



United Nations
Educational, Scientific and
Cultural Organization

Executive Board

Hundred and seventy-seventh session

177 EX/16

PARIS, 17 September 2007
Original: English

Item 16 of the provisional agenda

REPORT BY THE DIRECTOR-GENERAL ON A PLAN OF ACTION CONCERNING UNESCO'S PARTICIPATION IN THE IMPLEMENTATION OF THE DECISION AND DECLARATION BY THE AFRICAN UNION SUMMIT ON SCIENCE, TECHNOLOGY AND SCIENTIFIC RESEARCH FOR DEVELOPMENT (JANUARY 2007)

SUMMARY

In January 2007, the eighth African Union Summit of Heads of State and Government (Addis Ababa, Ethiopia) adopted a Declaration to boost science and technology and the development of the ethics of sciences and technology in Africa. Prior to the Summit, the African Ministerial Conference on Science and Technology (AMCOST) adopted the implementation plan of the Consolidated Plan of Action (CPA), which comprises a number of initiatives in fields ranging from biotechnology to laser research and science policy. The total cost of implementation as estimated by the African Union amounts to \$157 million over five years. The Declaration adopted by the African Heads of State and Government in Addis Ababa in January 2007 called on UNESCO to work closely with the AU/NEPAD Secretariat to implement the Plan. At its 176th session, the UNESCO Executive Board, responding to a proposal from the African Group, adopted a decision (176 EX/Decision 56) requesting the Director-General to prepare a plan showing how UNESCO intends to contribute to the implementation of the Summit's decisions and declarations, notably the implementation of the CPA over the next medium-term period (2008-2013 – 34 C/4). The present document contains the Director-General's proposals in this regard.

Decision proposed: paragraph 45.

A. INTRODUCTION

1. Held in Addis Ababa in January 2007, the Eighth African Union Summit of Heads of State and Government adopted several decisions on science and technology which are listed in document 176 EX/INF.10, in which the Director-General informed the Executive Board about UNESCO's participation in the Summit. The following were among the important results reported:

- the decision on the report of the Extraordinary Conference of Ministers of Science and Technology (Assembly/AU/Decl.6 (VIII)) which includes the adoption of the implementation plan of the Consolidated Plan of Action (CPA);
- the Addis Ababa Declaration on Science and Technology and Scientific Research for Development which called on "UNESCO and other bilateral and multilateral organizations to support the Member States, Regional Economic Communities and the African Union to implement the Summit decision on Science and Technology", while also recalling the OAU resolution on Bioethics adopted by the July 1996 OAU Summit in Yaoundé;
- the Addis Ababa Declaration on Climate Change and Development in Africa (Assembly/AU/Decl.4 (VIII)).

2. The present document has been prepared in response to the decision by the Executive Board, at its 176th session, requesting the Director-General to prepare a plan showing how UNESCO intends to contribute to the implementation of the decision taken by the Eighth Summit of the African Union Heads of State and Government and the Declaration, including the implementation of the CPA.

3. The CPA evolved from a series of continental and regional meetings of scientists, policy-makers and ministers which began in February 2003 and culminated in the Plan's endorsement by the African Union in Khartoum (Sudan) in January 2006. The implementation plan was subsequently formally approved by the African Union at its Summit in Addis Ababa in January 2007. The CPA articulates Africa's common objectives and commitment to collective actions to develop and use science and technology for the socio-economic transformation of the continent and its integration into the world economy (<http://www.nepadst.org>).

4. The CPA comprises a wealth of initiatives in fields ranging from biotechnology to laser research and science policy. The cost of implementing the Plan is estimated by AU/NEPAD at \$157 million over five years. The Declaration by the African Heads of State and Government in Addis Ababa in January 2007 called on UNESCO to work closely with AU/NEPAD to implement the Plan.

5. UNESCO played an important role in preparing the CPA. The Organization provided both intellectual and financial support, thanks to extrabudgetary contributions from Member States, especially the United Kingdom and Japan. UNESCO also acted as Convenor of the United Nations S&T Cluster in support of NEPAD.

6. It is not UNESCO's intention to contribute to the implementation of all the programmes and projects approved by the African Heads of State and Government. Rather, UNESCO will focus on some select areas where the Organization has a comparative advantage, such as water resources, science policy advice, capacity-building in science and technology, and science education through teacher training, e-learning, and the ethics of science and technology.

7. The Director-General has requested all programme sectors, and particularly the Natural Sciences, Social and Human Sciences, Education, and Communication and Information Sectors, to identify specific areas for cooperation in the context of the implementation of the current Programme and Budget for 2006-2007 (33 C/5). Furthermore, the requirements and concerns of

the CPA have already been included in the Draft Medium-Term Strategy (34 C/4) and in the Draft Programme and Budget for 2008-2009 (34 C/5), expected to be approved by the General Conference in November 2007 taking into account the recommendations of the Executive Board thereon (contained in documents 34 C/11 and 34 C/6 Add.). Intersectoral cooperation will be an important modality and feature of UNESCO's action during this period and it will also be applied, through the creation of suitable platforms, to the implementation of the CPA.

