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**ECONOMICS POLICY FOR MANAGING CLIMATE**  
**CHANGE IN AFRICA: CHALLENGES AND**  
**OPPORTUNITIES**

## **ECONOMICS POLICY FOR MANAGING CLIMATE CHANGE IN AFRICA: CHALLENGES AND OPPORTUNITIES**

### **1.0 Introduction**

Africa is the only continent whose share of reported disasters in the world total has increased over the last decade. More people are affected by natural hazards, and economic losses incurred are rising. Disaster impacts have become an impediment to sustainable development in Africa. Furthermore most of the disasters that occur in Africa are hydro-meteorologically related, resulting from droughts, floods, tropical cyclones, land slides, wild fires and locust invasions, etc. In recognition of the need to minimize the economic, social and environmental risks associated with these hydro-meteorological events, the Summit of the African Union adopted an Africa Regional Strategy for Disaster Risk Reduction, and a programme of Action for its implementation, in January 2006. Given the close relations between climate variability and disaster events in Africa, it has been found necessary to address the issues of climate variability and change within the framework of sustainable development efforts in the continent.

There is overwhelming evidence indicating that climate change poses a serious challenge to social and economic development in the world and particularly in Africa. The current levels of greenhouse gases (GHSs) in the atmosphere is equivalent to about 430 parts per million (ppm) CO<sub>2</sub><sup>e</sup>. This has occasioned global temperature to rise by half a degree Celsius (0.5<sup>0</sup> C) compared to pre-industrial levels. This level is on the rise as demand for energy and transport increase around the world. Predications indicate that GHGs concentration level is likely to be 550ppm CO<sub>2</sub><sup>e</sup> by 2050 (Stern, 2006). If this was to happen, it would most likely result in a temperature rise of about 2<sup>0</sup> C.

This rise will trigger severe climate change impacts which will pose a great threat on world's output, on human life and on the environment. The change will most affect vulnerable countries, most of them in Africa, although they have contributed least to the causes of climate change. This is because their economies depend on rain-fed agriculture and on natural resources sensitive to climate change. Those countries with coastlines are in addition vulnerable to changes of marine environment and coastal ecosystems.

The causes and consequences of climate change, who is responsible and who gets hurt- are now well understood. Disregarding that knowledge would be intentional behavior. The Kyoto protocol of 1997 was to draw attention to the growing concern of climate change and foster agreement among nations to engage in clean development pathways geared towards preventing dangerous anthropogenic greenhouse gas releases. However, implementation of this instrument has proved to be skewed, favoring the polluters and leaving out non-polluters, in particular the African continent. Africa should henceforth resist this kind of behavior and demand that polluters carry their share of this international burden (Wairoto and Marigi, 2006).

## 2.0 Evidence of climate change in Africa

Over the past millennia, Africa has experienced major shifts in climate, as can be seen from the dusty, fossil valleys that scoured their path through the Saharan landscape in earlier, wetter times.

Instrumental and proxy records presents clear evidence that climate of the Africa Continent is changing. For instance, rainfall has been declining in many areas including the Sahel.

Similarly, a number of lakes across the continent have registered declining water levels. In particular Lake Chad has lost over 50% of its water over the period 1973 and 2002. Lake Victoria, the largest lake in Africa and the second largest in the world, and lakes within the Rift valley have also suffered serious decreasing water levels. Glaciers on two of the Continent's highest mountains, Mt. Kilimanjaro, and Mt. Kenya have been melting as a result of climate change.

## 3. Vulnerability of Africa to climate change

Africa is particularly vulnerable to the impacts of climate change because of factors such as widespread poverty, recurrent droughts, inequitable land distribution, and overdependence on rain-fed agriculture. Although adaptation options, including traditional coping strategies, theoretically are available, in practice the human, infrastructural, and economic response capacity to effect timely response actions is well beyond the regions economic means. The adverse climate change concerns with regard to the region are therefore numerous and include but not limited to the following:

**3.1 Ecosystems:** In Africa today, forests, rangelands and wetlands are under threat from population pressures and systems of land use. Generally, apparent effects of these threats include loss of biodiversity, rapid deterioration in land cover, and depletion of water availability through destruction of catchments and aquifers. Changes in climate will interact with these underlying changes in the environment, adding further stresses to a deteriorating situation. A sustained increase in mean ambient temperatures beyond 1°C would cause significant changes in forest and rangeland cover; species distribution, composition, and migration patterns. Many organisms in the arid and semi-arid areas already are near their tolerance limits, and some may not be able to adapt further under hotter conditions. Arid and semi-arid areas, rangelands, as well as areas currently under threat from land degradation and desertification, are particularly vulnerable. Adaptive options include control of deforestation, improved rangeland management, expansion of protected areas, and sustainable management of forests.

