



Seventh African Development Forum

*Acting on Climate Change for Sustainable
Development in Africa*

Science, Technology, Innovation and
Capacity Building for Addressing
Climate Change

Issues Paper #10

ADF VII • 10 - 15 October 2010 • United Nations Conference Centre • Addis Ababa, Ethiopia



African Union



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I. Overview

1. There is general agreement that Africa's geographical location and low adaptive capacity make it very vulnerable to the effects of climate change. The continent has a relatively warm climate, poor soils and high variability in rainfalls and floods. These variations, which are likely to increase with climate change, have a major impact on key sectors such as agriculture, and on levels of poverty and disease. Science, therefore, has an indispensable role to play in efforts to understand and manage the full implications of climate change.

2. Climate change also presents many opportunities for Africa and could serve as a catalyst to build more efficient, low-carbon economies to guarantee Africa's future development. To realize this goal, Africa may have to develop innovative policies for climate change to guide the design of appropriate legal and regulatory frameworks and investment of human, financial and technological resources in development, and the acquisition, adaptation and diffusion of "green technologies and products". Therefore, science, technology and innovation policy for climate change is required to build capacity to respond effectively to the numerous threats and opportunities of climate change.

II. The main issues at stake

A. Science for decision makers

3. Africa lacks scientific data and information for adequate understanding of climate change vulnerability and the impacts on the continent. Better information is required to:

- a) Inform ongoing international negotiations which are critical for the future of Africa;
- b) Assist in transformation to a low-carbon development pathway;
- c) Inform policy and programme responses from continental to local levels;
- d) Monitor and evaluate impacts and the effectiveness of remedial measures; and
- e) Understand the uncertainties and manage the associated risks.

4. Africa has a limited number of scientists, facilities and data sources. Funding is too scarce to monitor all the pertinent variables, derive key information and communicate promptly and effectively with all stakeholders. Expertise in addressing climate change issues is meagre, as many trained scientists work overseas. In addition to future climate modelling, areas for special attention include environment monitoring, climate risk management for farmer support and several adaptation initiatives.

5. Improving environment monitoring: Many critical resource issues such as water, land and biodiversity) have to be addressed in coherent and coordinated ways. This requires sustained observations and capturing valuable and quality data sets, strengthened continent-wide environment monitoring networks and improved data sharing. Extensive Reducing Emissions from Deforestation and Degradation (REDD) in developing countries activities' will require independent monitoring and evaluation and can be achieved by improving access to satellite data for responses in proportion to the size of the task.

6. Support for decision makers: Many difficult decisions will have to be made about adaptation. Decision makers at all levels must have access to reliable, up-to-date and understandable information on a

subject that they may not have considerable prior knowledge of. This is a major science communication challenge - extending from remote pastoral communities to ministers of finance. In addition, decision makers will have to manage many levels of uncertainty. A culture of proactive climate risk management with no regret strategies must be instilled in all pertinent sectors and stakeholder groups.

7. **Diversity in action:** While there are a large number of ongoing adaptation initiatives in Africa, the total impact is still negligible in relation to the size of the problem. The Climate for Development in Africa (ClimDevAfrica) Programme and its Africa Climate Policy Centre (ACPC) are intended to bring greater harmony and share best practices more widely. The ACPC Annual Climate Conferences should address the issue of maximizing the impact of ongoing actions and identification of gaps.

8. **Funding:** Special funding mechanisms to support climate change adaptation and mitigation initiatives are urgently required. For instance, the African Development Bank (AfDB) has developed a climate risk management strategy and will make funds available for a broad range of such activities through the ClimDevAfrica programme. Other funding mechanisms in Africa could do likewise. The AfDB through ClimDev-Africa and other relevant initiatives, is ready to assist and lead the process. People should be informed of these possibilities and encouraged to participate in coordinated ways. With new and improved efficient funding and appropriate governance, the science infrastructure in Africa can be strengthened and trained scientists attracted back. Such mechanisms could capture multiple benefits through the mainstreaming of climate change concerns within funding for poverty alleviation, biodiversity conservation and sustainable use and infrastructure investments, among others.

B. The potential of technology

9. Globally, Africa invests the least in research and development and is the least importer and user of global technology. Some of the main barriers to technology transfer include limited technology information, intellectual property rights protection, foreign direct investments, financial incentives and low industrial and technology base. These will present a major challenge to creating and sustaining low-carbon development pathways.

10. The Africa Partnership Forum (Special Session on Climate Change, Oct. 2009) suggested that Africa would benefit from:

- a) Accelerated technology development, diffusion and transfer through intensified efforts to build capacity both to develop and to use new technologies;
- b) Technology focus on areas of particular relevance to Africa, such as forests and land, energy efficiency and renewable energy; and
- c) Mobilizing its trade policy to support technology diffusion through the elimination or reduction of tariff and non-tariff barriers to trade in environmental goods and services, in order to promote the dissemination of cleaner low-carbon technologies.