8. In the spirit of the special partnership called for by the African leaders themselves, UNESCO is eager to play its follow-up role and contribute to the implementation of the CPA at the continental and subregional levels, together with the African Union and the Regional Economic Communities. UNESCO's Regional Office in Nairobi (ROSTA) and the Division of Science Policy and Sustainable Development in the Natural Sciences Sector (SC/PSD) will play the lead role in this regard.

9. In the implementation phase, emphasis will be placed on: (i) assistance to build subregional and regional capacities and to develop human resources in the Regional Economic Communities and specialized regional institutions; (ii) support to Member States to establish governance systems and to develop national strategies for science, technology and innovation; (iii) implementation of subregional integrated scientific and technological programmes, in particular the African Distance Training Networks; and (iv) establishment and use of UNESCO Chairs as the foci for centres of excellence and their consolidation into an effective network.

10. Concerning the mechanism for regional consultation of United Nations agencies working in Africa to support AU/NEPAD under the supervision of the Economic Commission for Africa (ECA), UNESCO will continue to coordinate the response of the United Nations system in the field of science and technology. Therefore the implementation will also be based on an inter-agency partnership approach.

B. UNESCO'S RESPONSE

IMPROVING AND SUSTAINING WATER RESOURCE MANAGEMENT

11. **Focus:** UNESCO will contribute to the scientific assessment of Africa's water resources and systems through its International Hydrological Programme (IHP). The focus will be on regional and country level capacity-building, assessment of water resources availability, expanding scientific knowledge on hydrological processes and on the impact of climate change, as well as improving water resources management in various settings. Special attention will be paid to shared and transboundary waters. Groundwater, which is increasingly a critical resource owing to water scarcity, will constitute a particular focal area. Moreover, UNESCO's efforts will be strengthened through its existing ties to the African Ministers' Council on Water.

12. **Improving groundwater management:** The second phase (2007-2008) of the Water Programme for Africa (WPA II), now entitled Water Programme for Environmental Sustainability, financed by the Italian Ministry for Environment, Land and Sea, will seek to identify the impact of climate change and related adaptation strategies, particularly by improving management of groundwater resources (see also para. 39 below). With respect to transboundary aquifers, the UNESCO-IHP will perform continental studies and assessments of Africa's shared aquifers via the Regional Centre for the Management of Shared Groundwater Resources (Tripoli, Libyan Arab Jamahiriya), on condition that this centre is approved as a category 2 centre under the auspices of UNESCO by the General Conference at its 34th session. In parallel, within ISARM-Africa (Internationally Shared Aquifer Resources Management), IHP will support further case studies with co-funding from the Global Environment Facility. These case studies will include the lullemeden shared aquifer, the North Sahara aquifer systems, the Nubian aquifer system, the Lake Chad Basin aquifers and the Guinea Gulf aquifers.

Expected results

- New methodologies for managing coastal groundwater resources, mapping vulnerability and identifying risks developed.
- Adaptation strategies to counter the impact of global climate change on freshwater resources in Africa, particularly in arid and semi-arid areas, developed and shared with national authorities and decision-makers.
- Knowledge base on groundwater resources in Africa improved, through the reinforcement of groundwater-related studies and data collection activities.
- Continental studies and assessments of Africa's shared aquifers conducted by UNESCO-IHP.
- Databases and maps of transboundary aquifers developed in collaboration with the International Groundwater Resources Assessment Centre in the Netherlands (proposed to become a category 2 centre under UNESCO auspices).

Performance indicators

- Methodologies for coastal aquifers vulnerability mapping and training material.
- Training courses on aquifer vulnerability mapping
- Case studies to establish a vulnerability map of selected coastal aquifers.
- Training material on coastal aquifers vulnerability mapping produced and disseminated.
- Inventory of hazards and risks of coastal aquifers to be used as a territory and water resources management tool.
- Feasibility study on wastewater treatment, quality control, reuse and irrigation.

13. **Assessing rivers and predicting the impact of floods:** Within FRIEND (Flow Regimes from International Experimental and Network Data), the three FRIEND groups of Africa (Nile, South Africa, and Western and Central Africa) will continue to exchange hydrological data and mapping techniques. In parallel, the HELP (Hydrology for the Environment, Life and Policy) group is developing a model for the Nakambe basin in Burkina Faso that can be used to predict the impact of future floods. Beyond considerations of flooding, HELP will foster a greater exchange of information and experience on mitigating pollution from arable land to rivers and large water bodies, in line with a twin-basin agreement between the Welland (UK), Pilica (Poland) and Lake Naivasha/Malewa (Kenya) river basins. These activities will benefit from extrabudgetary support from Flanders.

Expected result

- Regional procedures for estimating the magnitude of floods at gauged and ungauged sites in the Nile basin designed.

Performance indicator

- At least two GIS training sessions on: physiographic characteristics of catchments and mean annual flood (MAF) measurements, in the Nile basin countries.

