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ICSU-UNESCO
RIO+20 REGIONAL SCIENCE AND TECHNOLOGY WORKSHOP FOR AFRICA

Appraisal of Rio+20 Issues and Recommendation of Follow-up Actions

by

Leading Representatives of the African Science, Engineering and Technology Community

NRF National Research Foundation

ACCESS
Applied Center for Climate and Earth Systems Science

Environmental Affairs
Science and Technology
Social Development

Central Drafting Committee of the ICSU-UNESCO Rio+20 Regional Science and Technology Workshop for Africa

We, the leading representatives of the STEM Community in Africa, have made these recommendations in good faith and look forward to a very successful Rio+20 Conference as well as implementation of programmes that will derive from it.

Done by:

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On the 1st day of June 2011 in Pretoria, South Africa

A. Preamble

In recognition of the critical importance of the United Nations Conference on Sustainable Development (Rio+20) that is scheduled to hold its session in Rio de Janeiro, Brazil in June 2012, to the welfare of the global society in general, and Africa in particular, leading representatives of the science, engineering and technology (SET) community in Africa gathered in Pretoria, South Africa, from May 30 to June 1, 2011, under the auspices of the ICSU ROA and UNESCO Bureau for Science in Africa, to review the socio-economic circumstances of Africa, assess the extent to which past and on-going economic development conventions and initiatives have met their objectives, vis-à-vis improvement of the quality of life in the continent, and analyse the declared objectives of the Rio+20 Conference and potential impacts that the prospective agreements and ensuing initiatives would have on sustainable development of the continent. Our assessments and recommendations are herein presented in three sections. Section A which is this preamble, provides the rationale for our contribution to the Rio+20 programme; section B covers our brief recommendations on overarching issues; and section C deals with our recommendations and responses to specific questions on each of the three thematic issues discussed at the Rio+20 Regional Workshop for Africa.

A.1 We, the representatives of national, sub-regional, regional and global SET organizations, participated in, and benefited from detailed reviews, presentations and dialogue on the following themes:

i. *Greening of the global economy for poverty reduction*
ii. *Building of institutional frameworks for sustainable development*
iii. *Identification and configuration of approaches to management of new and emerging challenges to sustainable development*

A.2 While exhibiting interest in the issues that will be addressed at the upcoming Rio+20 Conference, we the representatives of the African SET community, would like to highlight the immense contributions of Africa to global sustainable development in terms of natural resources, biodiversity, mitigation systems for global pollution, and knowledge systems, noting particularly, Africa's role as the host of the 2002 World Summit on Sustainable Development that was held in Johannesburg, South Africa.

A.3 In our appraisal of the objectives of the Rio+20 Conference, we note that new initiatives that will be developed within the planned themes, could bring aggregate benefits to the global society while deepening socio-economic disadvantages for African countries, at least, in the near-term. In view of the foregoing realization, a safety net which must be designed through well-informed and good-faith negotiations at Rio+20, must have the capacity to forestall further deterioration of the quality of life in Africa. Our contributions presented herein, to the development and implementation of appropriate action plans and implementation processes with adequate monitoring mechanisms, should be viewed within this context.

A.4 Taking cognizance of the non-implementation, outright failure and the minimal successes registered by most of the initiatives on Africa that derived from agreements at the 1992 Earth Summit at Rio de Janeiro, and many other agreements that have targeted sustainable development on the African continent, we the African SET representatives, with yearning for improved socio-economic conditions in Africa, and with respect for the declared interest of the global community in regional equity and

fairness, hereby provide moral and intellectual support to our national representatives on negotiations that will be held before, during and after the upcoming Rio+20 Conference.

A.5 Recognizing that Africa is a diverse continent with many socio-economic vulnerabilities and opportunities that could be enhanced or minimized by the agreements, initiatives and action plans that will derive from the Rio+20 Conference, we have configured our recommendations as approaches, mechanisms and systems that have utility in attaining the Rio+20 vision in Africa as a region, while maintaining adaptability to the specific circumstances of each African sub-region or country.