**3.2 Hydrology and Water Resources:** According to UNEP (1999), 14 African countries are currently under water stress or water scarcity, and a further 11 will join them in less than a decade. A reduction in precipitation projected by some General Circulation Models (GCMs) for sub-Saharan Africa, if accompanied by

high inter-annual variability, could be detrimental to the hydrological balance of the region and disrupt various water-dependent socio-economic activities in these countries. Changing climatic conditions are responsible for the melting of glaciers on the mountains of Kilimanjaro and Kenya. This is likely to result in decline in the water level of some rivers leading to serious water shortages in Lake Victoria. This in turn will affect river Nile flow and may pose a major conflict in the countries traversed by the river since the river is central in the livelihoods of the communities along its course. The same is likely to apply to rivers Zambezi, Niger and all other major rivers in Africa, since the rivers' sources are in the high rainfall potential areas in the tropical highlands of Africa which suffer adverse impacts of climate variability and change.

A drop in water level in dams and rivers could adversely affect the quality of water by increasing the concentrations of pollutants in the water, thereby increasing the potential for the outbreak of diseases and reducing the quality and quantity of fresh water available for domestic use. It would also affect the habitats of some species (birds, fish and other aquatic species) which depend on the lakes and rivers. A case in point is the flamingoes at Lake Nakuru in Kenya, which have been migrating elsewhere as the lake is drying. In this case, adaptation options include: water harvesting, management of water outflow from dams, and more efficient water usage.

**3.3 Agriculture, Livestock and Food Security:** Agriculture is mainly the economic mainstay in many countries of Africa. In sub-Saharan Africa, agriculture and natural resources provide livelihoods account for some 70-80% of people, 30% of GDP and 40% of export revenue. It is also the lead sector in employment especially in rural areas where farming depends entirely on the performance of the rainy season, a situation that makes the region particularly vulnerable to climate change. Increased droughts could seriously impact the availability of food and livestock products, as was the case in 1983/84, 1998-2001, 2003/2004 and 2005/2006 in the majority of the countries in Sub Saharan Africa and the greater horn of Africa regions. Changes in ocean dynamics could lead to changes in the migratory patterns of fish and possibly to reduced fish landings, especially in coastal artisanal fisheries.

Climate change is also associated with occurrence of new pest and diseases affecting plants and livestock. It has been noted that certain plant diseases previously unknown in certain high altitude coffee zones are now manifested in the areas. Similarly, diseases like Rift valley fever, which mainly afflict livestock has been found in areas hitherto unknown and affects labour productivity. Heat stress and drought negatively affects animal health, production of dairy products and result in food security. It also increases the need for irrigation in agriculture.

**3.4 Marine Environment zones, Mangroves and Coastal Ecosystems:** Africa's coastal zone would be adversely affected by sea-level rise associated with climate change. Sea-level rise and climatic variation may reduce the buffer effect of coral reefs and mangrove systems along the coast, increasing the potential for erosion. A sizable proportion of the coastline will be lost through a combination of

inundation and erosion, with consequent loss of agricultural land and urban areas. This may have severe and grave effect on many coastal cities like Banjul, Lagos, and Alexandria where vast parts of the cities or the whole city could be lost. This would be great loss to the countries. At the same time plans to build mega coastal cities could be jeopardized. With respect to coastal systems, adaptation measures would be very costly (in terms of billions of dollars). In this case the adaptation measures could include erection of sea walls and relocation of vulnerable human settlements and other socioeconomic facilities.