14. **Building research capacity and training water professionals:** The UNESCO-IHE Institute for Water Education will contribute towards meeting the water-related capacity-building needs of African countries, notably through postgraduate research by African students focusing on local problems, develop and share research on river engineering among the 10 riparian countries of the Nile basin and the implementation of a programme on water resources and environmental management at the National University of Rwanda, as well as through training provided at Kwame Nkrumah University of Science and Technology in Kumasi, Ghana, to enhance sustainable development and management of water resources in Ghana and the subregion, through a joint project with the Netherlands. Demand-driven training and education will be developed by UNESCO-IHE for practising water sector professionals in southern Africa, including a regional Master's degree programme in integrated water resources management. This will be achieved through WaterNet, which has 52 partners in southern Africa.

Expected results

- Research, education and training enhanced through cooperation among the 10 riparian countries of the Nile belonging to the UNESCO-IHE Nile Basin Capacity-building Network for River Engineering.
- Research capacity and skills of water sector professionals increased.
- Training in the use of satellite remote sensing for water resources management provided.

Performance indicators

- The number of African students enrolled in a Master's programme at UNESCO-IHE.
- The number of successful Ph.D. promotions of African students at UNESCO-IHE.
- The number of students enrolled in a Master's programme delivered on the African continent and developed with support from UNESCO-IHE (through the projects WaterNet, NPT/Ghana, NPT/Rwanda).
- Short courses delivered by UNESCO-IHE on the African continent.

15. **Moving towards integrated management of water resources:** Within the ongoing Sustainable and Integrated Management and Development of Arid and Semi-Arid Regions of Southern Africa (SIMDAS) initiative, studies will be undertaken of the Congo and Zambezi river systems as a first step to formulate recommendations for the integrated management of surface and groundwater resources in the SADC region.

Expected result

- Integrated management of surface and groundwater resources in the SADC region improved.

Performance indicator

- The report of the study and recommendations for the integrated management of surface and groundwater resources in the SADC region.

COMBATING DROUGHT AND DESERTIFICATION

16. **Centres of excellence in drought and desertification research:** UNESCO will encourage the establishment of regional and continental centres of excellence in drought and desertification research. One avenue being explored is the potential establishment of a subregional centre for drought management in the SADC region.

17. **Sharing information on dryland research:** Experience gained through dryland research projects like UNESCO's Sustainable Management of Marginal Drylands project will be made available to African scientists. Furthermore, scientific information will be shared and exchanged through work carried out in dryland biosphere reserves in Africa.

18. **Studying the hydrology of arid and semi-arid regions:** Within its global network on Water and Development Information for Arid Lands (G-WADI), UNESCO will continue to work with the Center for Hydrometeorology and Remote Sensing at the University of California, Irvine (United States) to offer African scientists access to tools and information resources to support research on hydrology in arid areas and the possibility of producing country-level information such as an aridity index map. The partners will make freely available real-time, dynamically updated high-resolution precipitation imagery to help counter land degradation in water-scarce areas.

Expected results

- Scientific and technical capacity for effective management and sustainable use of biodiversity in drylands in West Africa developed, within the UNEP/GEF and UNESCO-MAB regional project involving the six biosphere reserves in Benin (Pendjari Biosphere Reserve), Burkina Faso (Mare aux Hippopotames Biosphere Reserve), Côte d'Ivoire (Comoé Biosphere Reserve), Mali (Boucle du Baoulé Biosphere Reserve), Niger (W Biosphere Reserve) and Senegal (Niokolo Koba Biosphere Reserve).

- National policies informed through drought and desertification research undertaken.
- Knowledge base for hydrology in arid areas strengthened.

Performance indicator

- One publication, “Guidelines to promote dialogue among stakeholders within the biosphere reserves”, produced.

BUILDING A SUSTAINABLE ENERGY BASE

19. Access to electricity services in African countries remains very weak. In this context, the sustainable development of Africa is inextricably tied to rural electrification drawing on renewable energy. In support of the NEPAD objectives in the area of energy, UNESCO will pursue a four-pronged approach. First, it will provide technical assistance for energy policy-making and planning in the form of advisory services and institutional capacity-building. Legislation may be needed, for example, to eliminate barriers to broader use of renewable energy and to set up the necessary infrastructure for developing and disseminating relevant technologies. UNESCO will support countries in developing national policies or strategies through the established partnership on energy with the Community of Sahel-Saharan States (CEN-SAD). UNESCO will also provide technical support to the African Energy Commission (AFREC), as well as to national/regional initiatives launched at local and/or regional level. Furthermore, UNESCO will also assist African countries in defining and implementing priority national projects. Secondly, UNESCO will provide training targeting different audiences. For renewable energy to take root in Africa, it is essential for countries to have personnel trained to use, adapt and maintain the technology. This will include the organization of summer schools on solar electricity in rural and remote areas. In parallel, technicians, teachers and engineers in Africa need to intensify the exchange and sharing of knowledge and experience with their counterparts in other countries and regions (including through South-South and trilateral South-North-South cooperation). Next, UNESCO will support governments in implementing demonstration or pilot solar villages, highlighting the advantages of solar electrification and its impact on the daily lives of local communities. Lastly, UNESCO will advise governments in assessing their needs, their renewable energy potential and the role of renewable energy in local development.