B. Recommendations on Cross-Cutting Issues

Being that the three themes of the Rio+20 Regional Workshop for Africa, namely, green economy; institutional frameworks; and emerging challenges have interrelated driving factors and potential impacts, we the African SET representatives, hereby make the following cross-cutting recommendations that can support positive developments in the three themes. Recommendations that are more specific to each of the three themes are presented in Section C of this document.

B.1 Consistent with the recognition that social transformations will undoubtedly accompany efforts on the attainment of sustainable development through green economy programmes, specific systems should be implemented to ensure that vulnerable groups exemplified by women, youth and the disabled, are protected through their socio-economic empowerment in Africa.

B.2 Considering that well-designed programmes can fail if not properly coordinated and monitored, efficient mechanisms should be established to ensure good governance and accountability in both the public and private sectors, to effectively meet specific targets of Rio+20 programmes.

B.3 Knowing that human capital can be an asset to sustainable development, the workforce in African countries should benefit from educational programmes that are based on improved curricula, easy access to data/information and exposure to cross-disciplinary issues and methodologies.

B.4 Considering that initiatives such as green economy that target sustainable development must have regional context and relevance to succeed, such initiatives should be designed to gain from indigenous knowledge systems (IKS) of the African continent.

B.5 Being that research and entrepreneurship are known as the twin engines of innovation, SET and humanities research support infrastructure such as research parks, technology incubation centres, library systems, data storage and transfer centres, internet systems and laboratory support systems need to be established in greater numbers in Africa.

B.6 Transformation of socio-economic conditions at the intense level implied in the Rio+20 thematic programmes, requires the identification and engagement of all stakeholders to contribute in appropriate areas of the economy. It is particularly necessary to engage the private sector in Africa on the planning and implementation of Rio+20 initiatives.

B.7 Africa has been the object of numerous development policies and action plans at the local, provincial, national, sub-regional and regional levels. In order to ensure that the results of some of these

policies do not negate those that will derive from the Rio+20 Conference, the policies need to be analysed and harmonized.

B.8 In view of cross-cutting recommendation B.7, the following socio-economic transformation mechanisms need to be analysed and harmonized with respect to their operation in various countries and sub-regional economic blocs in Africa: regulations/conventions, policies, market incentives, educational and research support systems, performance monitoring systems, and enforcement systems.

C. Recommendations on Specific Themes and Responses to Questions on the Role of Science, Engineering and Technology

C.1 As representatives of the SET community in Africa, it delights us that the role of science, engineering and technology (SET) in the success of the Rio+20 vision and specific development targets such as the Millennium Development Goals (MDGs) has been recognized, as evident in the posing of the following questions.

C.1.i *What are the priority issues for Rio +20 as seen by the scientific and technological community from the region, taking into account the UNGA outline for Rio +20 in 2012?*

C.1.ii *What are the needs of science and technology in the region in order to be able to contribute best, to attain sustainable development in the region and to international endeavours of sustainability science?*

C.1.iii *What are the needs of science and engineering to sustainable development at the local, national and regional scales?*

C.1.iv *What role can the different stakeholders and major groups play in enhancing regional science and technology for sustainable development, and what are their needs from science and technology?*

C.2 The responses to questions posed in each of the themes of the Rio+20 Regional Science and Technology Workshop for Africa (green economy, institutional frameworks and emerging issues) are provided below, noting that some of the questions do not apply to all of the three thematic issues.

C.2.1 Recommendations and Responses on Green Economy

C.2.1.a. The priority issues for Rio+20 as seen by representatives of the SET community in Africa, are as follows.

C.2.1.a.i *Harmonization of development policies and initiatives across economic sectors within African countries and sub-regional economic blocs to promote green economy.*

C.2.1.a.ii *Design and provision of market incentives and financing to promote entrepreneurship and green projects to levels that are needed to accelerate transition from brown to green economy.*

C.2.1.a.iii *Improvement of SET base at appropriate levels (artisans, mid-level and advanced levels) to support novel industrial operations that the targeted green economy requires in African countries.*

C.2.1.b. With respect to the needs of science and technology in Africa vis-à-vis the attainment of sustainable development, we have identified them as follows, while recognizing that greening of the economy is a mechanism for attainment of sustainable development.

