, harvesting and integrated planning would assist in the adaptation process.
- **Energy:** Chinese research institutes and universities could partner with KIST to develop and promote appropriate renewable energy technology for Rwanda.
- **Climate resilient infrastructure:** China has substantial experience working in the infrastructure sector in Rwanda, and building climate resilience into roads is crucial.

Box 3.2 Green Growth and Climate Resilience

In late 2011, the Government of Rwanda published its national Strategy for Green Growth and Climate Resilience – the first of its kind in Africa. It aims to promote stable socio-economic development whilst minimising the impact on the environment. Rwanda has made great steps forward in the past decade, bringing 1 million people out of poverty since 2005 (NISR, 2012). It is vital to ensure that these development gains are not lost due to climate change.

The Strategy has 3 strategic objectives:

- To achieve Energy Security and a Low Carbon Energy Supply that supports the development of Green Industry and Services and avoids deforestation
- To achieve Sustainable Land Use and Water Resource Management that results in Food Security, appropriate Urban Development and preservation of Biodiversity and Ecosystem Services
- To ensure Social Protection, Improved Health and Disaster Risk Reduction that reduces vulnerability to climate change impacts

H.E. President Paul Kagame: "There is a common interest to reverse or prevent the damage caused by climate change. We may all be different in terms of levels of prosperity, but preserving our environment, managing climate change issues properly is really everybody's business. If it works here in Rwanda, I believe it can work anywhere else in the world."

3.1.5. South Africa

In the continent's largest economy, advantages like sophisticated climate science are balanced by water scarcity and inequality. As well as addressing gaps, China can learn from South Africa's strong environmental policies and climate modelling best practices, and could help organise knowledge exchanges with other countries.

Source: Ezilon maps, 2012.

South Africa sits in the sub-tropics at the southern tip of Africa, where the Indian and Atlantic Oceans meet (Figure 3.5). It is the strongest economy on the continent, rivalled only by Nigeria, historically based on mining but with strong agriculture and services sectors. Despite its strengths, South Africa has extreme inequality, is water scarce, and millions still live in poverty. In addition, South Africa is projected to experience higher than average temperature increases and thus more significant climate change.

National Development and Adaptation Strategies

The National Development Plan 2030 (NDP) sets out South Africa's development strategies, and the main goals are to eliminate poverty and reduce inequality. The NDP advocates for sustainable and inclusive development through creating jobs, expanding infrastructure, transitioning to a low-carbon economy, improving education and training, providing quality health care, building a capable state, fighting corruption and enhancing accountability, and transforming society and uniting the nation (NPC, 2011). To foster growth, the NDP proposes investment in infrastructure, more innovation, private investment and entrepreneurialism as ways to expand economic opportunities.

The South African Constitution establishes a right to an environment that is not harmful to health and well-being, balancing environmental protection rights with social and economic development. South Africa's Initial National Communication (2003) and the Second National Communication (2011) both seek to achieve a pro-growth, pro-development and pro-jobs strategy through redefining competitive advantage and facilitating structural transformation of the economy by shifting from an energy-intensive to a climate-friendly path.

South Africa initially focused on mitigation, with the Long Term Mitigation Scenarios (LTMS) providing guidance for policy makers; recently, however, it has published the South African Risk and Vulnerability Atlas (see Box 3.3) and is putting more effort into adaptation. The National Climate Change Response White Paper (2011) addresses climate change adaptation and mitigation and shows the government's vision for effective climate change response and transition to a climate-resilient and lower-carbon economy. Resilience to climate variability and to climate-related extreme weather events forms the basis for South Africa's future approach to climate disaster management.

Key Stakeholders

The Department of Environmental Affairs within the Ministry of Water and Environmental Affairs coordinates climate change issues in South Africa at national, provincial and local levels. The Departments of Water Affairs, Agriculture and Fisheries, Minerals, Energy and Science and Technology also play critical roles in climate change affairs. South Africa hosted the COP17 climate negotiations in 2011, which was chaired by the Minister of International Relations and Cooperation. NGOs are involved in climate change research, raising awareness, capacity building, and advocacy and lobbying. Private companies, particularly in energy- and carbon-intensive sectors, have been actively engaged in developing a good understanding of the relative contributions of sectors and companies to both direct and indirect greenhouse gas emissions, and have helped to identify potential mitigation activities.

Tertiary educational institutions engage in research and offer a range of courses on climate change-related topics. The University of Cape Town hosts the world-class Climate Systems Analysis Group (CSAG) and the Energy Research Centre. International organisations have also played a significant role in education on climate change, particularly the global System for Analysis, Research and Training (START). Following identified priority areas, development partners tend to collaborate with the government and other development agencies in climate change adaptation projects.

Climate Impacts

South Africa's climate record shows an increase in air temperature over the past 30 years, increased maximum temperatures, fewer frost days and increases in the intensity of extreme rainfall events. Projected regional climate scenarios are uncertain, particularly with regard to rainfall projections, although air temperature is virtually certain to continue to increase by between ~1 °C and 3 °C, with the greatest increases towards the interior. Regional rainfall scenarios project a general drying in most seasons in the southwestern parts of the western Cape, while the northern and eastern regions of the country are likely to become wetter (Midgley et al. 2007).

South Africa is a water-scarce country, and climate change will exacerbate the situation with more variable streamflows. Water shortages will impact agriculture, resulting in greater competition with urban use, lower crop yields and greater crop yield variability. Additional heat stress will reduce crop productivity. The geographic borders of vector-borne diseases such as malaria will likely expand, which will interact with rural livelihoods, in particular. Increasing frequency and intensity of extreme precipitation events will raise the risk of flooding episodes in urban settings, and drought will induce water shortages and fire risk. The potential impacts from sea level rise, especially when accompanied by high tidal and storm events, are relevant for vulnerable coastal areas with high population densities.

Priority Sectors and Needs

South Africa is poorly equipped to deal with extremes and finds it difficult to identify a single sector requiring greater assistance than others. A coherent view of vulnerabilities is needed, and there are gaps in knowledge and in the country's ability to communicate, understand and facilitate the implementation of solutions at a landscape level.

Box 3.3 South Africa's Risk and Vulnerability Atlas (SARVA)

The Atlas aims to bridge the divide between scientists and policy makers by providing environmental change sensitivity and vulnerability information at regional, national, provincial and municipal levels. It exists both as a report and as an electronic spatial database for South Africa which is continuously updated by national and international global change researchers from various disciplines. A major benefit of the Atlas is that it consolidates the latest findings on global change impacts on key sectors in South Africa (e.g. biodiversity, water and agriculture).

Case studies in the Atlas facilitate virtual exploration of climate change impacts and adaption and mitigation strategies. They enable Atlas stakeholders to explore synergies and apply relevant scientific principles underpinning the case studies to their own adaption strategies and implementation plans.

Prioritised sectors are water, health, biodiversity and ecosystems, industry and livelihoods, as well as disaster risk reduction management. Worsening water scarcity will be exacerbated by climate change and require effective and sustainable management of water demand. Some of the world's biodiversity hot spots are in South Africa and also must be managed well and sustainably. In addition, climatic effects on HIV/AIDS in South Africa should be addressed through research, healthcare and education. There is a need to develop agriculture and forestry approaches and strategies that are climate-resilient, incorporate rural development planning, address food security, manage land sustainably and help farmers adapt to climate change. Climate scientists involved in modelling need to communicate better with each other and improve short-, medium- and long-term adaptation scenarios. Research and technology needs to be improved and used in fine tuning Early Warning Systems. Decision-makers and the society at large need more information and knowledge about climate change.

Existing Links with China

Official relations between China and South Africa were established in January 1998. China is South Africa's largest trading partner and about a quarter of China's foreign direct investment (FDI) into Africa goes to South Africa. South Africa is part of the BASIC negotiating group with Brazil, India and China, a distinct voice in UNFCCC climate change negotiations. China invited South Africa to join the BRICS (Brazil, Russia, India, China and South Africa) an association of leading emerging economies, due to South Africa's position and influence in Africa.

South-South Cooperation and Learning

South Africa is a member of only one African Regional Economic Community – SADC – but plays a leading role in Africa. In July 2012, Nkosazana Dlamini-Zuma became the new head of the African Union Commission, the first woman and first Southern African to hold the post. South Africa has strong connections with India and Brazil through IBSA, BRICS and BASIC alliances and is a member of the G20 and the G24. It has a Climate Journalists Network which focuses on translating seasonal climate forecasts for media dissemination. This is one forum that can be used to operationalise South-South learning.

South Africa has been involved in adaptation-related South-South learning exchange initiatives, including a recent endeavour with Costa Rica on payments for ecosystem services (PES). The Knowledge Exchange Programme was designed by Conservation International and Conservation South Africa to expose relevant South African officials to the lessons from the national PES programme of Costa Rica. South Africa has taken part in South-South learning exchanges facilitated by the World Bank South-South Experience Exchange Facility, both as a provider and recipient of knowledge.