Expected results

- Capacity-building in the use and application of renewable energy at the regional and national levels enhanced through training platforms and training of trainers.
- Pilot demonstration projects for building solar villages supported.
- National renewable energy policies developed.

Performance indicators

- Three training activities and one teaching material/tool developed.
- One pilot project implemented.
- Two countries/regional and/or regional entities assisted and 1 meeting organized

20. **Creating an African databank of energy research and technologies:** UNESCO will prepare materials and training workshops for national teams in energy technology assessment and foresight exercises. In addition, UNESCO will also assist countries in developing and/or improving their energy technology procurement policies and strategies.

Expected results

- An African databank of energy research and technologies established.
- National energy technology procurement policies and strategies developed.

Performance indicators

- Databank established.
- Support provided to at least three countries.

21. **Assessing energy resources in southern Africa:** Under the SIMDAS programme, UNESCO will define strategies to assess energy resources in southern Africa, taking into account critical parameters, such as the subregion's hydroelectric potential and the need for regional interconnection of electric grids, alternative sources like solar energy and the potential impact of new energy sources. This project will contribute to the NEPAD objective of ensuring access to energy for at least 35% of the African population within 30 years.

Expected result

- Assessment of the energy resources in southern Africa completed.

Performance indicator

- A map/publication assessing the energy resources in southern Africa produced.

IMPROVING POLICY CONDITIONS AND BUILDING MECHANISMS FOR INNOVATION

22. **Launch of the African Science, Technology and Innovation Policy Initiative (ASTIPI):** UNESCO will launch ASTIPI to build capacities in science, technology and innovation policy formulation. The core objective will be to develop national science, technology and innovation (STI) policies for all those African countries still without one. UNESCO will work with these countries to reform their science systems, assist them in policy formulation, facilitate the adoption of national policies and assist them in elaborating and implementing strategies and programmes. In cooperation with the other United Nations agencies belonging to the S&T Cluster, UNESCO will mobilize the necessary expertise, provide initial funding and, in consultation with AU/NEPAD, mobilize extrabudgetary resources to implement a capacity-building programme. Some 100 specialists will be trained in policy analysis between 2008 and 2010 and, an ASTIPI postgraduate course will be designed and implemented. Short-term executive workshops will be organized for senior government officials and creation of an African e-library of science, technology and innovation policy is planned.

Expected results

- Policies for science, technology and innovation adopted by African governments.
- Planning capacities of African governments strengthened at various levels.

Performance indicators

- Policies formulated in at least eight countries during the coming two years
- Up to 100 policy analysts trained.

23. **Assessment of status of science and technology policy formulation:** In cooperation with AU/NEPAD, UNESCO will conduct a survey of Member States to determine which countries have S&T policies and whether these policies are adequate for meeting present S&T needs and orientations. The survey will include an analysis of training needs in terms of the capacity to develop policies.

Expected result

- Status of science and technology policy formulation and training needs assessed in African Member States.

Performance Indicator

- Status report prepared and published.

24. Development of an African science, technology and innovation indicator: The UNESCO Institute for Statistics (UIS) and the Science Policy and Sustainable Development Division of the Natural Sciences Sector will cooperate with NEPAD to promote the adaptation and adoption of internationally compatible policy-relevant STI indicators and methodologies, build institutional capacities and develop an African network for STI indicators. Training seminars and workshops on STI policy-relevant indicators will be co-organized by UIS in 2008 for English-speaking Africa and in 2009 for French-speaking Africa. The organizers will also advise on the design of questionnaires, manuals and documentation for national collection of STI data.

Expected results

- Common African STI indicators developed.
- National capacities built for collection and interpretation of STI indicator data.

Performance Indicator

- An African Network for STI developed.

25. African STI observatory: UIS and the Natural Sciences Sector will cooperate with AU/NEPAD in the preparation of a feasibility study for the establishment and operation of an African STI observatory. UNESCO may also coordinate the regional analysis and dissemination of policy-relevant STI indicators in Africa, assist national STI institutions in producing and using them, and contribute to the training of specialists from STI institutions in their use.

Expected result

- Feasibility study for the establishment and operation of an African STI Observatory completed.

SAFE DEVELOPMENT AND APPLICATION OF BIOTECHNOLOGY

26. Helping to create a critical mass of African scientists and technicians in frontier life sciences: UNESCO will respond to the objectives of the CPA to create a critical mass of African scientists and technicians with the skills to engage in frontier life sciences and increasing access to, and sharing of, affordable state-of-the-art class research facilities for African scientists working in Africa in genomics, bioinformatics, gene technology, immunology, etc. Through its International Basic Sciences Programme (IBSP) and in close consultation with the United Nations Interagency Cooperation Network on Biotechnology (UN-BIOTECH), UNESCO will mobilize its networks and work with scientific NGOs to encourage intra-regional exchange and cooperation, including at the recently launched category 2 Regional Centre for Biotechnology Education and Training in India. The emphasis will be on South-South cooperation to strengthen existing infrastructure.