C.2.1.b.i. *Integration of existing SET programmes, including educational curricula that are in step with developments with green economy and creation of synergies in research across regions.*

C.2.1.b.ii. *Planning, design, construction and operation of appropriate facilities and efficient processes that can marry SET with entrepreneurship in key sectors of the green economy that will be targeted in Africa.*

C.2.1.b.iii. *Promotion of trans- and multi-disciplinary approaches and mainstreaming of IKS to generate innovation to green the African economy while addressing the needs of people in local communities.*

C.2.1.b.iv. *Incorporation of scientific advice into decision-making processes at various jurisdictional levels within African countries, to enable the selection of rational options in green economy initiatives in particular, and sustainable development in general.*

C.2.1.b.v. *Relaxation of rules and policies to enable mobility of African SET personnel, including students, across Africa and between Africa and other global regions.*

C.2.1.b.vi. *Identification of SET intellectual resources and facilities that are available within the African Continent through development and integration of databases and directories of African researchers and research-related organizations.*

C.2.1.c. The major contributions of SET to sustainable development in the area of green economy can be enhanced in Africa through the following initiatives and actions.

C.2.1.c.i. *SET can serve as the engine for transformation of Africa's economy from brown to green, through innovation in entrepreneurship activities, including manufacturing and delivery of services.*

C.2.1.c.ii. *SET activities can nurture and harvest African talent for deployment in green economy programmes provided that incentives such as scholarships, prizes, projects and good working conditions are availed to talented Africans.*

C.2.1.c.iii. *SET can support Africa's capacity to take advantage of current and planned economic concessionary programmes such as those of the MDGs, African Growth and Opportunity Act and Clean Development Mechanism (CDM) that require the development of internationally marketable products and services.*

C.2.1.c.iv. *The creation of SET support facilities and operational systems such as research parks, entrepreneurship centres, satellite observation systems, and data storage and transfer centres, can intensify economic activities to the benefit of host communities in terms of start-up firms, employment and income at the local and national levels.*

C.2.1.d. Many stakeholders need to be involved in the transition of regional, national and local economies from brown to green. The primary roles of the key stakeholders should be as outlined below.

C.2.1.d.i. **SET Personnel:**

- *Improvement of their methods of communication with stakeholders, broadening of targets beyond their peers, and use of general newsletters in addition to peer-review journals, to communicate with external communities.*
- *Provision of clear explanations of the relationship between their innovations and national, regional and global green development vision and initiatives.*
- *Engagement of other stakeholders in non-traditional academic settings (advisory boards, citizen groups) to enhance awareness of their activities.*

C.2.1.d.ii. **Professional Societies:**

- *Formation of partnerships with public and private sector organizations to provide input to green development policies and initiatives.*
- *Volunteering to serve as monitors of progress towards attainment of green development.*
- *Development and provision of data on available experience in various SET disciplines that support green development and making of such data available to both the public and private sectors through websites, newsletters and directories.*

C.2.1.d.iii. **National Governments:**

- *Development and implementation of clear policies on various aspects of green economy to satisfy roles as signatories to conventions and action plans.*
- *Networking with other countries and agencies to promote the attainment of both regional and national goals through collaboration.*
- *Inclusion of SET as the primary engine of clean economy development through the development and integration of National Science and Technology Policies (with adequate funding), and creation of science advisory boards to provide input into developments in every socio-economic sector.*
- *Nurturing of the development of SET expertise through improvement of education in general, and promotion of mobility of labour with appropriate compensation for expertise depletion in labour source countries.*
- *Provision of the framework for implementation of domestic programmes that support the brown to green economy transition through regulations/codes, policies, technical guidance systems, market incentives, research/data generation, education, monitoring systems and enforcement.*