**3.5 Human Settlement, Energy, Industry and Transportation:** The main challenges likely to face Africa's population will emanate from extreme climate events such as floods (and resulting landslides in some areas), strong winds, droughts, and tidal waves. Individuals living in rural Sub Saharan Africa may be forced to migrate to urban areas (where infrastructure already is approaching its limits as a result of population pressure) if the marginal lands become less productive under new climate conditions. Similarly, populations living in low lying coastal areas and small islands will have to migrate as a result of displacement by the sea level rise resulting from climate change. Climate change could worsen current trends in depletion of biomass energy resources. Reduced stream flows would cause reductions in hydropower production, leading to negative effects on industrial productivity. Management of pollution, sanitation, waste disposal, water supply, and public health, as well as provision of adequate infrastructure in urban areas, could become more difficult and costly under changed climate conditions.

**3.6 Human Health:** Africa is expected to be at risk primarily from increased incidences of Vector-borne diseases and reduced nutritional status. A warmer environment has already opened in many areas of the Sahel, and Southern and Eastern Africa, where malaria is already a serious problem, and could further open up new areas in the continent for proliferation of the disease. Altered temperature and rainfall patterns could also increase the incidence of yellow fever and trypanosomiasis. There will be increased morbidity and mortality in areas where vector-borne diseases increase following climatic changes. These impacts would have far-reaching economic consequences. In view of the poor economic status of the region, global efforts will be necessary to tackle the potential health effects.

### **3.7 Tourism and Wildlife**

Climate change is expected to have a far reaching effect on Africa's economy. Tourism is one of the continent's fast growing industries. It is a major source of foreign earning to a number of African countries besides offering employment opportunities. Tourism is dependent on wildlife and water, so the industry would be greatly adversely impacted on by a loss of these attractions. Climate change poses a big threat to the survival of both flora and fauna. This is further aggravated by loss of habitat through anthropogenic factors. According to the IPCC (2001), the greatest impacts on tourism are likely to be felt in drought-prone parts of the Sahel, East Africa and Southern Africa. Reduced water run off could also alter the characteristics of popular tourist destinations.

Moreover, tourism could be affected by the destruction of coastal zones and marine eco-systems, which are key attractions in several countries of Africa, particularly those with sand beaches.

**3.8 Millennium Development Goals and poverty:**

Most African countries are already reckoned as being substantially off-track in terms of meeting the Millennium Development Goals. With Climate Change it will be increasingly difficult to achieve these goals by 2015 and even thereafter. This will pose major barriers in the continent's efforts to alleviate poverty. This problem is compounded by existing land degradation and desertification, declining yields from water catchments, over dependence on subsistence agriculture, high prevalence of HIV/AIDS and other diseases, inadequate governance mechanisms and high rates of population growth.

Natural fluctuation in climate such as those related to the El- Nino and La Nina phenomenon cause widespread disruptions in society's ability to harness resources and even to survive. Consequently, climate change may affect the achievement of development objectives related to the most vulnerable countries of Africa. The table below gives the impacts of climate change on MDGs in Africa.

**Impacts on MDGs**

<b>Millennium development goal/target</b>	<b>Climate change implications</b>
<b>1. Eradicate extreme poverty and hunger</b>	<ul style="list-style-type: none"> <li>• Increase in weather and climate extremes will lead to insecurity in livelihoods</li> <li>• Diminishing bio-diversity and access to natural resources</li> <li>• Diminished crop yields</li> <li>• Reduced fisheries due to coral bleaching and increased calcification of corals increasing soil salinity.</li> </ul> <p>These impacts will result in hunger and will slow down the fight against poverty.</p>
<b>2. Achieve universal primary education</b>	<ul style="list-style-type: none"> <li>• Lifestyle demands of increased time seeking food, water and cash income, reduces time for education</li> <li>• Increased environmental refugees and ill-health impacts are barriers to attending classes</li> </ul>
<b>3. Promote gender equity and empower women</b>	<ul style="list-style-type: none"> <li>• Increase in extreme weather and climate related disasters impacts adversely on women who are already 2/3 of the world's poor</li> <li>• Women's greater reliance on subsistence and natural resources for income, is diminished</li> </ul>