Expected result

- African scientists trained in frontier life sciences.

27. Contribution to building R&D capacity in health and agriculture: The launch of the Cape Town Component of the International Centre for Genetic Engineering and Biotechnology (ICGEB) in South Africa, based at the University of Cape Town, will provide an additional opportunity for UNESCO to strengthen existing collaboration with ICGEB. Capacity-building research and training activities will focus on diseases of concern to Africa and on plant biotechnology for essential staple crops in collaboration with ICGEB and the International Union of Biochemistry and Molecular Biology (IUBMB). The Biostatistics Centre, recently established with support from UNESCO at the University of Malawi, will contribute to training in statistical methods in these areas.

Expected results

- Capacity in research on diseases of concern to Africa and on plant biotechnology strengthened.
- Training in statistical methods applied to basic sciences and medical research provided.

BUILDING ENGINEERING CAPACITY FOR MANUFACTURING

28. Assessing engineering infrastructure and the curriculum of higher education institutions: As part of preparations for the UNESCO engineering report, UNESCO will commission a study on the status of engineering infrastructure and human resources in Africa.

Expected result

- Status of engineering infrastructure and human resources in Africa assessed.

29. Promoting university-industry-science partnerships: Within its University-Industry-Science Partnership (UNISPAR) programme, UNESCO will launch a pilot project in 2008 for the development of a science and technology park, in cooperation with the World Technopolis Association and ISESCO. This project will serve as a model for the region. It is expected that this project will develop a body of good practices and guidelines for establishing technology parks, which will be disseminated widely to national governments.

Expected results

- A pilot science and technology park established.
- Skills of government and university staff as well as private businesses in science park development and management developed.

THE AFRICAN LASER CENTRE

30. UNESCO will contribute to strengthening the African Laser Centre and postgraduate training and research on lasers and to the training of postgraduates and researchers in Africa through its Active Learning in Optics and Photonics (ALOP) project. UNESCO plans to strengthen this project in cooperation with ICTP and the African network of researchers in optics, photonics and lasers. ICTP holds an annual college on lasers and optics, which is usually attended by researchers and students from African and other developing countries. ICTP also supports an African network on lasers and atomic, molecular physics (LAMNET).

Expected result

- Researchers and postgraduate students in Africa trained to conduct research using lasers.

BUILDING AFRICA'S CAPACITY FOR MATERIALS SCIENCE

31. Strengthening postgraduate training and research on materials: ICTP can contribute to strengthening postgraduate training and research on materials and the establishment of an African Materials Research Society through its well-established Theoretical Condensed Matter Research Group. In parallel, UNESCO will facilitate sharing of information and experience in materials science by providing links to countries such as Brazil, Chile, Mexico, Malaysia, the Philippines and Thailand, which have succeeded in establishing postgraduate training and research in materials science – including laboratory facilities – in universities and research institutions.

Expected result

- Postgraduate training in materials research provided.

SECURING AND USING AFRICA'S INDIGENOUS KNOWLEDGE BASE

32. Developing an African databank on indigenous knowledge and technologies: Within its programme on Local and Indigenous Knowledge Systems (LINKS), UNESCO will contribute to the AU/NEPAD project on Africa's indigenous knowledge base, including the development of appropriate policies in support of quality indigenous knowledge research.

Expected results

- Guidelines and methodologies for the rigorous documentation of indigenous knowledge, practice and worldviews developed.
- Indigenous knowledge relevant to natural disaster preparedness, prevention and response, including knowledge related to climate change, documented and disseminated.

Performance indicators

- Number and quality of documents prepared and disseminated.
- Number of guidelines developed.

33. Promoting the integration of indigenous knowledge and practices in education curriculum: UNESCO will assist in reviewing the indigenous knowledge content of current curricula in African education systems and in identifying international good practices as well as teaching tools in order to propose a place for indigenous knowledge alongside science in formal education.

Expected result

- Integration of indigenous knowledge issues into formal education curricula and educational materials promoted in Africa.

Performance indicator

- Number of pedagogical materials developed.

CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY

34. The NEPAD framework commits African countries to establishing regional networks of centres of excellence in science for the conservation and sustainable use of the continent's biodiversity. UNESCO's Man and the Biosphere (MAB) Programme will use its regional network – 68 biosphere reserve sites in 30 African countries to date – to help governments make informed decisions about biodiversity conservation, through research and monitoring in biosphere reserves in eco-hydrology and the sharing of information and experience arising from this work. UNESCO will also identify gaps in knowledge and needs for future assessment, and train conservation scientists. To strengthen African gene banks, UNESCO will assist African countries in the conservation and sustainable use of microbial diversity. A twofold strategy for adding value to biodiversity will entail helping biosphere reserves to generate much-needed revenue from eco-industries.

Expected results

- Research on dryland, humid tropic and mountain ecosystems in biosphere reserves in Africa expanded and the results disseminated.
- Strategies using biosphere reserves for testing the idea of pilot sites and learning laboratories for sustainable development to promote eco-industries and methodology in the light of global climate change developed.