11. **Innovative technology:** Africa is a relatively dry continent in dire need of improved water management to cope with climate change. Innovative continent-wide approaches must be considered to monitor transient water levels and for improved water harvesting and saving technologies. Satellite technology can be used for daily monitoring of river levels and soil moisture, for efficient water resource management, especially in transboundary waterways. Furthermore, improved engineering technologies for harvesting and storing water may be needed, especially in drought-prone areas.

12. Intellectual property rights (IPRs) constitute a major divide in climate negotiations. African countries see them as a barrier to technology transfer while developed countries stress their role in promoting innovation. There should be a balance between rewarding innovators and greatly scaling up technology diffusion and transfer. A classic example is the data policy of the World Meteorological Organization. Efforts to recover costs by selling weather and climate data only resulted in restricted access to data for development in Africa, and perpetuated the gulf between climate and development communities.

13. Institutional arrangements: Another fundamental issue is the institutional framework for technology transfer. Africa (as part of G77) is seeking a new 'mechanism' to guide overall technology development and transfer activities under the United Nations Framework Convention on Climate Change (UNFCCC). However, developed and developing countries have not yet agreed on the arrangements and mechanisms for supporting technology transfer, especially its financing.

C. Innovation

In understanding planning and adapting to a changing climate, innovation and innovative approaches are important for African countries to take advantage of opportunities and reduce risks. This is because innovation will bring new products, processes and services that could improve and enhance adaptation and mitigation strategies. As such, innovation will determine the ability of Africa to generate new and improved products and processes to meet the challenges of climate change.

15. Africa's technological and non-technological innovative potential remains untapped and its ability to generate new opportunities and meet emerging challenges posed by climate variability and change is low. For example, community biofuel production could be a supplementary income earner for a vast number of rural communities, particularly in years of surplus food production. There is also potential for vast solar power generation in some parts of Africa with the possibility of connecting into major markets for green energy in Europe. Overall, the introduction of greener innovation systems and initiatives will be highly dependent on workers with the requisite skills to integrate cleaner technologies into existing and emerging systems in a sustainable manner. Furthermore, Technology Innovation Systems (TIS) should also be developed to enable interaction between industry, technologists and governments.

16. Cultivating curiosity: The continent is in need of an ever-curious cadre of scientists, technologists, policy makers and industrialists with problem-solving skills. This could be achieved through education and rewarding of innovations in both the public and private sectors. Traditional knowledge and new technologies can be combined for adaptation to climate change through "innovative partnerships" and "adaptive innovation". Africa could also learn from the experiences of others and from ongoing initiatives on the continent. In order to promote the engagement of the private sector, policy and investment environments should be favourable. Innovation centres might best be developed in association with the Regional Economic Communities (RECs) and regional development banks.

17. Innovation and Africa's comparative advantage: The continent has many comparative advantages in several areas, and can thus uniquely develop its own brand of innovation. For instance, by deploying second generation technologies, the continent could become a leader in the production of the world's bio-energy by 2050. South Africa alone is expected to produce over 400 million litres of biofuel per year and an additional 25,000 jobs. To achieve this, countries need to actively acquire and develop new and emerging technologies.

18. Investing in science and innovation: Although over the last 30 years, African governments have made several pledges to invest more in science, technology and innovation (STI) most of these pledges have not been implemented. The reality is that the continent's ability to innovate on climate adaptation and mitigation cannot be translated into concrete action without significant investment in STI, particularly by governments. Most sub-Saharan African countries spend an average of just 0.3 per cent of their GDP on science and technology — a far cry from the one per cent promised in 1980 and again in 2005. Research and development (R&D) in climate change is one way of using science, technology and innovation to foster regional integration. Climate change research could be undertaken through concerted action in the different subregions of Africa, with assistance from the RECs and contribution from countries.

D. Capacity building

19. Insufficient trained human resource is a constraint, due, in part, to brain drain, limited investment in education and lack of demand and opportunity for skilled individuals in Africa. Capacities should be built to empower researchers, industry, communities and individuals to tap into new and emerging opportunities in the green economy and meet the challenges of adaptation to climate change. Adaptation could also be seen as an opportunity for beneficial change to pursue new development strategies, diverse economic activities and improve efficiency and productivity of existing sectors, such as agriculture, energy, transport and water.

20. Capacity-building is required to:

- a) Negotiate a fair deal for Africa in international environmental fora;
- b) Develop and practice climate risk management (CRM) in terms of training, research, and development;
- c) Develop innovation policies for climate change, including institutional and legal frameworks;
- d) Integrate climate change into development strategies and policies from the continental to local level, and demonstration/pilot to large scale projects;
- e) Integrate climate change into sectoral work plans and operational decisions;
- f) Establish safety nets in a changing climate for most vulnerable communities;
- g) Accelerate transfer of environmentally sustainable technologies;
- h) Improve communication to receive and send prompt advisories, early warnings and development information, especially in rural communities;
- i) Provide next generation education and public awareness on climate and development issues and action plans; and
- j) Facilitate the transfer of relevant baseline data and environmental information within and between ministries and countries.