C.2.1.d.iv. **Private Sector:**

- *Creation of more opportunities by banks for loans and development of other financial instruments to support innovations.*
- *Formulation of regional compacts that continuously identify innovative advances in green technology that have high market potential for targeting by entrepreneurs.*

- *Collaboration on funding of individual research projects at institutions and transactions on intellectual property that may result from the outcome of such projects.*
- *Aggressive marketing of green technologies, processes and products to provide information on lifestyle options to the general public.*

C.2.1.d.v. **International Agencies and Sponsors:**

- *Development and monitoring of performance indices to evaluate progress on the transition to green economy.*
- *Provision of incentives to national governments and economic blocs to collaborate and implement action plans for global good.*
- *Relaxation of trade barriers to expand markets for African green exports (consider all agricultural products as green goods, (WTO)).*
- *Support for the establishment of science, technology and entrepreneurship parks, perhaps near free trade zones, to promote green industries.*
- *Use of multi-lateral funds to equitably reward countries that make progress on green development.*
- *Expansion and de-politicization of green development support funds such as the MDGs and the CDM funds*
- *Inclusion of progress on green development and its enabling instruments such as National Science and Technology Policies, and National Environmental Action Plans as evaluation factors within NEPAD's African Peer Review Mechanism for African countries.*

C.2.2 Recommendations and Responses on Institutional Framework

C.2.2.a. The key issues on Rio+20 institutional frameworks to support sustainable development of Africa are identified below, with recommendations for action.

C.2.2.a.i. *Establishment of specific institutions at national level, to strengthen the science/policy links, including empowerment of national science councils, organizational science advisory boards and professional organizations.*

C.2.2.a.ii. *Reinforcement of legal, political and diplomatic frameworks to ensure the accountability and enforcement of the implementation of internationally and nationally agreed commitments (for example, the commitment of African countries to devote 1% of GDP to SET); and monitoring of the progress on these commitments in each African country.*

C.2.2.a.iii. *Improvement in political commitment to support SET institutions and generate national resources to ensure the sustainability of SET and Research and Development initiatives.*

C.2.2.b. The needs of SET in Africa with respect to contributing to sustainable development are stated below.

C.2.2.b.i. *Enhancement of the viability of national and regional academies of SET to provide improved platforms for the exchange of information on good practices in SET research and development (R&D); facilitate networking to increase the visibility of Africa-based research and researchers; and encourage SET personnel in Africa through awards, prizes and other incentives.*

C.2.2.b.ii. *Creation of an African Continental Research Foundation with an endowment that will provide resources for talented African researchers and their collaborators to produce high-utility models, processes, materials and services to promote sustainable development.*

C.2.2.b.iii. *Creation and support of high-level networked academic institutions modelled after successful regional academic institutions, and tied programmatically to national, sub-regional and regional development plans such as those of NEPAD and UNECA.*

C.2.2.b.iv. *Strengthening and better funding of financial support/lending institutions to support local entrepreneurship and economy-of-scale projects in key economic sectors in Africa such as agriculture, energy, transportation and municipal services.*

C.2.2.c. The major contributions of SET to sustainable development at the local, national and regional scales have already been discussed along with recommendations, in the preceding sections. Adequate institutional frameworks which have already been recommended above are needed to support all the Rio+20 programmes that we have recommended.

C.2.2.d. With respect to the roles that different stakeholders and major groups can play in enhancing SET in Africa for sustainable development, including greening of the economy, we hereby make the following recommendations for action by the stated stakeholders.