Performance indicator

- Teaching kit resources for dryland countries produced.
- Regional, subregional and national networks developed and made operational.

35. Mobilizing and training conservation scientists: A comprehensive review of conservation science training programmes and institutions in Africa will be conducted to identify needs and leading universities and related research agencies which would form a network of centres of excellence in conservation. Specific opportunities for training African conservation scientists will be identified and their training both within and beyond Africa will be facilitated. Ties between postgraduate training institutions in Africa and their counterparts in other parts of the world will be strengthened to promote South-South, as well as triangular South-North-South cooperation, to

improve training of forest managers and scientists in the field of conservation and sustainable use of biodiversity.

Expected results

- Knowledge-sharing and exchange promoted between the Regional Post-graduate Training School on Integrated Management of Tropical Forests (ERAIFT) and other universities in the humid tropics, in the continent as well as in South-East Asia and Latin America.
- ERAIFT transformed into a centre of excellence *in situ* for training and research in biodiversity and conservation, in order to reduce brain drain.

Performance indicators

- Each academic year 20 sub-Saharan African specialists at the Master's/postgraduate level and at least three Ph.Ds. every three or four years trained.
- An MoU between the UNESCO Chair of Para University (Belem, Brazil), the Kinshasa University (DRC) and some Asian universities in humid tropics regions, established.
- Feasibility study to strengthen the ERAIFT School as a UNESCO institute – category 1 or 2, initiated.
- Twenty MAB Young Scientists Research Grants, including the GRASP Fellowships to men and women, especially from least developed countries (LDCs) and Africa, awarded.

SCIENCE AND TECHNOLOGY EDUCATION

36. Through a series of subregional and national training courses and workshops, UNESCO's intersectoral platform in draft document 34 C/5 on science education will strengthen the knowledge base of decision- and policy-makers and curriculum planners in science, technology and engineering education (STE), to enable them to improve the quality and relevance of their national STE policies and programmes in the interests of poverty reduction, environmental protection and sustainable development in Africa. Teachers will be trained to use contents, methods, materials and activities that are challenging and practical and respond to the latest developments in science and technology, as well as being of interest to pupils and relevant to their daily lives and expectations. This will include South-South cooperation. It will also involve the participation of science museums, botanical gardens, zoos and science associations.

Expected results

- Knowledge base of teachers and decision- and policy-makers strengthened.
- Relevance of STE curricula improved.
- Information exchange and networking enhanced through networks such as ADEA, SMASSE and FAWE.

37. **Creating an African virtual campus:** UNESCO (ED, SC and CI) will work with existing educational institutions, and notably the Avicenna Virtual Campus which UNESCO has already established in the Mediterranean Basin with European Commission funding, to develop a regional e-learning network in science and technology in sub-Saharan Africa. Depending on the availability of resources, the Avicenna Virtual Campus network for Africa will be put in place in three phases between 2008 and 2013. Likewise depending upon funding, distance-learning centres will be set up in universities, engineering institutes and specialized scientific institutions in sub-Saharan Africa, to train the trainers and technical staff in charge of managing the network. A quality control mechanism has been put in place to guarantee high-quality online courses.

Expected results and performance indicators

- An African virtual campus put in place by 2009.
- Virtual library in science and technology developed.
- Tutors trained in distance teaching.

Performance indicators

- Virtual laboratories in physics, chemistry and natural sciences for secondary and higher educational institutions in place by 2012.
- Teachers able to produce online courses and high-quality online modules by 2013.
- Knowledge-sharing and material exchange freely available via the African virtual campus network by 2013.

SCIENCES AND ADAPTATION TO CLIMATE CHANGE

38. The science is clear: the warming of the Earth's climate is "unequivocal" and attributable to human activities. The impact of climate change is already being felt. The cost of inaction will exceed the cost of taking early action. Industrialized countries must continue to take the lead in reducing their emissions, in line with their historic responsibility and economic capabilities. For their part, developing countries need to engage further in actions to address climate change, while safeguarding development and the reduction of poverty. Adaptations to climate change, as well as ways of mitigating its impact, need to be mainstreamed in development planning. UNESCO's more than 30 climate-related programme activities are tackling such issues as biodiversity loss, sea-level rise, carbon economics and sequestration, salt-water intrusion in coastal soils and groundwater, drought management, renewable energy use, the impact of climate change on biosphere reserves and climate monitoring via global observing systems. These are all important issues for Africa. The African Summit in January 2007 emphasized climate change, as it will significantly affect the future of biodiversity, as well as the options for land and resource use and human well-being in Africa. The implementation of NEPAD's S&T CPA and its climate change resolutions are inextricably linked. Consequently, UNESCO's contribution to the CPA will seek to promote synergies between these two components of the Plan wherever possible.