Recommendations

South Africa has managed to develop solid policies and frameworks on climate change adaptation issues, even though many of these have yet to be implemented. South Africa could offer guidance in policy development to other countries, particularly in Africa. South-South learning should be initiated through learning exchanges involving field trips to understand the national and local context. South Africa is keen to host other countries in learning exchanges. It would also welcome support from other developing countries to build capacity and develop skills and technology to address climate change. Particular areas of interest for engagement with China are:

- **Early warning systems and disaster risk management programmes:** particularly focusing on how ecosystems can help to buffer and reduce disaster impacts.
- **Climate-resilient infrastructure:** including both the design and promotion of major projects such as the rail system in Cape Town.
- **Agriculture:** developing GMO and crop diversity in order to reduce vulnerability.
- **Systematic observations:** China could make satellite observations available to South Africa for climate impact modelling and projections. Ocean monitoring in the Pacific by the Chinese would improve understanding of and predictions for El Niño in South Africa.
- **Ecosystem-based approaches:** South Africa and China could share knowledge on ecosystems-based adaptation approaches that are being piloted in both countries.
- **Technology:** South Africa would welcome support in research and development, innovation and capacity building.

China can learn from South Africa's strong environmental legislation and policies, and its best practices for climate modelling. The two countries could collaborate in organising knowledge exchanges with other countries in these areas.

3.2. Asia

Three countries in Asia were assessed: Bangladesh, Indonesia and Nepal.

3.2.1. Bangladesh

Source: Ezilon maps, 2012.

The most crowded country in the world is facing almost every possible threat from climate change, but has risen to the challenge by becoming a global leader in adaptation. China could learn from Bangladesh's highly regarded early warning system, for example, while providing technical input on forecasting and monitoring climate impacts. The country's well-developed adaptation strategy should guide cooperation.

Bangladesh, located in South Asia and almost completely surrounded by India, straddles the Ganges-Brahmaputra Delta (Figure 3.6). It is the world's eighth most populous country with over 160 million people, and it has the world's highest population density, excluding city states and islands. Since the restoration of democracy in 1991, the economy has grown significantly, though its nominal GDP per capita is only USD 700 and its HDI is low. It is one of the countries most vulnerable to climate change, facing almost every challenge possible. The government has responded to this with action and Bangladesh is a global leader in climate change adaptation.

National Development and Adaptation Strategies

Bangladesh's development goals are set out in the country's 'Vision 2021', whose main focus is the eradication of poverty, inequality and deprivation. Vision 2021 sees Bangladesh transformed by 2021 into a middle-income and high-HDI country through high-performing economic growth driven by advanced and innovative technology. A 'Digital Bangladesh' is envisioned where information and communication technology supports growth. Vision 2021 will be implemented through the Sixth and Seventh Five-Year Plans (2011 – 2015 and 2016 – 2020).

Bangladesh has been one of the leaders in the field of adaptation. Under the UNFCCC process it submitted its Initial National Communication in 2002 and was the first to submit a NAPA in 2005, which was updated in 2009. The country's own Climate Change Strategy and Action Plan (BCCSAP), developed in 2009, is designed as a blueprint for integrating climate change issues, including adaptation, technology transfer, mitigation, and development and capacity building, into mainstream policy. There are a wide range of climate change activities underway in Bangladesh. The country has set up two funds (the Climate Change Resilience Fund and the Multi-Donor Trust Fund) designed to channel money into projects and programmes aimed at addressing the needs identified in the BCCSAP. Climate change adaptation has been incorporated into the majority of the main development strategies in Bangladesh.

Key Stakeholders

Action on climate change is led by the Ministry of Environment and Forests (MoEF) and its agencies. The MoEF has been responsible for producing all of Bangladesh's submissions to the UNFCCC as well as the BCCSAP. Under the MoEF, the Department of Environment is mandated to implement policies to ensure sustainable development and environmental

conservation and management, and the Climate Change Cell was created in 2004 to focus solely upon climate change issues and the integration of climate change into national planning. A National Steering Committee on Climate Change has been established to coordinate and facilitate national actions on climate change. Chaired by the Minister of the MoEF, the committee is made up of the secretaries of all climate-affected ministries and divisions, along with representatives of civil society and the business community. It reports to the National Environment Committee, which is chaired by the Prime Minister.

The Ministry of Food and Disaster Management is responsible for providing the guidance for disaster risk reduction and emergency management planning. A wide variety of other ministries and institutions will need to be involved in climate change adaptation implementation, including the Ministry of Water Resources; the Ministry of Defence, which houses the Meteorological Department; the Ministry of Agriculture; and the Ministry of Fisheries and Livestock.

Civil society and academic institutions in Bangladesh are active in the area of climate change adaptation, and the country's community of climate change experts is influential in policy formation. A number of organisations are included in the Bangladesh delegation to the UNFCCC, for example. Academia, CSOs and NGOs research climate change and adaptation and help to implement solutions.

Climate Impacts

Bangladesh already experiences a wide range of natural disasters almost every year, such as floods, tropical cyclones, droughts and tidal bores. The high population density and the large portion of people who rely on natural resources for their livelihood make Bangladesh particularly vulnerable to climate variability and change.

Climate change is likely to increase the frequency and severity of extreme events in Bangladesh in the future. The greatest challenges identified in Bangladesh's BCCSAP are scarcity of fresh water; drainage; river bank erosion; frequent floods and prolonged and widespread drought; and wider salinity in the surface, ground and soil in the coastal zone. The impacts of climate change will be heaviest in the sectors of agriculture, water, health, infrastructure, and biodiversity and ecosystems. Coastal regions, areas adjacent to rivers and areas already experiencing drought conditions will be most affected.

Priority Sectors and Needs

The BCCSAP identifies six priority areas for action, five related to adaptation and one to mitigation: food security, social protection and health; comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low-carbon development; and capacity building and institutional strengthening. In order to implement effective adaptation measures Bangladesh requires various resources including finance, technology transfer, capacity building, institutional strengthening, and research and data collection.

Existing Links with China

Bangladesh and China have good relations characterised by mutual visits, regular dialogue, cooperation in economics and trade, expansion of educational and cultural ties, and promotion of bilateral cooperation on regional and international issues. The two countries already cooperate in sectors relevant to adaptation: water resources, agriculture, disaster risk management and infrastructure.

South-South Cooperation and Learning

Bangladesh is a member of the regional bodies SAARC and BIMSTEC and is seen as a leader in climate change action in the region. It has been involved in a number of successful South-South learning exchanges, both as the recipient and as the provider of knowledge. Current South-South learning generally takes one of two main forms: knowledge exchanged through regional organisations and networks, and individual knowledge exchanges facilitated by a multilateral organisation such as the World Bank. Informal South-South knowledge exchanges appear to occur through international NGOs, which often have systems in place to share information between different country offices. Within Bangladesh there has been some movement towards increasing South-South exchanges. For example, the International Centre for Climate Change and Development (ICCCAD) and Action Research for Community Adaptation in Bangladesh (ARCAB) are Bangladesh-based centres with a specific focus on sharing climate change adaptation knowledge both within the country and internationally.

Bangladesh is also involved in monsoon and hazard-mitigation research in deltaic coastal regions, along with Vietnam, Japan, China, Pakistan, India, Cambodia, Australia, Thailand, Myanmar, Canada, Brunei Darussalam, Indonesia, Republic of Korea and the USA.