C.2.2.d.i. **All Groups:** *Enhancing the accountability of institutional frameworks; engendering the ownership and empowerment of African SET; improving the visibility of SET on the continent, enhancing innovation and serving as advocates for growth investment (in terms of creativity, vision, commitment and financial resources) especially, for the private sector.*

C.2.2.d.ii. **Government:** *Drafting of legislations; regulations; investment and funding; capacity building; policy development; leadership and governance.*

C.2.2.d.iii. **The African Diaspora:** *Brain gain through contributing their expertise to African SET R&D; capacity building for Africa SET; expansion of SET base in Africa; enabling African countries to leapfrog into new frontier technology areas such as nanotechnology.*

*C.*2.2.d.iv. **The Business sector:** *The private sector should provide the wealth of experience on market incentives, entrepreneurship skills, technological innovations and financing systems to support sustainable development and Green Economy. The African Business Chambers of Commerce, African component of Commonwealth Chambers of Commerce among others, are critical in advancing public sector/private sector partnerships.*

C.2.2.d.v. *The following needs were identified for action to support the work of stakeholder organizations in accelerating African sustainable development through greening of the economy.*

- *Enhancement of the quality of life (food security, environment, shelter, etc).*
- *Improvement of local infrastructure.*
- *Engenderment of the relevance of SET initiatives to local African circumstances through moves away from Eurocentric approaches.*

- *Identification and engagement of all SET stakeholders in projects to ensure that the projects can be implemented cost-effectively.*

C.2.3. Recommendations and Responses on New and Emerging Challenges

C.2.3.a. The key emerging issues on sustainable development for discussion at Rio+20 and subsequent management actions are outlined below:

C.2.3.a.i. **Food security**: *Land redistribution, transfer and acquisition have to be addressed if Africa is to benefit from the green (agricultural) revolution in ways that can parallel developments in the green economy.*

- *The challenge of identification of indigenous seed and crop varieties that are best-suited to African conditions and up-scaling their production to meet food security needs.*
- *The challenge of utilization of African products to diversify the agro-economy, even beyond crop production.*
- *The challenge of finding adequate financial credit at levels that improve entrepreneurship and venture capital operations.*

C.2.3.a.ii **Biodiversity and ecosystem loss:** *Deforestation, including clearing of forests for other competing needs, is a key issue that should be addressed at the Rio+20 Conference.*

C.2.3.a.iii. **Climate change and security**: *Africa should prepare itself for adaptation to, and mitigation of the impacts of climate change, especially, sea level rise along the coast of Africa that can generate massive migration of people.*

C.2.3.a.iv. **Water scarcity and use:** *Africa should explore possibilities for alternative water resources such as groundwater, and application of SET in water harvesting methodologies in the face of climate change and increase in its population.*

C.2.3.a.v. **Energy crisis:** *Africa's clean and renewable energy resources are enormous but there is a need for use of SET to effectively tap this resource as a response to climate change and deforestation/environmental degradation.*

C.2.3.a.vi. **Health security:** *Africa bears the bulk of the disease burden with the double tragedy imposed by emerging (eg hemorrhagic fevers) and re-emerging (eg TB, malaria) diseases. SET should be deployed to find solutions to these health challenges.*

C.2.3.a.vii. **Natural and human-induced hazards and disasters:** *Africa is prone to a wide variety of escalating natural and human-induced disasters such as droughts, flooding, tropical cyclones, pests and diseases. It is therefore important that Africa adopt cost-effective policies to lower associated risks and allocate appropriate resources to hazards and disaster mitigation and preparedness.*

C.2.3.a.viii. **Desertification:** *The advance of the Sahara southwards and spread of aridity in most parts of Africa calls for SET IKS interventions to address the desertification.*

C.2.3.a.ix. **Human migration:** *Due to slow economic growth and development in the rural areas, there has been increased rural/urban migration and from rural to coastal regions, thus*

over-stretching basic infrastructure in those areas. This has led to population growth, and increase in poverty and pollution.

C.2.3.b. The needs of science and technology in addressing emerging issues in Africa have, to a large extent, been covered by our assessments and recommendations in the preceding sections. We hereby make the following additional recommendations.