21. A particularly important issue in Africa is capacity utilization. How do we ensure that existing institutions and trained personnel can express their full potential? For example, relationships between weather services and communities should be improved so that meaningful information can be applied to adaptation efforts. With increased climate variability and the spate of disasters, it is essential to have better climate services working with local stakeholders in long-term partnerships. Courage is needed to reform underperforming institutions with new governance. Good salary and a productive working environment are extremely important for retaining quality staff. Regional institutions supported by member States may be an appropriate vehicle for work on climate change. Some countries have already implemented programmes to capture expertise through sharing of key staff across government

departments and ministries, development of long-term partnerships with academic institutions and maintenance of expert databases.

22. Education: Raising awareness of future generations to cope with climate change is essential. The science of climate change should be introduced into school and college curricula with a focus on practical skills for the management of climate risks. Online training should be developed to increase public awareness about taking immediate action. Many in the financial industry have already recognized business opportunities and are hiring top experts in CRM.

III. Conclusion

23. Clearly, while climate change is a major challenge for Africa, it also presents many opportunities. For the allied processes of mitigation, adaptation and development through climate change, Africa is in need of a continuous coordination process to:

- a) Create a broad, knowledgeable, well resourced and connected scientific community;
- b) Develop a new innovation policy for climate change to nurture a culture of innovation especially in low carbon and alternative technologies;
- c) Ensure access to up-to-date technological resources, tailored to needs in Africa;
- d) Generate a community of stakeholders capable of managing climate risks; and
- e) Create public awareness and interest in responding to climate change issues.

IV. Key questions

A. Science for decision Makers

24. Can Africa be fully competent in (a) global negotiations, (b) transformation to a green economy with low-carbon development pathway and (c) adaptation processes, without major investment in the climate and environmental sciences in Africa?

25. Are international partnerships an effective way for nourishing African scientific skills? These may be appropriate for global climate modelling and satellite environmental monitoring but how can science (as in climate risk management) best support local governance to increase resilience of poor rural communities?

B. The potential of technology

26. What must Africa do to harness the full potential of technological advancements and innovations in order to develop low-carbon development pathways? Will enhancing technology transfer and investing in future technological solutions and opportunities through expanded R&D be sufficient?

C. Innovation

27. How can Africa promote Innovation in mitigation and adaptation processes? Is consensus more valued in African society than individual thinking? Does this stifle innovation or are mechanisms for rewarding innovation lacking? Might innovation centres help in identifying and disseminating best practice? Do development banks choose secure investments and avoid innovation? How do we strengthen adaptive and resilience capacities, especially of those countries and sectors/communities most vulnerable? How willing are African countries to invest in Science, Technology and Innovation to meet the challenges of climate change?

D. Capacity building

28. While human capacities need strengthening throughout Africa, what are the priorities for investment vis-à-vis climate change? Should this be organized centrally? By region? Or left for countries to attend to themselves? What needs to be done to reverse the brain drain and ensure that capacities are available in Africa for the long term?

E. Working together

29. Would the benefits from integrating the many existing adaptation initiatives and networking of climate-in-development programmes justify the work involved? Would such a process allow best practices to be transferred elsewhere and scaled up more efficiently? Would it give Africa more control over its adaptation agenda? How can cooperation between programmes be enhanced without stifling creativity and innovation? When are regional initiatives appropriate? What actions are needed to strengthen international cooperation to promote dialogue, common awareness, shared analysis and understanding?

F. Ongoing initiatives in Africa

30. Has anyone mapped them? Are there more major ones?
- a) ECA- (ICSU): Road Map development and Network of Academy of Sciences;
 - b) World Climate Conference 3: Global Framework for Climate Services;
 - c) UNDP) Adaptive Learning Mechanism and African Adaptation Programme;
 - d) Climate Risk Management through (IRI/NOAA), (ACMAD), (ICPAC), (DMC) and RC4DC;
 - e) CCAA: DfID-IDRC Research and Adaptation Capacity-Building programme;
 - f) Community Based Adaptation by IIED; GTZ Adaptation capacity-building;
 - g) UNEP-SEI Climate Adaptation Collaborative Programme, UNEP-UNDP PEI ;
 - h) ClimDevAfrica: AUC, AfDB, ECA, and other Partners (GCOS, WMO, UNEP, FAO);
 - i) AUC-EC African Monitoring of Environment for Sustainable Development (AMESD) ESA-TIGER Integrated Water Resource Management, and many others;
 - j) Africa Climate Policy Centre (ECA), IPCC, TERI ; and
 - k) Regional and subregional efforts to build hydro-political resilience in Africa (AU, NEPAD, AMCOW, UNECA; ECOWAS, SADC, IGAD).