39. **Climate change and water resources in Africa:** In collaboration with others partners, IHP will continue to heighten awareness among decision-makers of the impact of climate change and climate variability in Africa, to ensure that the climate change dimension is taken into account in national strategic development plans. UNESCO will: (i) collaborate on the preparation of the ECOWAS subregional action plan on climate change; (ii) contribute, through FRIEND, to improving the knowledge base on the impact of climate variability and change on the major river basins and shared aquifers in Africa, and assessing adaptation strategies; (iii) assess groundwater resources in Africa and provide forecasting under various scenarios of future population pressures and climate change, within its global GRAPHIC (Groundwater Resources Assessment under the Pressures of Humanity and Climate Change) project; (iv) co-organize an international conference on groundwater and climate in Africa in Kampala (Uganda), together with the Directorate of Water Development of Uganda; (v) establish an African regional network of experts in Africa to work on the GRAPHIC project from 2008 onwards, while another project will focus on North Africa (Morocco, Algeria and Tunisia); and (vi) organize workshops and other activities to improve management of coastal aquifers and vulnerability mapping, and to identify hydrogeological characteristics within its Coastal Aquifers Management, Groundwater-dependent Ecosystems and Climate Change project, supported by GEF.

40. **Developing a pan-African ocean and coastal observation and forecasting system:** The Global Ocean Observing System for Africa (GOOS-Africa) coordinated by the Intergovernmental Oceanographic Commission of UNESCO (IOC) is a component of the Global Climate Observing System in Africa. GOOS-Africa encompasses: (i) the African network of *in situ* ocean observing and monitoring systems, including sea level records for monitoring coastal zones and the impact of global change in Africa; (ii) remote sensing and satellite applications for the marine and coastal environment; (iii) modelling and forecasting based on *in situ* and satellite data through the EU-supported project GEONETCast; (iv) the effective involvement of different stakeholders at different stages of project implementation and development of an end-user interactive communication and information delivery system; (v) industry and business partnerships to reinforce a Regional Ocean Forecasting System for Africa; and (vi) project management, integration and coordination.

Coordination of the collection of data and information on the role that primary forests play in sequestering carbon, using African biosphere reserves as pilot sites, is also part of GOOS-Africa. In this connection, a first pilot project currently being conducted in the Taï Biosphere Reserve (Côte d'Ivoire) will serve as a model for other projects. The current project uses satellite imagery and involves UNESCO-MAB, Spot Image Toulouse (France), Pro-Natura International and two ERAIFT alumni from Côte d'Ivoire working in Taï Biosphere Reserve.

Expected results

- A Pan-African regional ocean observing and forecasting system for integrated management of the ocean and coastal environment and natural disasters in Africa, developed within GOOS-Africa.
- Innovative combinations blending carbon sequestration for climate change mitigation with rural energy and infrastructure development tested in the context of biosphere reserves.

41. **Adaptation to climate and coastal change:** IOC is involved in developing approaches to mitigate the effects of climate change on coastal areas, which is exacerbating the vulnerability of ecosystems, coastal infrastructure, biodiversity, agriculture, fishing, and drinking water resources, especially in Western Africa. The Adaptation to Climate and Coastal Change (ACCC) is a GEF/UNDP project being implemented by UNESCO/IOC at the request of Cape Verde, Gambia, Guinea-Bissau, Mauritania and Senegal. It was initiated by the African Process and taken up in the Action Plan for the Environmental Initiative of NEPAD. The objectives of the ACCC project are to perform adaptation actions in pilot sites particularly vulnerable to natural climate changes and to anthropogenic degradation in the short, medium and long term (erosion, mangrove destruction, etc.). These actions could serve as an example for future regional and global application. Another major objective of the project is to formulate national and regional strategies of adaptation aiming at managing the impact of changes to the shoreline, in the framework of integrated coastal area management. The ACCC project will run for four years (2007-2010), in the form of one GEF Full Size Project.

Expected result

- National and regional adaptation strategies for climate and coastal change formulated.

DELINEATION OF CONTINENTAL SHELF

42. NEPAD, the IOC and GRID-Arendal are working together to play an important advocacy role to promote awareness among African countries of Article 76 of UNCLOS dealing with the delineation of the outer limits of the continental shelf. In this regard, the three agencies are developing a strategy for fast-tracking capacity-building in Africa, so that countries can prepare submissions on the outer limits of the continental shelf beyond 200 nautical miles, before the deadline of May 2009. UNESCO and UNEP are exploring opportunities for developing partnerships with a view to assisting the African countries in the preparation of these submissions.

Expected result

- Assistance in the preparation of the submissions provided.