Recommendations

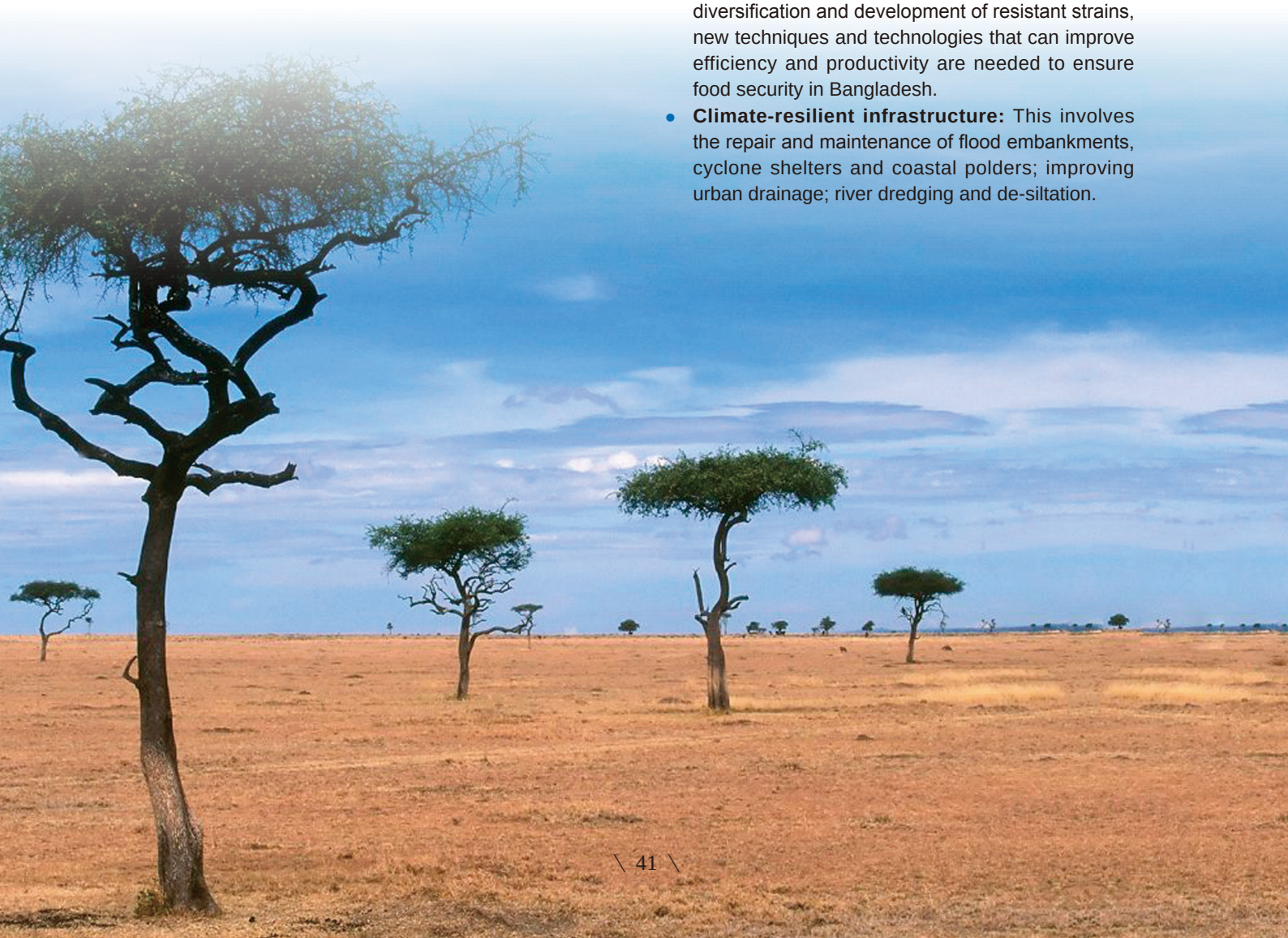
Given China's size, it will face the same broad range of challenges raised by climate change in Bangladesh. Thus, the two countries would benefit greatly from sharing their adaptation lessons and experiences as well as useful adaptation tools, methods and technologies. A number of MOUs addressing shared challenges show that both countries recognise this

potential. Bangladesh has been dealing with extreme events and disasters for many years and is one of the forerunners in climate change adaptation, so there will be much that China can learn.

There are a range of options for providing support for adaptation in Bangladesh. The BCCSAP outlines a wide array of opportunities and details potential stakeholders and implementing agencies that could be partnered with. The 2009 NAPA also outlines several specific projects for implementation which are split into groups in terms of priority. MOUs, such as those already established between the two countries in the water resource, agriculture, disaster risk management and infrastructure sectors, are another area of opportunity for work on specific sectors. The use of this form of knowledge exchange could be scaled up. Current initiatives to assist South-South sharing in Bangladesh, such as ICCCAD and ARCAB, would enable access to Bangladesh's adaptation knowledge base and would be a good route for sharing Chinese experience and expertise. Any work with Bangladesh on adaptation should be aligned with the BCCSAP.

Specific areas where China's expertise and experience would bring benefits include:

- **Systematic observation and meteorological services:** Research and data collection on the impacts of climate change is quite weak in Bangladesh and a real restriction on how well impacts can be estimated and adaptation measures implemented.
- **Science and technology knowledge exchange:** BCCSAP seeks to establish a centre for research knowledge management and training on climate change. China's experience with the CCICED could produce vital lessons on international scientific knowledge sharing and how best to feed this into policy making.
- **Comprehensive disaster management:** Capacity building and technical training in forecasting, flood modelling and Geographic Information Systems will enable more accurate forecasts and warnings and improve planning processes. Assistance in this area would enable China to build experience in working with a highly regarded early warning system.
- **Health:** Partnerships between academic institutions, NGOs and governments in the two countries could assist in the research and development of medicines and preventative measures.
- **Adaptation in agriculture:** Crop and livestock diversification and development of resistant strains, new techniques and technologies that can improve efficiency and productivity are needed to ensure food security in Bangladesh.
- **Climate-resilient infrastructure:** This involves the repair and maintenance of flood embankments, cyclone shelters and coastal polders; improving urban drainage; river dredging and de-siltation.



3.2.2. Indonesia

Source: Ezilon maps, 2012.

Indonesia enjoys a large base of financial and human capital along with major support from donors like Germany in developing and implementing adaptation plans. China and Indonesia, which face some similar challenges from climate change, could be relatively equal partners for co-learning.

Indonesia, an archipelago stretching across the Indian and Pacific Oceans at the equator, is made up of ~17,500 islands (Figure 3.7). It has 33 provinces with over 238 million people, making it the world's fourth most populous country. It is an emerging economy, with the 16th largest GDP and medium HDI, and is a member of the G20. Indonesia has abundant natural resources and an important role to play in preserving the world's tropical rainforests.

National Development and Adaptation Strategies

Since the mid-2000s the Government of Indonesia has prepared a detailed set of national and regional plans that deal with both development and climate change, which have been integrated from the outset. The main national long-term plan, the Rencana Pembangunan Jangka Panjang Nasional (RPJPN) (or National Long-Term Development Planning) covers the period 2005-2025. More detailed planning is allotted to a sequence of medium-term plans, RPJMN, of which the current is the second, covering 2010-2014. The regional planning structure reflects the structure at national level.

Linked with these plans are the 2007 National Action Plan on Climate Change (RAN-PI) and the National Action Plan for Mitigation (RAN-GRK), which address both adaptation and mitigation. Since 2007, via the so-called 'Yellow Book', the Indonesia Climate Change Sectoral Roadmap (ICCRS) has been developed, in turn informs the medium-term plans at national and regional levels. Funding for ICCRS activities comes in part from a newly established Climate Change Trust Fund. The priority sectors in the ICCRS are agriculture, coasts and fisheries, energy, and forestry, and activities in each sector will shift progressively through three stages: data, information and knowledge management; planning and policy, regulation and institutional development; and implementation and control of plans and programmes with monitoring and evaluation. Together, these plans are designed to mainstream climate change adaptation and mitigation into national development and poverty reduction policy.

An implementation plan for RAN-PI has been published (in Bahasa Indonesian only), but we located no such progress reports in English. The German Government is running a program called PAKLIM that provides assistance in implementing RAN-PI, RAN-GRK and the ICCSR, along with other activities, but so far mostly in mitigation. Indonesia is expected to launch the RAN-PI plan for adaptation at the UNFCCC COP 18 in Doha in November/December 2012.

Key Stakeholders

The National Council on Climate Change works on relevant issues across and at the highest level of government. The main responsibility for this work falls under the Ministry of National Development Planning, and in particular the National Development Planning

Agency, BAPPENAS. The Ministry of the Environment is also important, with other ministries taking responsibility for their sectors.

In addition to government agencies, there are a substantial number of universities across the country engaged in teaching and research on climate science and adaptation. Further research is being undertaken with partners, including China. In addition there is engagement from the private sector and numerous other partners, many concerned primarily with mitigation, but some, including the German government through PAKLIM, also with adaptation.

Climate Impacts

According to McSweeney et al. (2008), based on the full set of models used in the IPCC's Fourth Assessment Report, temperatures in Indonesia will increase by 1.2 °C to 3.7 °C by the 2090s, accompanied by an increase in the numbers of hot days and nights. Rainfall may change by between -28mm and +53mm per month (-12% to +20%) by the 2090s; a higher proportion will fall on days of heavier rainfall. Sea level rise may be 18 cm to 59 cm by 2100. There is considerable uncertainty amongst the models on any future changes in the amplitudes and frequencies of El Niño and La Niña events. Although Indonesia currently experiences little or no water stress, water shortages may intensify in the future, in particular during El Niño-related droughts. With a coastline exceeding 54,000 km in length, and much of the archipelago consisting of coastal lowlands, sea level rise is a critical consideration for Indonesia. Coastal erosion is a concern, as is future inundation and coastal surges. An estimated 968 fishery ports have been built without consideration of sea level rise.

Priority Sectors and Needs

Forestry and coastal zone management are amongst the priority sectors for immediate consideration, but the ICCRS also identifies water, energy, infrastructure, land use, agriculture and health as long-term priority planning areas.

There are numerous policies and plans for all sectors, but according to a 2007 review, 'Although the legal instruments are more than adequate for sustainable environmental management, both implementation and enforcement of these laws are very weak, due to lack of political will, inadequate coordination among various agencies, low technical capability for proving violations, limited access to information, and lack of adequate funding.[2] Indonesia has seen substantial development in recent years, but capacity and know-how are still important needs. tThe PAKLIM programme represents one key to the successful implementation of climate change programmes. In most published gap analyses, however, the country's limitations revolve primarily around institutions and finance rather than resources and capacity. The continuing deforestation of the country represents one test of political will and law enforcement.