	making women more vulnerable
<b>4. Reduce child mortality</b>	<ul style="list-style-type: none"> <li>• Health impacts on children are particularly vulnerable to flood-related, vector-borne and hunger related diseases</li> </ul>
<b>5. Improve maternal health</b>	<ul style="list-style-type: none"> <li>• Climate change will increase health impacts on mothers, particularly given the maternal vulnerability to malaria</li> </ul>
<b>6. Combat HIV/AIDS, malaria and other diseases</b>	<ul style="list-style-type: none"> <li>• Malaria and other vector-borne diseases predicted to dramatically increase with extreme weather and climate events, increased flooding and temperature rises, will make it difficult to combat the HIV/AIDS menace, malaria and other diseases</li> </ul>
<p><b>7. Ensure Environmental Sustainability</b></p> <p><i>Target:</i> Halve number of people without access to safe drinking water</p> <p><i>Target:</i> Achieve significant improvement in the lives of 100 million slum dwellers</p>	<ul style="list-style-type: none"> <li>• Continued financing of fossil fuel based technology/development at the expense of local communities and the global atmosphere</li> <li>• Increased water shortages as a result of changes in rainfall patterns, greater periods of drought and salt water incursion into fresh water reserves</li> <li>• Loss of arable land, particularly in coastal areas.</li> </ul> <p>This will make it difficult to ensure Environmental sustainability</p>
<b>8. Develop a global partnership for development</b>	<ul style="list-style-type: none"> <li>• Dealing with the costs of weather related disasters could affect the Gross Domestic Product, level of indebtedness, state of public finances, and investment on development in poor countries.</li> </ul>

Source: Australian Climate Action Network (modified)

#### 4: Observed Impacts

Africa is indeed poor and stands to suffer most from the devastating impacts of climate change (IPCC, 2001). In the recent times, extreme climate events in the region have become more frequent and severer as result of increasing variability of the climate and climate change. Climate change is therefore likely to upset any management methods based on the natural variability of these extremes with far reaching implications (Marigi, 2002). Among the recent extreme climate events leading to climate change related disasters experienced in the region include droughts, floods, Landslides and lightning strikes:

- Droughts have resulted in the loss of vegetation cover leading to a reduction in available forage that supports human and animal life. The consequences have been high animal mortality, famine, and lack of water for domestic as well as

industrial purposes. Pastoral communities in the sub-region have suffered most loss of their livelihoods through drought (**one example is given in panel 1**).

- Floods have resulted in deaths of people and livestock, displacement of communities, destruction of farmlands, homes and infrastructure, waterborne diseases and epidemics, and famine (**an example is given in panel 2**).
- Landslides have occurred in areas of steep slopes especially where people have settled. The situation is worsened by human activities that clear natural vegetation, quarrying, mining and construction. In the affected areas, the landslides have caused loss of life, destruction of agricultural crops, houses and infrastructure, e.g. power transmission and water supplies (**see example given in panel 3**).
- Lightning (the discharge of static electricity generated in parts of storm clouds) strikes have caused death to human and animal lives particularly in parts of Eastern and Southern Africa. Other adverse effects have included the destruction of buildings, telecommunications and power installations as well as electronic systems (**Panel 4 gives one such example**).



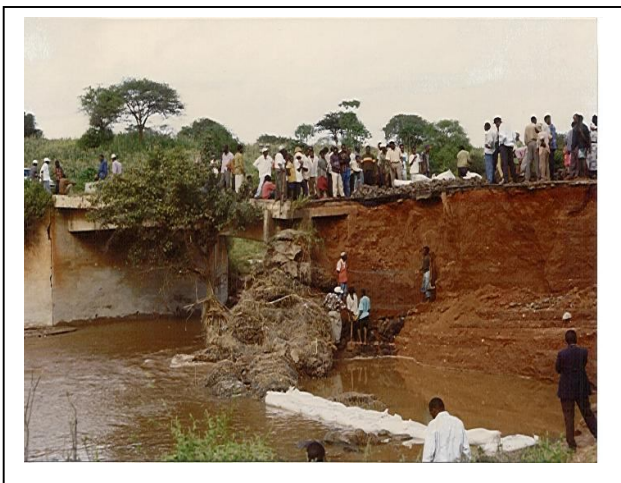
Panel 1: Pastoralists in a dilemma as drought wiped out their livestock



Panel 2: A flood victim trapped on the roof of a house in western Kenya

Adopted from Wairoto and Marigi

Adopted from Wairoto and Marigi





Panel 3: A landslide scene in a village in central Kenya.

Adopted from Wairoto and Marigi

Panel 4: Fire brigade putting off a fire resulting from lightning striking an electric transformer thus causing power interruption.

Adopted from Wairoto and Marigi

The impacts highlighted in this section are just a signal that the climate change problem is already at our door steps and therefore needs to be managed before it manages us.