C.2.3.b.i. *There is the need to increase investment / funding for SET infrastructure, research and capacity building. Governments must re-commit to funding science and technology from their GDP.*

C.2.3.b.ii. *There is the need to promote participatory approaches to engage communities and collaboratively identify roles for them in science, technology and sustainable development (can create an enabling environment for learning science through home experiences)*

C.2.3.b.iii. *The platform for dialogue between natural scientists and social scientists need to be created and/or improved in Africa.*

C.2.3.b.iv. *There is the need to develop appropriate governance and coordinating bodies at all levels, to help advance the agenda of the scientific community through development of mechanisms of project identification, prioritization and dissemination.*

C.2.3.c. Africa needs appropriate SET systems, including the use of IKS, to serve the following high-utility roles in addressing the emerging issues outlined above, some of which are re-stated below.

C.2.3.c.i. *Conservation of biodiversity through cost-effective programmes.*

C.2.3.c.ii. *Improvement of quality of life and nutrition through increased food production.*

C.2.3.c.iii. *Development of better and locally usable climate change models to improve impacts prediction and adaptation to the looming and inevitable environmental challenges*

C.2.3.c.iv. *Use of advanced technologies such as nano-biotechnology for water quality improvement.*

C.2.3.d. The following stakeholders have been identified to play the stated roles in dealing with emerging sustainable development issues.

C.2.3.d.i. **Women:** *Women in Africa can play the roles indicated below in managing emerging issues in sustainable development, especially, if they are empowered with basic science education and armed with the means to adapt available and innovative technology to local situations.*

- *Addition of inclusive/gender-balanced perspectives to emerging problems.*
- *Playing of critical roles in food production and as primary implementers of projects on the ground.*
- *Service as custodians of indigenous knowledge.*
- *Exertion of influence on the development of appropriate technologies.*
- *Exertion of influence on children on adoption of, and adaptation to green technologies.*

C.2.3.d.ii. **Youth and children:** *This stakeholder group needs to be empowered through emphasis on mathematics and natural science education including earth and environmental sciences at pre-school and primary school levels, extra-curricular scientific and technological activities, and incorporation of indigenous knowledge into their scientific activities to enable them play the following roles in managing emerging issues.*

- *Service under mentorship, as future leaders.*
- *Service as generators of creative and unbiased ideas.*
- *Involvement as participants in the implementation of sustainable development programmes and projects.*

C.2.3.d.iii. **Indigenous People:** *This stakeholder group needs the protection of its intellectual property rights, documentation of its natural and intellectual resources, as well as provision of formal platforms for knowledge sharing to enable it share and bring IKS into mainstream science, to produce greater benefits to society.*

C.2.3.d.iv. **Non-governmental Organizations:** *Non-governmental organizations need better processes of information acquisition; recognition by governments and other stakeholders as partners; and scientific information packaging to enable them play the following critical roles in tackling emerging sustainable development issues.*

- *Important public interest advocates / lobby groups.*
- *Providers of pluralism to problem definition and solution.*
- *Facilitators and/or implementers of scientific knowledge for sustainable development.*
- *Facilitators of information dissemination.*
- *Sources and providers of funding for projects.*

C.2.3.d.v. **Local Authorities:** *These authorities need to be empowered to apply current and applicable scientific information to their decision-making processes. They can play the following roles in addressing emerging sustainable development issues.*

- *Implementers of policy at local and municipal levels.*
- *Identification of the needs of the community and projects that can address them.*
- *Sources and providers of funding for projects (in certain countries).*
- *Role players in deciding how funds and other recourses are used in the community.*
- *Facilitators of policy experimentation based on solid scientific information.*
- *Providers of a platform for dissemination and educational outreach.*

C.2.3.d.vi. **Workers and Trade Unions:** *With adequate mechanisms that provide them with valid information, recognition by governments and other stakeholders as partners, as well as receipt of information in formats that they can understand, workers and trade unions can play the following roles.*

- *Advocates and lobby groups.*
- *Providers of pluralism for problem definition and solution.*

- *Facilitators and/or users of scientific knowledge in sustainable development projects.*
- *Facilitators of information dissemination.*

C.2.3.d.vii. **Business and Industry:** *Depending on the levels of success attained on the creation of effective policies to provide enabling environments for research and development, operation of science and technology parks as business incubators, and their involvement in public policy processes, this set of stakeholders can serve the following roles more effectively in sustainable development.*