Existing Links with China

Diplomatic links between Indonesia and China have improved steadily since their reestablishment in 1990. Following a visit to China by the President of Indonesia in March 2012, cooperation agreements of USD 17 billion were signed and Chinese companies were welcomed to invest in Indonesia. Amongst various infrastructure and economic activities, the main agreement regarding climate is a plan to set up a joint oceanographic and meteorological research institute.

South-South Cooperation and Learning

Indonesia has an influential role in South Asia. It is a founding member of the regional body ASEAN, the Non-Aligned Movement and the Organisation of the Islamic Conference, now the Organisation of Islamic Cooperation. Indonesia has historically been a member of OPEC – although it withdrew in 2008 as it was no longer a net exporter of oil – and has been a member of the G20 since the group was formed in 1999.

There are a number of examples of South-South Learning involving Indonesia and India, Vietnam, Brazil, Colombia, Haiti, China, Afghanistan, Borneo, Malaysia and the Philippines. Several of the programmes incorporate climate change, but mainly from a mitigation perspective. Under the World Bank Institute there are several Indonesian Institutes that are connected through the Global Development Learning Network. In some of these programmes Indonesia is a supplier, rather than a recipient, of knowledge, and the Vice-President of Indonesia has commented recently that the country is ready to become a knowledge hub within the South-South context in the areas of energy and food security, community-driven disaster mitigation, governance and peace building, and macro-economic management. There is an important collaboration with JICA, through which Indonesian knowledge is shared with other JICA-supported countries .

Regarding climate change adaptation, Indonesia is involved in monsoon and hazard mitigation research in deltaic coastal regions, along with Bangladesh, Vietnam, Japan, China, Pakistan, India, Cambodia, Australia, Thailand, Myanmar, Canada, Brunei

2. It should be noted that many documents are available only in Bahasa Indonesia; this report has been prepared from available reports in English and may therefore omit certain aspects.

Darussalam, Republic of Korea and the USA; and in a UNESCO project on coastal and small island community resilience with Philippines and Timor Leste. Indonesia is collaborating with China on a monitoring programme to study the impacts of climate change on ocean fish migration.

Opportunities

Compared with most other countries reviewed in this report, Indonesia is in a rather stronger position to manage and implement its own climate change adaptation and mitigation policies and plans, and to contribute to international negotiations. Its financial and human capital base, including at regional level, is substantial, and the country already enjoys the support of numerous development partners in various adaptation and mitigation activities. Germany's PAKLIM programme, as mentioned above, will likely be central in any implementation of existing adaptation plans.

That does not mean, of course, that further initiatives are not needed, as there are numerous opportunities to share best practices in areas such as agriculture and health, and to explore approaches to up-scale these. Moreover, governance of climate change activities remains a major weakness in Indonesia, and it is here that China might focus its assistance.

Recommendations

Indonesia is probably as well placed to assist China in learning about climate change adaptation as China is to assist Indonesia. That equality will facilitate co-learning, given that some of the key issues, especially in agriculture and health, are not dissimilar between the two countries. Any activity should ideally be structured within the policies and plans either already formulated or under development in PAKLIM, and might be addressed to either national or regional level. The critical needs appear to be in the areas of capacity at community and district levels and the implementation of policies and plans.

The ICCSR frequently identifies needs for adaptation technology, from databases through to field equipment. Various organisations are working to provide technology in various areas, but the need is sufficiently great that further collaboration with China might be appropriate. China could learn from Indonesia's experience in forest management, particularly of mangroves and peat land, and there is already interest from China in this area.

3.2.3. Nepal

Nepal is one of the world's least developed countries and spans diverse climate zones. Its Local Adaptation Plans of Action (LAPAs) are an important innovation, but the country needs extensive adaptation support, particularly capacity building. There are opportunities across all sectors for neighbouring China to offer knowledge and cooperation.

Source: Ezilon maps, 2012.

Nepal, located in South Asia, is home to the Himalayas and the world's highest mountain, Mt Everest (Figure 3.8). Landlocked and wedged between China and India, it is dependent on trade with powerful neighbours. It has widespread poverty, low HDI and high inequality. Its political future is uncertain, as it currently has no constitution and there is debate over the future governing structure.

National Development and Adaptation Strategies

The Government of Nepal has developed a number of strategies and plans pertinent to climate change, including the draft Climate Change Policy of 2011, designed to integrate and mainstream climate change alongside activities in development and poverty

alleviation. The draft Climate Change Policy includes sections covering climate adaptation and disaster and risk reduction; low-carbon development and climate resilience; access to financial resources and utilisation; capacity building; people's participation and empowerment; study and research; technology development, transfer and utilisation; and climate-friendly natural resources management. It was developed from a number of extant policies and plans, including the National Conservation Strategy (1988) and the Sustainable Development Agenda for Nepal (2003).

Preparation of the Climate Change Policy was guided, in part, by the Initial National Communication of 2004 and the NAPA of 2010, and also the National Capacity Self Assessment published in 2008. The Second National Communication and the Technical Needs Assessment, both recommended under the UNFCCC process, are currently in preparation. The NAPA structure is particularly detailed, not least as it links with a sequence of equivalent programmes designed at the local level with community participation – the LAPAs. Community-level programmes, CAPAs, have also been considered. Moving forward from the NAPA, a Strategic Programme for Climate Resilience (SPCR) has been prepared but still awaits further development before it can receive funding from the Climate Investment Funds.

The commitments and structures defined in the various policies and plans are appropriate for the country, but none of the policy has been converted into law as yet. Nevertheless, the government has made its concerns clear in the 2010 Sagarmatha Declaration (announced after a cabinet meeting held at Everest Base Camp to focus attention on the effects of climate change in the Himalayas) and the 2012 Kathmandu Call for Action. In his opening address to the 2011/12 Session of the Legislature in the Nepalese Parliament, the President of Nepal stated: 'Climate Change Policy and national adaptation programs will be gradually implemented in order that the effect of climate change on various sectors can be minimised. A Climate Change Center will be established to address and minimise the challenges caused by global climate change and resource depletion trends.' It must be noted that the Constituent Assembly has not sat in session since late May 2012 following its dissolution given lack of political agreement on a new constitution; this report assumes that resolution of these political issues will not affect any extant policies and plans.

Key Stakeholders

At the highest level of government is the Climate Change Council, chaired by the Prime Minister, tasked to provide high-level policy and strategic oversight, to coordinate financial and technical support to climate change-related programmes, and to secure measures to benefit from international negotiations. It is supported by two parliamentary committees, one on Natural Resources, Economic Rights and Revenue Sharing and one on Development. Academia. The private sector, NGOs and CSOs work with the government through the Multi-Sectoral Climate Change Initiatives Coordination Committee. The lead ministry is Environment, Science and Technology (MoEST), within which sits the Climate Change Management Division; other ministries and related agencies assume sectoral responsibilities. The MoEST has no funding responsibilities and thus needs to work through other ministries.

Advice is provided by the National Planning Commission (which has proposed a climate resilience framework for government adaptation and mitigation planning) and the National Commission on Sustainable Development, and at district level by District Development Committees, each of which has an Energy and Environment Unit; the bulk of spending under the NAPA is intended for the local level. At the technical level a Nepal Climate Change Knowledge Management Centre has been established.

Numerous development organisations work in Nepal. Private sector initiatives are being organised through the formation of fifteen thematic groups representative of climate-sensitive sectors. Courses up to M.Sc. level are provided at two universities, and a new funding initiative will expand the number of studentships available.

Climate Impacts

Potential impacts of climate change in Nepal cover a number of sectors, in large part because of the country's differential altitudes and, hence, climate zones. The Himalayas, shared with China, are one area where climate change impacts are thought to be well defined: warming has resulted in retreat of glaciers and creation of glacier lakes or extension of existing lakes, increasing the threat of glacier lake outburst floods (GLOFs). In the south of Nepal, by contrast, the climate is sub-tropical, with climate-related threats from flooding and droughts, and impacts on crop growth and on health.

Priority Sectors and Needs

Priority sectors need to be considered also in terms of development, Nepal, one of the world's least developed countries. For example, though the country is potentially rich in hydropower, most of the population relies on biomass for heating, and deforestation is a major issue. Thus most key sectors could be considered important in terms of both development and climate change. The various documents mentioned above differ in the priority sectors they identify, but the five sectors highlighted in the SPCR are mountain watersheds, climate-related hazards, mainstreaming, community resilience and endangered species.

Nepal's needs are substantial and wide-ranging. A list of strategic, institutional, systemic and resource limitations was prepared for the Rio+20 Conference and is replicated in the Country Report. But above all, the scoping study concluded that the country's prime need, beyond political stability, is capacity. All information points to a lack of human capital undermining attempts to mainstream climate change into policy and to implement adaptation actions.

Existing Links with China

Nepal and China are, of course, neighbours with shared concerns over the environment and climate change, particularly in the Himalayas. Some other links are more economically focussed, with agreements for trade promotion and creation of improved transportation links; there are also projects on forest management and water resources. There are positive relations as China has brought additional trade to Nepal through a major road to Kathmandu, and farmers are allowed to graze their livestock in China.