ETHICS OF SCIENCE AND TECHNOLOGY

43. The fifth session of COMEST was held in Africa for the first time (Dakar, 6-9 December 2006), with 200 participants representing 25 African countries as well as other regions. Key issues of interest to Africa are outlined in the Dakar Declaration on the Ethics of Science in Africa and the Forum of Young African Researchers (Social Responsibility of Researchers in Africa). UNESCO will develop a regional programme of cooperation with ECOWAS to implement the Declaration and follow up the dialogue between researchers and policy-makers. It is of utmost importance to

increase awareness of sustainable and ethical use of natural resources in African countries. UNESCO will assist in capacity-building for Africa relating to the “ethics of science and technology, environment and natural resources” (Eighth AU Summit on S&T in Africa). In light of this, national and regional workshops on environmental ethics will be organized to promote reflection, dialogue and capacity-building on current issues especially in Africa (AU Summit, 2007). With respect to capacity-building: a draft core curriculum for the teaching of environmental ethics will be developed with different stakeholders; teaching of environmental ethics will be encouraged; networks of experts in environmental ethics will be created; contributions will be made to existing teaching programmes, developing model programmes and evaluation criteria. As a follow-up to the UNESCO publication *Environmental Ethics and International Policy*, meetings with experts from different regions will be organized. In order to engage civil society in public debate, “Ethics around the World” conferences will be organized in African countries. Bioethics capacity-building will be focused on establishing national bioethics committees in at least six countries. Technical assistance during three years (training, documentation, ethics consultation) will be provided to those countries that have established, with the assistance of UNESCO, a national bioethics committee in 2007 (Gabon, Ghana, Togo, Madagascar and Malawi). The proposal for a core curriculum in bioethics, based on the Universal Declaration on Bioethics and Human Rights and developed by UNESCO, will be introduced and tested in at least 10 university curricula in at least five countries. Furthermore, at least five ethics teacher training courses for young scientists and professionals interested in ethics teaching will be scheduled in cooperation with the UNESCO Regional Bioethics Documentation and Information Centre at Egerton University, Kenya.

Expected results

- National bioethics committees established in at least six countries.
- Technical assistance (training, documentation, ethics consultation) to those countries that have established national bioethics committees (Gabon, Ghana, Madagascar and Malawi) provided.
- Core curriculum in bioethics, based on the Universal Declaration on Bioethics and Human Rights, developed, introduced and tested in at least 10 universities in at least five countries.
- Five ethics teacher training courses for young scientists and professionals interested in ethics teaching conducted.

FLAGSHIP PROJECTS

44. As a means of concentrating efforts in certain priority areas, the Director-General has identified three flagship activities in consultation with the Africa Group:

- (i) initiative for capacity-building in science policy;
- (ii) science and technology education; and
- (iii) establishment of an African virtual campus.

Proposed draft decision

45. Taking into consideration the above, the Executive Board may wish to adopt the proposed decision as follows:

The Executive Board,

1. Recalling 164 EX/Decision 8.6, 166 EX/Decision 4.1, 170 EX/Decision 4.1, 175 EX/Decision 41 and 176 Ex/Decision 56,
2. Also recalling the Yaoundé Decision of the 32nd OAU Summit on Bioethics (AHG/Res.254 (XXXII)),

3. Further recalling the Addis Ababa Declaration of the Heads of State and Government of the African Union on Science, Technology and Scientific Research for Development (Assembly/AU/Decl.5 (VIII)), in which the African Union (AU) called upon UNESCO to assist in the implementation of the decision of the Summit on science and technology and the Addis Ababa Declaration on climate change and development in Africa (Assembly/AU/Decl.4 (VIII)),
4. Having examined document 177 EX/16,
5. Welcomes document 177 EX/16 prepared by the Director-General and expresses its satisfaction that expected results have been formulated for the various programme areas;
6. Notes with satisfaction that the priorities of the Plan of Action correspond to the strategic programme objectives of the Draft Medium-Term Strategy for the period 2008-2013 (34 C/4), as amended by the Executive Board (34 C/11);
7. Invites the Director-General to ensure that in the implementation of document 34 C/5, once approved by the General Conference, all programme sectors, in particular the Natural Sciences and Human and Social Sciences Sectors, but also the Education and Communication and Information Sectors, will work in an intersectoral manner in the implementation of this Action Plan and the realization of the expected results;
8. Calls on UNESCO, as lead agency of the United Nations S&T Cluster for the Support of AU/NEPAD, to continue coordinating its work with other appropriate United Nations organizations as well as bilateral and multilateral institutions, so as to ensure coordinated and coherent implementation of the Plan of Action;
9. Approves the emphasis placed by the Director-General on three flagship projects, namely the initiative for capacity-building in science policy, science and technology education and the establishment of an African virtual campus;
10. Invites the Director-General to ensure that, during the three biennia (34 C/5, 35 C/5 and 36 C/5) covered by the new Medium-Term Strategy (2008-2013), resources of the regular programme are made available to partially finance some of the projects;
11. Invites the Director-General to cooperate with the African Union in the mobilization of extrabudgetary resources for the implementation of this Plan of Action;
12. Requests the Director-General to initiate activities promoting the ethics of science and technology in Africa, issues addressing environmental ethics, support to ethics and national bioethics committees in Africa and strengthening national research systems;
13. Underlines the importance of South-South and triangular South-North-South cooperation in the field of science and technology and requests the Director-General to reinforce UNESCO's support in this regard;
14. Requests the Director-General to implement the proposals and initiatives contained in document 177 EX/16 and invites him to submit a progress report on the implementation of this Plan at its 180th session;
15. Decides to transmit this decision to the 34th session of the UNESCO General Conference.