## 5. State of negotiations and milestones

A major pillar of the Convention on Climate Change for the United Nations is that developed countries shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology (UNFCCC, 1992). Furthermore, developed countries are required to assist the developing countries in meeting costs of adaptation to Climate Change and to take measures to minimize the adverse effects of climate change on developing countries and Small Island States (SIS).

Such assistance takes full consideration to what actions are necessary including actions related to funding, insurance and transfer of technology to meet the specific needs and concerns of developing country parties arising from the adverse effects of climate change. Unfortunately very little of such assistance have been provided to the developing countries, particularly those in Africa, which continue to languish in poverty and to suffer severe impacts of climate variability and change, where lives are lost and the little development that Africa manages to put up with her meager financial resources, is wiped out in just one season.

Since weather and climate knows no political boundaries, international cooperation in addressing climate change issues must be enhanced within the United Nations Framework Convention on Climate Change (UNFCCC) and other climate change negotiations processes and fora. African countries together with the rest of the developing world should continue to advocate with more vigour, and demand for a more equitable approach to issues of climate change and in particular, financial assistance for adaptation to the adverse effects of climate change including:

- Enhancing capacity for monitoring, research and systematic observations and vulnerability assessment;
- Building capacity in hazard management;
- Identifying and facilitating adaptation options when impacts are understood and measures are feasible; and
- Funding technology development and transfer to developing countries.

The key elements that should guide any approach for a balanced future international climate change system should be how best to ensure:

- Sustainable development ( address inequality in climate vulnerability in terms of social, economic and ecological issues);
- Environmental effectiveness ( meet the Kyoto Protocol targets; meet technology transfer commitment; define multiple forms of broader participation and address capacity constraints); and,
- Adaptation (assist Developing Countries to build resilience and reduce vulnerability).

With respect to UNFCCC negotiations, the region needs serious action with regard to:

- Operationalization of the implementation of National Adaptation Programmes of Action (NAPA);
- Capacity Building ( in all fronts including, capacity to implement decisions and to participate in Clean Development Mechanism (CDM));
- Issues around the Adaptation Fund and Climate Change Fund should be made clear (Resources promised need to be released); and
- Development of Technology and Transfer

It must however be emphasized that the UNFCCC financial mechanisms are not sufficient to meet the adaptation to climate change requirement for the region. The costs for adaptation in the region are enormous (estimated to be in billions of dollars) and more sources for funding adaptation would be needed. Sir Nicholas Stern in his review indicated that such sources are available as ODA and from the pledges of G8 and G5 (Stern Nicholas, 2006). Such funding could also be obtained through Foreign Direct Investment (FDI) initiatives. African Union Commission in collaboration with National Governments should explore these extra avenues in addition to the UNFCCC links and utilized them in sourcing funds for adaptation activities in Africa.

### ***5.1 Compensation***

It is an undisputable fact that Africa is a region trapped in poverty and climate change related damages are making matters worse for the region. Good examples are the increasing frequencies of droughts which have become more severe with larger spatial coverage particularly in countries of the Greater Horn of Africa; Sub Saharan region and Southern Africa. Industrialised countries are historically and presently responsible for climate change. It is time now for Africa to pursue seriously the issue of compensation since the “polluter pays” principle is still inherent in the United Nations Climate Change Convention, and further it would be in line with the equity principle in the same convention. This would be another possible opportune avenue through which resources for adaptation and to support sustainable development in Africa could become available.

### ***5.2 Trading***

Under the New Partnership for Africa’s Development (NEPAD) initiative, African governments have stated clearly that they have a pressing duty to eradicate poverty and to place their countries, individually and collectively, actively in the world economy

and political arena. This is a clear indication that African states want to trade with the rest of the world but not to beg. Africa must therefore use her environmental space wisely as an economic asset for development. This would be in line with the realization that climate change offers vast economic opportunities for faster sustainable development in Africa if well managed. In this context the region should demand for arrangements where it will bring something on the table to trade in the name of “emission entitlements” and at a good price. Other measures like extra taxation for inefficient systems with respect to energy utilization and ghg emissions should be put in place with the aim of brining about efficiency in trading systems and schemes. It is hereby suggested that the region develops institutional arrangements for trading in its environmental space both within the countries and in the global perspective, in the best interest of the well being of its citizens. Under this arrangement, it is expected that:

- There will be increased role of market forces to address climate change and a broader participation beyond Kyoto protocol;
- Modalities for the Adaptation fund and Climate Change fund will have to be agreed upon and resources promised released; and
- There will be increased awareness, networking and communication. Further, the role of non governmental actors will be addressed.