South-South Cooperation and Learning

Nepal is a member of SAARC and BIMSTEC. There are a number of South-South learning initiatives in which Nepal is a knowledge recipient, and China is a partner in several of these. The initiatives include building resilience in ecosystem management and capacity building. A landmark South Asian initiative is the Trans-boundary Biodiversity Initiative in the Kailash Scared Landscape region with China, India and Nepal. Some of the other current South-South learning initiatives involve climate change, covering areas such as use of biogas, REDD and a programme for learning on adaptation from Latin American countries.

The Nepalese government attended the Climate Summit for Living Himalayas in Bhutan, together with Bangladesh and India. The four countries agreed upon a regional 'Framework of Cooperation' aimed at building regional resilience to the negative impacts of climate change in the Himalayas.

Opportunities

The needs of Nepal are so extensive and urgent that there are many options for assistance. Capacity building needs to be given a high priority, but in almost any sector there are additional opportunities that will provide benefits on shorter time scales. Several documents reviewed in the main country report, the most recent being the SPCR along with a Technical Needs Assessment to the UNFCCC in preparation, provide lists of priorities and of priority needs, and any of these is a valid guide to potential areas for South-South learning.

Recommendations

From the Nepalese perspective, priorities come from various plans and policies, especially the NAPA and LAPAs, the draft Climate Change Policy, and the proposed Strategic Programme for Climate Resilience. China and Nepal will often be able to mesh their priorities for adaptation learning, although there are differences between the two in climate, climate change and social and political systems. Opportunities for capacity building and learning exist in all pertinent sectors, including water, health, agriculture, energy, etc., as well in science support and in public education.

Nepal will likely be the main beneficiary of this learning, and thus China should ensure that any learning activities are consistent with those of other development partners, NGOs, and so on. Activities with potential for co-learning should be selected where possible, but otherwise the recommendation is that any learning process is demand led from the Nepal side.

Box 3.5 Local Adaptation Programmes of Action (LAPAs) in Nepal

During the NAPA inception workshop for Nepal in May 2009, it was agreed that Local Adaptation Plans for Action (LAPAs) should be developed as adaptation is very context-specific and needs local knowledge and ownership to be successful. This led to the development of the Nepal National Framework for LAPA which was approved by the Nepal Council of Ministers in November 2011. The framework has four guiding principles – that the planning process is bottom-up, inclusive, responsive and flexible (Government of Nepal, 2011).

The LAPA framework consists of 7 steps, each of which has objectives, action and tools:

1. *Climate change sensitisation*
2. *Climate vulnerability and adaptation assessment*
3. *Prioritisation of adaptation options*
4. *LAPA formulation*
5. *LAPA integration into planning process*
6. *LAPA implementation*
7. *LAPA progress assessment*

The LAPA is a novel concept which is yet to be tested in Nepal, but has gained global attention. The framework could be used in any country to speed up implementation on the ground.

3.3. Caribbean

Two countries in the Caribbean were assessed: Grenada and Jamaica.

3.3.1. Grenada

One of Grenada's vulnerabilities is its highly developed coastline, which is currently not protected by any coastal zone management policy. China is starting to offer the country technical assistance, and this should be accompanied by South-South learning activities to help fill such gaps.

Source: Ezilon maps, 2012.

Grenada is comprised of the island of Grenada and six smaller islands at the southern end of the Grenadines in the south-eastern Caribbean Sea (Figure 3.9). It is one of the smallest countries in the world and has a population of ~110,000. It has a high HDI and GDP per capita of USD 7,800.

National Development and Adaptation Strategies

Grenada's National Strategic Development Strategy for economic transformation is focused on five transformational sectors: health, education and wellness; tourism and hospitality services; agro-business; energy development; and information communication technology (Government of Grenada, 2012).

Grenada is a signatory to the St. George's Declaration of Principles for Environmental Sustainability in the Organisation of Eastern Caribbean States, and has been engaged in climate change activities since 1997. It submitted its Initial National Communication to the UNFCCC in 2000 and is working on the Second National Communication. Signs of political will at the highest level include a cabinet sub-committee on Climate Change headed by the Prime Minister, a National Climate Change Committee (NCCC), and more recently a National Climate Change Policy and Action Plan focused on three areas – Coastal Zone Management, Water Resources Management, and Data and Data Sets.

In 2011, the Government of Grenada began developing its Strategic Program for Climate Resilience (SPCR), funded by the World Bank. This is a mechanism to streamline Grenada's move towards low-carbon, climate-resilient poverty reduction and sustainable, climate-compatible development, through coordinated and comprehensive methods. The objectives are closely linked with those of the 2007 National Development Strategy for Grenada, the National Water Policy and the Grenada National Climate Change Action Plan. These objectives 'are intended to integrate climate resilience into development policies and planning, strengthen local capacity in climate change and implement climate resilient investments and to collaborate with relevant initiatives such as climate change adaptation and disaster risk reduction' (Government of Grenada, 2011).

Key Stakeholders

The Ministry of Environment, Foreign Trade and Export Development has been designated the National Focal Point for Climate Change under the UNFCCC and chairs the NCCC. Institutional arrangements within the process for developing the SPCR also highlight the role of the Ministry of Finance, Planning, Economy, Energy & Cooperatives. Other ministries with a direct role include the Ministry of Agriculture, Forestry and Fisheries; the Ministry of Tourism; the Ministry of Works, Physical Development & Public Utilities; the Ministry of Housing, Lands and Community Development; and the Ministry of Health. The National Water and Sewage Authority is also identified as an important agency in the institutional arrangements for the SPCR.

Grenada's government often consults NGOs and the private sector and has specifically engaged the hotel sector in formulating the SPCR. A number of education and research institutions are accessible to Grenadians. The St. George's University of Grenada offers multiple medical degree options and includes climate change in its list of research areas, making it particularly important in the nexus between health and climate change. The regional University of the West Indies has several research and taught programmes focusing on climate change.

Climate Impacts

Grenada is a tourism-based economy, and as on many other Caribbean islands, climate is one of the most important draws for visitors. Therefore, 'as climate in the higher latitudes would be milder, Grenada could be a less desirable climate-influenced destination' (Simpson et al, 2012). A depressed tourist industry would hurt livelihoods outside of direct tourism services, including those of farmers, fisherfolk and construction workers, for example. Agriculture is also a vulnerable sector and vital for rural livelihoods. Farms have suffered substantial damage from extreme events in recent years and are struggling to cope with longer-term changes such as decreased rainfall. Floods have become more frequent over the last 20 years, and within the last decade climatic events have damaged as much as 90% of Grenada's forest resources (Simpson et al, 2012a). This in turn has affected ecosystem services offered by those resources.

Decreases in precipitation are projected for the Caribbean region, which is also likely to experience shorter rainy seasons and precipitation in intense, shorter-duration events interspersed with longer periods of relatively dry conditions. Higher temperatures may also increase the per capita water

demand in the country as both locals and tourists would consume more water. In general, water storage capacity in the country is not sufficient to cater for the reduction in surface water during the dry season. Rising sea levels threaten coastal aquifers with seawater intrusion, exacerbated by a decrease in groundwater recharge through over-abstraction and decreasing precipitation.

Priority Sectors and Needs

According to the SPCR, the main areas impacted by climate change and in need of attention are water resource management, coastal infrastructure, disaster risk management, health, agriculture and tourism. In spite of significant development and high concentration of tourism sites and activities in the along the coastline, there are no policies or legislation specifically addressing coastal zone management issues. Much of Grenada's basic infrastructure was built during the colonial period and is therefore aging. Some of the challenges include erosion of roads, inadequate drinking water systems, and public facilities such as health clinics and disaster shelter systems that require climate proofing and rehabilitation.

Like many of the SIDS, Grenada lacks sufficient financing, technology, and human and institutional capacity. The SPCR lists the following as key needs related to vulnerability to climate change: strengthening of policies and regulations and increased capacity to enforce them; systems, expertise and facilities to collect, store and analyse relevant information and data; knowledge, awareness and technical skills; and improved planning for a coordinated response to climate change and disaster risk reduction activities. Across the board there are needs for standardised protocols for data collection, and in many instances data recovery or digitisation of some data. In addition, despite the number of studies already undertaken, there is still a need for detailed sector-related impact studies.

Existing Links with China

China and Grenada established diplomatic relations in 1985, which were severed in 1989 when Grenada established diplomatic relations with Taiwan. Relations were re-established with China and severed with Taiwan in 2005. Grenada has benefitted from Chinese involvement in many ways. Starting in 2012, through the AOSIS-China Climate Change Adaptation Pilot Programme, China will provide more than USD 2 million in technology assistance for climate adaptation to Grenada over a five-year period (Caribbean Journal Staff, 2011). This technology transfer fund will provide private and public sector agencies with loans for hardware, training and equipment from China, with repayment linked to the savings in fuel imports.