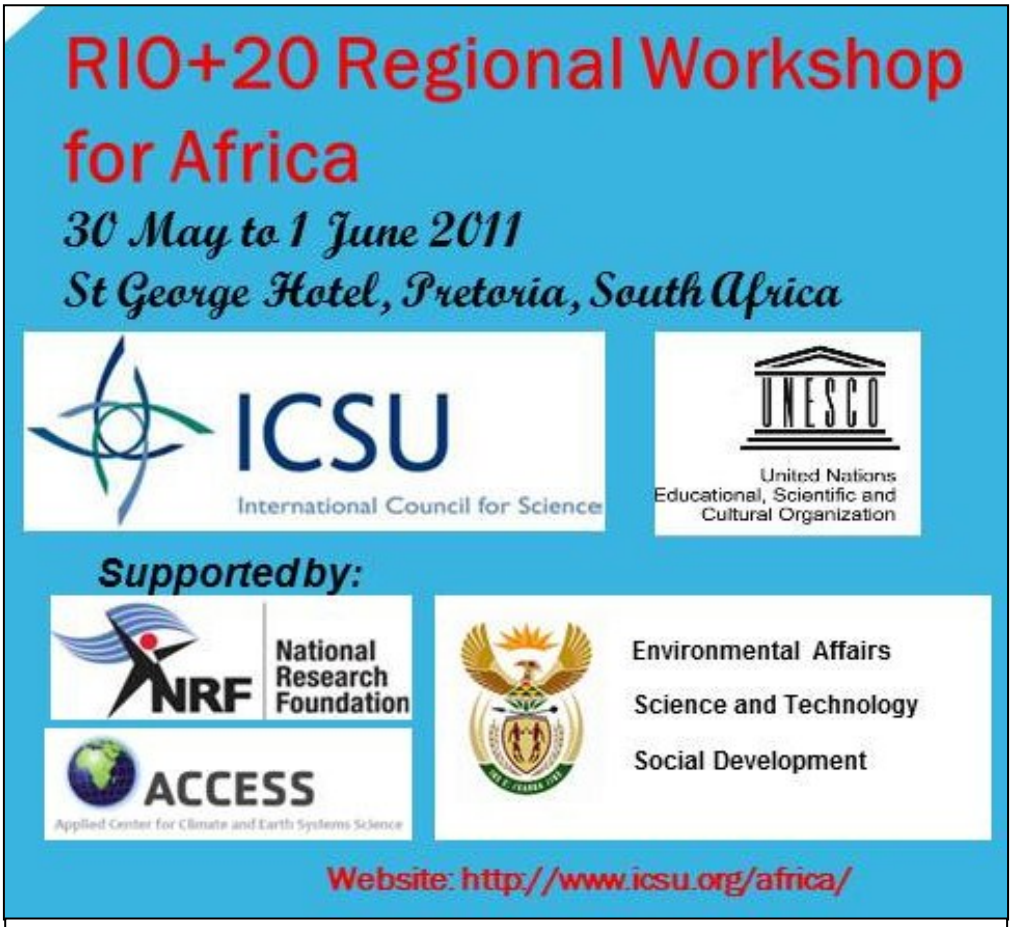
- *Providers of funding for research and development.*
- *Translators of science into applicable technology, products and services.*
- *Employers of people at various professional levels.*

C.2.3.d.viii. **Scientific and Technological Community:** *With funding, support infrastructure and recognition by government as partners, the scientific and technological community can play the following roles in addressing emerging sustainable development issues.*

- *Performers of research and development.*
- *Developers of new knowledge systems.*
- *Disseminators of knowledge.*
- *Contributors to policy-making and entrepreneurship programmes.*

C.2.3.d.ix. **Traditional Leaders:** *Traditional leaders are respected and wield influence in African communities. They can influence the acceptance of innovation at the community level.*

C.2.3.d.x. **The Diaspora:** *With provision of an enabling environment to them, the African diaspora can increase their contributions to the development of science and technology, and related programmes in Africa.*



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