### ***5.3 Emissions Entitlements Trading***

Process aimed at capping total emissions, progressively reducing them and equitably sharing emission entitlements on per capita basis using a formula based on equity principle so that in an agreed timeframe, the entitlements converge to being equal share per person, should be developed and employed. The reasoning behind here is that human beings by virtual of being born equal have equal, right to the atmosphere, a global common resource. Such a principle is expected to establish a global market in tradable emissions entitlements which would promote efficiency, transfer of resources to poor countries whose emission quotas exceed their needs and creating sustainable livelihoods through international co-operation, capacity building and transferring of environment friendly technologies. This would be yet another possible opportune avenue through which resources for adaptation, and to support sustainable development in Africa could become available in the long term.

### ***5.4 Uplifting the livelihoods of Africans***

Currently most citizens of Africa live below the poverty line and are disposed to less than US\$ 1 per day. The region’s pressing duty therefore is to eradicate poverty and place itself actively in the world economy. In this regard, industrialization has been identified as the key to attaining self sufficiency and the sustainable development urgently required. Africa therefore has a duty to develop to the status of the developed countries. Energy is the main vehicle to achieve the required industrialization. Further, the region is not under any obligation to reduce her GHGs emission but can only do it voluntarily. However sustainable development demands that even as Africa’s development moves fast forward, technology to be used must be carefully selected to ensure that the region does not follow a path that hastens the rising of the ghgs concentrations in the atmosphere and worsen climate change situation.

Currently, the energy resources used in the sub-region have some implications on the global climate system. Biomass fuels (wood fuel, charcoal, agricultural and animal wastes) and fossil fuels are the main source of energy in the rural areas and will remain so for many years to come as long as poverty persists in the region. Deforestation will therefore continue and so the GHG sinks will continue diminishing. Consequently, climate change reversal may become difficult to achieve.

Fossil fuels (e.g oil products) are mainly used:

- For electrical energy generation;
- In industrial and transport sectors; and
- In households mainly in urban areas and to a lesser extent in rural areas for lighting and cooking.

The outcome of utilization of these fossil based fuels is the release of GHGs into the atmosphere, hence contribution to global climate change. With the current emphasis on industrialization in the region, the region's emissions are bound to rise. Morally, it is important that the region adopts the right technologies in its quest for industrialization. Such technologies should ensure:

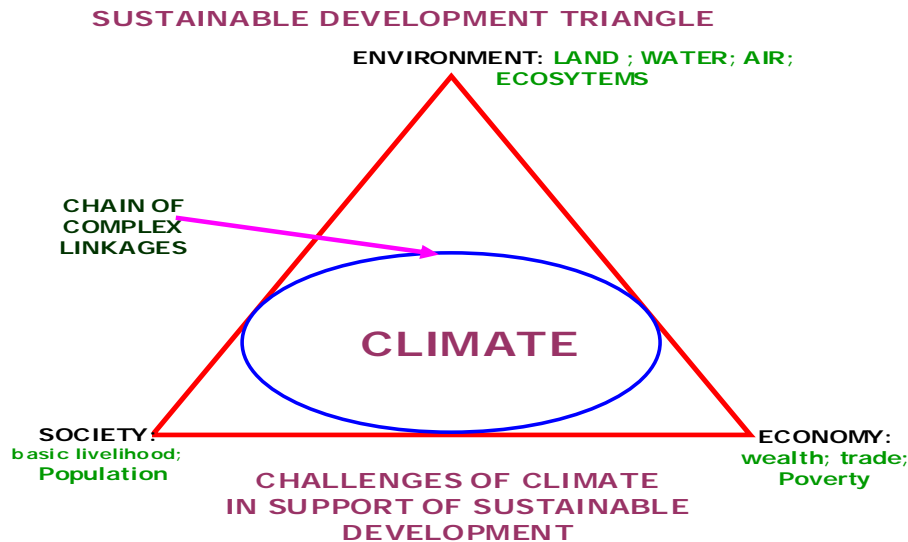
- That they are proven and appropriate for Africa's needs;
- Transfer of skills associated with technology to ensure continuity of programs;
- Full involvement of local resources and expertise;
- That the energy supplied is adequate; and
- That the energy meets the needs of the present and future generations i.e. should be sustainable.