Other assistance provided by the Chinese government includes a number of infrastructural projects, agricultural support, a USD 6 million grant to complete projects previously financed by Taiwan, and an additional USD 1 million scholarship fund (Erikson, 2009). In May 2012, Grenada signed a MOU with the Export-Import Bank of China, which gives China access to a USD 1 billon development fund allocated to the Caribbean (Coward, 2012). Chinese residents are also interested in accessing education services from St. George's University to undertake studies in medicine and the social sciences, including tourism studies.

South-South Cooperation and Learning

Grenada is a member of the regional bodies CARICOM and OECS, which facilitate cooperation on climate change in the Caribbean. It appears that the majority of technical assistance and learning in the past has been primarily between developed nations and Grenada. Currently there seems to be little South–South learning outside of regional initiatives.

Recommendations

South-South learning could be pursued in many sectors and should complement any technical assistance to Grenada. China's support of climate adaptation in Grenada should be focused on:

- **Institutional and human capacity building:** particularly in disaster response, water resource and watershed management.
- **Systematic collection of data:** including coastal zone management, which requires appropriate technology.
- **Water resources:** Needs include efficient irrigation practices; waste-water recycling schemes and legislation; investigation of groundwater potential; and computer modelling of groundwater flow to account for the impact of sea-level rise.
- **Agriculture:** This sector would benefit from research and development of new varieties of key export crops (nutmeg and cocoa) that will improve the quality and yield of crops under existing conditions, as well as strategies and technologies for the production and propagation of seedlings.
- **Health:** The links between health, tourism and climate change need to be better understood; early warning systems for diseases would be beneficial; and public sector health officers need training in data collection and analysis.
- **Biodiversity:** Technologies and strategies for mangrove restoration, reforestation and afforestation.
- **Infrastructure and settlements:** Buildings, roads, bridges, coastal structures and provisional shelters need climate proofing. Knowledge exchange for professionals would facilitate this.

3.3.2. Jamaica

Jamaica lacks legislation and institutional structures for rolling out climate change initiatives. Its adaptation plans call for mainstreaming of climate issues and disaster management, along with technical assistance that China could help provide. Similar to Grenada, a major climate-related threat is sea level rise on an island where the coast produces 90% of GDP.

Source: Ezilon maps, 2012.

Jamaica is the fifth largest island in the Caribbean, 145 km south of Cuba at roughly 18° north of the equator (Figure 3.10). Sixty percent of its population of over 2.8 million live within 2 km of the coast. It has a high HDI, medium Gini coefficient (a measure of income inequality) and a nominal GDP per capita of USD 5,402. It takes climate change seriously and has one of the few dedicated Ministries for Climate Change.

National Development and Adaptation Strategies

Vision 2030 Jamaica: National Development Plan aims to facilitate a 'broad strategic push for the transformation of the Jamaican economy and society towards sustainable development and prosperity for the Jamaican people' while acknowledging linkages among economic, social, environmental and governance sectors. It has four national goals, including 'Jamaica's Development is in Harmony with its Natural Environment' with three national outcomes: Sustainable Management and Use of Environmental and Natural Resources; Hazard Risk Reduction and Adaptation to Climate Change; and Sustainable Urban and Rural Development.

Vision 2030 Jamaica is supported by seven three□year, medium□term socio-economic policy framework documents. The Jamaica Medium Term Socio-Economic Policy Framework 2009-2012 (MTF) is the first such document. It states that climate change is likely to exacerbate the risk of natural hazards by causing more frequent extreme weather events and sea level rise that magnifies the impact of storm surges and waves on coastal areas. With this document, the government aimed to intensify efforts to improve resilience against all forms of hazards and minimise the overall social and economic impact. Regarding adaptation strategies, the MTF listed the following priority programmes and actions for developing mitigation measures and adapting to climate change:

- Preparation of the Second National Communication (SNC) of Jamaica
- Creation of mechanisms to infuse climate change considerations into planning and legislative frameworks, and
- Development of sector-specific action plans to assist with the mitigation and adaptation of climate change in all sectors.

Jamaica has submitted two national communications to the UNFCCC (in 2000 and 2011), thereby completing the first action outlined in the MTF. The country has also participated in a number of regional climate change adaptation initiatives and drafted a National Climate Change Policy and Action Plan as well as a Water Resources Master Plan. The Agriculture Sector Plan under Vision 2030 Jamaica, along with corresponding sections of the MTF, seeks to dynamically transform the Jamaican agricultural sector to revitalise rural communities, create strong linkages with other sectors and reposition the sector to focus on production of high-value commodities and contribute to national food security. The Strategic Programme for Climate Resilience (SPCR) aims to 'assist in climate-proofing the country's development', works in tandem with Vision 2030 Jamaica, and addresses gaps and challenges identified in the SNC (Government of Jamaica, 2011).

Key Stakeholders

The fact that Jamaica has both a Ministry of Climate Change and a Ministry of Water, Land, Environment and Climate Change reflects strong political will at the highest level to advance climate change adaptation. In April 2012 the Prime Minister established a multi-sectoral Climate Change Advisory Board, tasked with

creating a Climate Change Department, preparing a Climate Change Policy, building public awareness about Climate Change, and seeking additional bilateral and multi-lateral support for climate change projects.

The government sees climate change as a cross-cutting development issue whose management spans many ministries, departments, agencies and local-level organisations, and involves the private sector and NGOs (Government of Jamaica, 2011). The National Focal Point for the UNFCCC process is the Meteorological Service, and the focal point for Vision 2030 is the Planning Institute of Jamaica. Other agencies with a role to play include the Ministry of Finance, Planning and the Public Service; the Environmental Management Division; the Ministry of Local Government & Community Development Hazard Mitigation and Weather Services; the National Environment and Planning Agency (NEPA); the Office of Disaster Preparedness and Emergency Management (ODPEM); and the Ministry of Foreign Affairs and Foreign Trade.

The government has included numerous NGOs in committees and consultations relevant to climate change. The lead NGOs among these are the National Environmental Societies Trust (NEST, an umbrella organisation for NGOs), the Environmental Foundation of Jamaica (which offers grant funding) and the Jamaica Conservation and Development Trust (which is involved with the development and management of national parks). Under NEST, many parish- and community-based organisations are attempting to provide a more coordinated and consistent approach to environmental management activities (NEPA, 2012).

The Private Sector Organisation of Jamaica, a membership-based umbrella organisation for private sector entities, has established an environmental sub-committee and sought climate change funding for its 2011 project 'Capacity Building of Caribbean Private Sector Environmental and Energy Management Capabilities' (PSOJ, 2011).

The regional University of the West Indies has a number of research and taught programmes focussing on climate change. At the Mona Campus in Jamaica, there is an Environmental Energy and Environmental Physics undergraduate programme with courses in Atmosphere & Climate, Solar Power, Wind & Hydro Power, Integrating Alternative Energy, and Climate Change in the Tropics, among other relevant subjects.

Climate Impacts

Regional climate models project increases in mean annual temperature of 2.9 to 3.4 ^{0}C by the 2080s under a high-emissions scenario. Rainfall is projected to decrease by 10% to 41% in Jamaica, particularly between March and August. Annual mean sea surface temperatures in waters surrounding Jamaica are projected to increase by 0.9 to 2.7 ^{0}C by the 2080s relative to the 1970-1999 average, and there is an associated potential for more intense hurricane events, but not necessarily more frequent storms.

Over-abstraction of water due to drought in recent years, compounded by sea level rise, has resulted in saline intrusion in coastal aquifers (Simpson et al, 2012b). More than half of Jamaica's population lives within 1.5 km of the shoreline, and approximately 90% of the island's GDP is produced within its coastal

zone. The impacts of climate change, in particular sea level rise, will worsen vulnerabilities on the coast and accelerate coastal erosion as a result of increased wave attack.

Climate change threatens a number of different livelihood-supporting ecosystems in Jamaica: cloud-forest habitats may be displaced into progressively smaller regions at the tops of mountains; changes in humidity may also result in drier forests and habitat loss for certain species; worsening hurricanes damage forests and plantations; freshwater ecosystems, mangrove forests, beaches and coral reefs are all threatened by human activities and climate change.

Priority Sectors and Needs

Priority sectors identified in the SNC and the SPCR are water resources, agriculture, human health, coastal zones and human settlements, and tourism. According to the SPCR, there is no legislative framework to support climate change adaptation, and existing institutions do not have structures in place to facilitate the implementation of key climate change initiatives. Limited financial resources, limited capacity of staff and the lack of a strong research and development core within these institutions also limits the ability to develop and implement projects and plans. The SPCR has therefore identified 'Mainstreaming Climate Change Adaptation and Disaster Risk Reduction at National, Sectoral, and Local Levels' as one of its critical components.

As in Grenada, there is a need across the board to develop a standardisation protocol for data collection, and in many instances data recovery and digitisation of some data. In addition, despite the number of studies already undertaken, detailed sector-related impact studies are needed. The SNC and SPCR put forward a large number of strategies and call for assistance in research, monitoring and data collection; development of new models; development of appropriate technologies; and institutional and human resource capacity building. Referencing the country's Technical Needs Assessment, the SNC notes that technology transferred to Jamaica should be affordable and socially acceptable, have minimal negative environmental and economic impact, have potential to create jobs, aid in reducing the amount of foreign exchange utilised to purchase energy (where relevant), be durable, be commercially proven, aid in the development of Jamaica, aid in vulnerability reduction and be in line with future projected energy scenarios.

Existing Links with China

In 2009, trade volume between Jamaica and China reached USD 253 million. The two countries are cooperating on a number of projects, some of which are based on special financial arrangements. These include new infrastructural developments, rehabilitation projects, shoreline protection and grant funding for a Chinese garden at the Hope Botanical Gardens. There has also been substantial Chinese private sector investment in Jamaican industries such as sugar, coffee, bauxite and telecommunications. Frequent cultural, educational and sporting exchanges have included language training and scholarships for Chinese students in Jamaica and Jamaican students in China. In July 2005 Jamaica was granted Approved Destination Status as a tourism destination for Chinese citizens. The Embassy of Jamaica and the Jamaica Tourist Board launched a Mandarin-language tourism website the following year.

South-South Cooperation and Learning

Jamaica is a member of CARICOM. Jamaica's involvement in South-South learning exchanges has been largely focussed on regional initiatives, with additional initiatives with Central and South American countries and some Pacific Islands.

Recommendations

There are significant opportunities for South-South learning and development in the area of climate adaptation between Jamaica and China. China's technical assistance should be focussed in the areas identified by the SPCR and the SNC. A few of these areas are:

- **Water resources:** Data collection and monitoring of hydrology, water use and water quality, with the creation of a national database; appropriate modelling tools to assist strategic planning of water resources; study of the feasibility of shifting focus from groundwater to surface water storage for water supply; development and use of micro-scale water harvesting technologies.
- **Agriculture:** Impact assessment of export and domestic crops and meat production; development of resistant crop varieties suited to the needs of poor farmers; expert visits by Jamaica to Chinese pest management units; research and development of new or alternative health practices and techniques to reduce the spread of diseases and losses of livestock and fisheries.
- **Health:** Sustainable design standards for housing; improved data gathering and technical support staff at the Meteorological Office for monitoring and warning of air-borne diseases; support for regional research institutions.
- **Tourism:** Rainwater harvesting, resource, waste and disaster risk management plans for large-scale hotels; exposure of Jamaican architects and other relevant professionals to Chinese green hotels (and green buildings in general).

4. Key Findings of the Study

4.1. South-South Learning and Cooperation

Climate change adaptation is a new area for South-South cooperation. NGO networks and Southern knowledge hubs established in the last few years are starting to support structured learning about adaptation, but knowledge is still fragmented across regions.

Southern countries have been exchanging knowledge and cooperating in a variety of ways for decades, but most of these learning activities are not well documented or disseminated. As shown in Figure 5.1, governments cooperate bilaterally and through regional and international bodies; civil society organisations collaborate bilaterally and through networks; academics share and cooperate on research through individual contacts and professional societies; private sector companies engage through regional and international headquarters; and development partners share lessons with country and regional offices around the world.

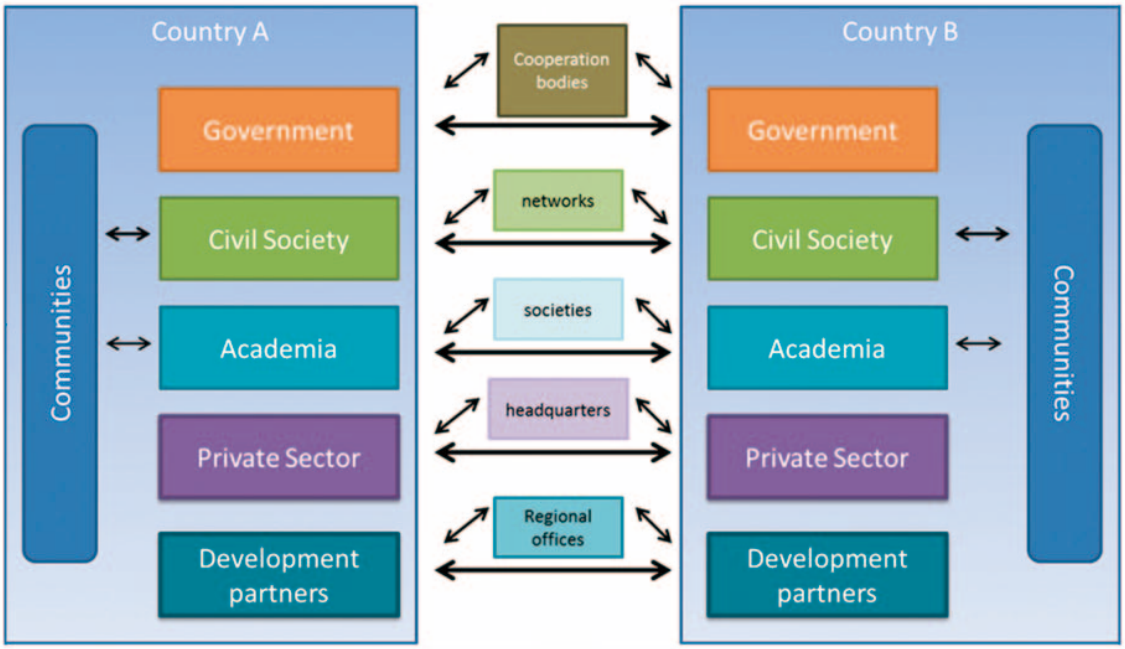


Figure 5.1 Schematic of South-South learning between different stakeholders.

While each sector has some engagement with communities, civil society is most involved in cooperation and learning at community level, followed by academia. This work has generally focused on promoting economic development and has been led by national governments and multilateral organisations, with support in the North and South. While the North's involvement is beneficial and often necessary, there is a strong desire in the South for ownership of programmes and long-term priorities.

Climate change adaptation is a new area of cooperation and is highly context specific. The level and type of engagement vary across stakeholder groups, with most South-South learning occurring between NGO staff, development agencies and academia in the South. Civil society and academia have important roles to play in improving understanding of nuances at the community level.

Countries need to start sharing lessons for adaptation in a more structured way, and recently several new regional knowledge hubs in the South have begun to fill this gap. These include Africa Adapt, the Africa Climate Policy Centre (ACPC), the African Climate and Development Initiative (ACDI), the online

Regional Climate Adaptation Knowledge Platform for Asia, the Asia-Pacific Adaptation Network (APAN), the International Centre for Climate Change and Development (ICCCAD) and the Caribbean Community Climate Change Centre (CCCCC). Additionally, a number of global NGO networks facilitate South-South learning on climate change, including the Third World Network (TWN), the Climate Action Network (CAN) and the Pan African Climate Justice Network (PACJA), as well as national networks in each country. But while these knowledge hubs and networks are important in promoting South-South learning and cooperation, their activities are not connected, and all except TWN focus on their specific region. Inter-regional engagement and knowledge sharing is infrequent and mostly happens ad hoc or through Northern networks.

4.2. China's role

China's economic power and extensive ties around the South are helping it make a push for South-South cooperation on climate change adaptation. Other developing countries welcomed exchanges with China and stressed the need for two-way learning.

China is recognised and respected as a global economic power by its fellow developing countries, many of whom seek to learn from the rapid poverty reduction in China over the past 30 years. As described in section 2.3 of this report, China is already involved in cooperation with many developing countries through various organisations and forums. These can serve as platforms for promoting cooperation on climate change adaptation. Relevant institutions and resources include:

- The Chinese Academy of Science and Technology for Development (CASTED)
- Technology transfer projects across various ministries
- The China Council for International Cooperation on Environment and Development (CCICED)
- The Forum on China-Africa Cooperation (FOCAC)
- A South-South technology manual published by the Chinese Ministry of Science and Technology (MOST)
- The Network/Platform for International Science and Technology Cooperation at the China Science and Technology Exchange Center (CSTEC)
- The Chinese Premier's recent pledge of RMB 200 million for South-South climate change cooperation
- The newly established South-South Cooperation Programme on Climate Change, now undertaking a two-year GEF-funded project on 'Enhancing capacity and knowledge and technology support to build climate resilience of vulnerable developing countries'.

China's support and cooperation varies across the ten countries studied here. The Asian countries have stronger historical and cultural ties with China than Africa or the Caribbean. Further, while the Caribbean has the highest income levels, Asia has higher technical capacity in general and South Africa and Indonesia have the strongest economies. None of the ten countries, however, has sufficient funds to implement its development plans with the additional costs of adaptation, and all ten welcomed Chinese support of South-South learning and cooperation when representatives were surveyed. Respondents in this study stressed that two-way learning and mutual respect are important and that all developing countries have knowledge to share.

4.3. Needs in the Priority Countries

Adaptation planning is underway in all ten countries studied here, but there has been little progress on implementation. Top priority sectors include water, agriculture, health, infrastructure and disaster risk reduction. Many stakeholders in this study called for participatory approaches to tap knowledge in local and indigenous communities.