Towards this, the region should enhance relevant indigenous technologies from the region and further seek to obtain appropriate technologies developed by the industrialized countries. In this respect, the region should demand from the industrialized countries the transfer of relevant energy technologies that are either energy efficient or renewable energy based. Of course this action requires co-operation but the co-operation should be based on the principle of "*equal but differentiated responsibilities*" as articulated in the climate change convention of the UNFCCC (UNFCCC, 1992).

## **5.5 Sustainable development**

In order for Africa to attain Sustainable development, it will be necessary to pursue simultaneously the measures aimed at reducing poverty, expanding the ability of the environment to meet people's needs by improving technology and social organizations and achieving greater equity both within and between generations. This process brings into play the three pillars of sustainable development (Society, Environment and Economy) with complex linkages through climate, Fig. 1. In this connection the

environmental sustainability must entail building resilience so as to increase countries' ability to withstand and recover from disturbances in economies and ecosystems while the economic sustainability must entail encompassing economic diversity as well as accumulation of man-made capital and technical progress and finally the social sustainability should focus on equity by putting in place mechanisms for sharing equally among the members of the community benefits, burdens, and decision including governance. It is emphasized that this principle should also prevail in the global cooperation on climate change to enhance sustainable development in all countries.



**Fig. 1: Sustainable development Triangle**

## 6: Concluding Remarks

It is time for Africa to take firm decisions to adapt to climate change. Africa must also play a critical role in ensuring that adequate mitigation efforts are employed and in good time by all concerned particularly developed countries. Africa must therefore negotiate for an instrument which gives her the freedom to trade her unused emissions entitlements and invest the proceeds in her development goals according to her priorities. The environmental space in the region is enormous and portends vast opportunities as a natural resource. Africa therefore must use it wisely as an economic asset for her development.

By taking this bold step, the region stands to achieve the following:

- Equity concerns in solving global climate change comprehensively addressed;
- New sources of financial assistance and investments to promote sustainable development while mitigating emissions; and
- New channels for the promotion of environmentally-sound technology transfer

## 7.0 Key policy measures

1. **Adaptation to climate:** Taking measures to build resilience and to minimize costs of impacts of climate change is on essence. What is needed is improved information on climate change among policy makers, planners and communities and better planning with a view to integrating climate change into development policies. Necessary capacities need to be developed to assess the impacts of climate change and in the development of appropriate adaptation strategies. Africa should demand that developed countries honor their pledges for adaptation activities.
2. **Mitigation measures:-** Africa should engage and demand that developed countries institute deeper cuts on green house gas emissions to ensure that green house gas concentrations in the atmosphere are stabilized at 450 ppm by 2050. This can best be achieved through cooperation in relevant conventions related to climate change (international frameworks such as the UNFCCC, United Nations Convention to Combat Desertification (UNCCD), Montreal protocol, IPCC, etc). Africa needs to strengthen her strategy and coordinated approach to the negotiations in the Conventions. African Union Commission should take a leading role in these negotiations. In this respect the African Union Commission should establish a climate program at its Headquarters to coordinate issues of climate and climate change in Africa.
3. **Cooperation on Climate Change:** Africa should strengthen the region's cooperation on matters of climate change with other regions and institutions including: WMO, UNFCCC, UNCBD, UNCCD, UNEP, IPCC, involved in climate change matters, so as to reap maximum benefits in the global process addressing climate change.
4. **Observation and early warning Systems:** The strengthening and development of national observations and warning systems should be a matter of priority in Africa. The Global Climate Observing Systems (GCOS) and WMO's World Weather Watch (WWW) Programs should be given top priority and their use and application in addressing weather and climate observations, processing and generation of early warning systems in Africa be strengthened. The systems and technologies used should be compatible as much as possible in different countries and regions.
5. **Research and Development:** There is need to develop and strengthen research and development policies relating to the impacts of climate change in Africa. Energy research and development should especially be considered. A strengthening of development investment in forestry in renewable energy will be key in putting Africa in a low-carbon development path and avoid commitments which would be hard to reverse.

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