All ten countries have submitted documentation to the UNFCCC, with Bangladesh and Rwanda showing early leadership. All except Angola (still recovering from a long civil war) have developed national climate adaptation strategies in the past six years. All are in the process of mainstreaming climate change adaptation into national development strategies, but there has been little progress on implementation, partly due to lack of funding and partly to the complexity and scope of work.

All ten governments identified water, agriculture and health as priority sectors, while infrastructure and disaster risk reduction featured regularly. Other priority sectors included coastal zones, forestry, tourism and biodiversity. Stakeholders consulted in this study often referred to China's strengths in these areas and welcomed its support. They agreed that support for climate change adaptation should align with each country's development goals and adaptation strategy, and should have clear long-term objectives to ensure sustainability. Many stakeholders highlighted the importance of integrating local and indigenous knowledge into adaptation solutions, and they supported a participatory approach in which government, the private sector, NGOs, academics and communities work together.

4.4. Challenges for Adaptation and South-South Cooperation

The ten countries identified common challenges for climate change adaptation that are likely to be relevant to all developing countries:

- Identifying the vulnerable sectors
- Increasing adaptive capacity of vulnerable people
- Fostering inter-agency cooperation
- Accessing appropriate technology
- Accessing financial resources
- Limited human capacity
- Managing resources for adaptation programmes
- Integrating climate change issues into sectoral policies, laws, plans and programmes
- Implementation

In addition, stakeholders identified common challenges for South-South learning, both with China and with other developing countries and organisations across the world:

- Lack of institutional infrastructure
- Long history of North-South relationships
- Funding tends to come from the North
- Limited publications and online resources
- Language barriers
- Cultural differences
- Economic strength of more developed Southern countries (or emerging economies) creates partnerships that are perceived as unequal
- Lack of willingness to learn from less developed Southern countries

These factors push countries towards one-way learning in North-South or South-North-South partnerships. Many stakeholders said that two-way South-South learning would be preferable.

4.5. Opportunities and Recommendations

The best short-term opportunities for South-South cooperation on adaptation include:

- **Sharing examples of good practice from the ten countries**
- **Science and technology support from China**
- **Strengthening the foundation for South-South learning by documenting initiatives, convening a panel of Southern experts and building up institutional architecture**

In each country, stakeholders and national strategies pointed to specific opportunities and recommendations. These are not 'priorities', as only the national government can decide a country's priorities, but they do suggest areas for engagement and support in the short term.

4.5.1. Good Practices to Share

The country scoping studies highlighted several examples of good practice in climate change adaptation. These could provide valuable lessons for other developing countries facing similar challenges:

- Nepal – community forestry management in protected areas
- Bangladesh – flood management and community-based adaptation
- Indonesia – health and food security vulnerability mapping
- Ethiopia – insurance and risk management
- South Africa – climate modelling and knowledge sharing
- Rwanda – green growth and climate resilience strategy
- Grenada and Jamaica – sea level rise modelling and impact assessments

4.5.2.Chinese Support of Adaptation

Many of the opportunities for China to support adaptation relate to science and technology, where China is recognised as a leader. Knowledge exchanges, scholarships from Chinese academic institutes, and joint research were mentioned in all fields. In particular, China can provide and receive important lessons in ten areas:

1.Systematic observation and meteorological services
Without robust meteorological data to enable accurate climate projections, it is very difficult to design effective adaptation strategies. While temperature increases have a high certainty, rainfall changes that would affect agriculture and food security are much less certain. Most of the countries studied here need improved meteorological stations, software, technology and technical expertise to better understand climate change and the associated risks and vulnerabilities. China is a recognised leader in this area and could share its data, knowledge and technology. Joint research and engagement with regional Centres of Excellence would be helpful. Specifically, China's South-South programmes could provide satellite observations to Centres of Excellence (such as CSAG in South Africa) for climate impact modelling and projections; ocean monitoring in the Pacific to improve understanding of and predictions for El Niño in southern Africa; and appropriate technology for coastal zone management.

2.Early warning systems and disaster management
Early warning systems and disaster management are particularly important for low-income countries with high vulnerability to climate change. Some of these countries have excellent systems and practices, but technical training in forecasting, flood modelling and Geographic Information Systems would help them improve forecasts and warnings as well as planning processes. Risk assessments and vulnerability mapping also require improved data collection, analysis and modelling. Respondents in this study showed particular interest in the ecosystems approach employed in China.

3.Climate-resilient infrastructure
A common theme across these ten countries is China's involvement in infrastructure projects in the developing world. Almost all countries wanted to see climate resilience incorporated into the design and management of these projects. Specifically mentioned

were hotels, road and rail, and flood embankments, cyclone shelters and coastal polders.

4.Agriculture
Many stakeholders acknowledged the strong scientific community in China and its expertise in development of climate-resistant crop varieties. There was widespread interest in China supporting countries in identifying, preserving and developing local varieties, especially those suited to the needs of poor farmers. Strategies and technologies for the production and propagation of seedlings are important. Many countries depend on rain-fed agriculture and need to diversify and explore simple irrigation technologies. In addition, new techniques and technologies that can improve efficiency and productivity are needed to ensure food security in many countries. Expert visits to Chinese pest-management units would be beneficial. Countries also asked for research and development of new or alternative practices to reduce the spread of diseases among livestock and fisheries.

5.Health
The priority countries share with China the common challenge of combating malaria and dengue fever. South-South partnerships between academic institutions, NGOs and governments could assist in research and development of medicines and preventative measures. Early warning systems for diseases would help, and would require improved data gathering and technical support. Regional research institutions would benefit from engagement and partnership with Chinese research institutions.

6.Coastal zones
Home to millions of people and hundreds of major cities, coastal zones are highly vulnerable to sea level rise, storm surges and tropical cyclones. The potential human and financial costs of inaction make adaptation a pressing issue. China could support the development and dissemination of appropriate technology for coastal zone management, particularly in SIDS and LDCs.

7.Ecosystems-based approach
China has used innovative ecosystems-based adaptation strategies in places like the Loess Plateau. Countries expressed interest in developing ecosystems-based adaptation together with China, and in learning lessons from Chinese successes. China's experience with management and mainstreaming could be shared.

8.Water
Water is a priority sector for all countries. China could get involved by sharing expertise and technology for water conservation, harvesting and integrated planning; capacity building; efficient irrigation practices; waste water recycling; hydrological modelling to improve strategies; and water quantity and quality monitoring and collation.

9.Climate knowledge mainstreaming
China's experience could offer vital lessons on sharing scientific knowledge internationally and feeding this into policy. Bangladesh and Rwanda each seek to establish a centre for research knowledge management on climate change. Training would help government officials identify climate considerations and manage risk in the development process.

10.Local adaptation plans
Nepal's pioneering framework on Local Adaptation Plans of Action (LAPAs) reflects the importance of including local communities in the design and planning of adaptation activities. This tool could be replicated and adjusted to suit other national contexts around the world.

4.5.3. Building the Foundations of South-South Learning

Strengthening the basic frameworks for cooperation and learning will help South-South adaptation initiatives move forward. This study recommends:

- **Creating a comprehensive report and database to document learning projects**
- **Using regional Centres of Excellence to organise a panel of Southern adaptation experts**
- **Building institutional architecture for research collaborations between government and academia and across countries**
- **Experimenting with ways to transcend language barriers and improve understanding of different country contexts**
- **Ensuring adaptation programmes are driven by demand and by long-term thinking**

Better documentation is needed for the wide range of South-South learning activities underway in different sectors and at different scales. There would be great value in developing a comprehensive report and database for all forms of South-South learning on climate change adaptation. This process should identify good practice in climate change adaptation, promote examples of successful learning and cooperation, and document programme design, implementation and evaluation. Outputs would take a variety of forms – publications, online databases, workshops, expos and media reports – and the project should look at how users can most easily access the information.

Countries also must seek to understand their different contexts if they are to learn from each other. Factors of culture, history, politics, accountability and public opinion can pose challenges for South-South learning, and language in particular is an important barrier that suggests the need for innovative means of communication.

An expert panel would help to tap the large human resource of knowledge in the South. Most Southern experts have grassroots experience and are relatively inexpensive compared to their Northern counterparts. The Centres of Excellence that already exist in Africa, Asia and the Small Island Developing States could provide a platform for this. On technology, countries encouraged China to research breakthrough technologies for the South as they felt that this could make a significant difference to future adaptation and development.

A key constraint is the lack of institutional architecture for South-South learning. Filling this gap would facilitate collaboration between Southern governments and academics, and enable Southern universities to expand from national to international programmes. It is important to build upon what other institutions have already achieved, so mapping of relevant institutions and their activities would be a crucial part of this process. The architecture would need to include a monitoring and evaluation framework for adaptation, including indicators for capacity building. Relevant data and information should be compiled into targeted reports that help policy makers choose the most effective policies.

Finally, two of the strongest recommendations from stakeholders in this study were that cooperation programmes for adaptation should be demand-driven, and that funding needs to be targeted at long-term sustainability if adaptation is to be successful.

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