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The reality of climate change and Africa's development agenda

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Abstract

Studies affirm that developing countries will be hardest hit by the dynamics of climate change given that they have to contend with extreme poverty levels and waning levels of economic growth. Climate variability will impact on water resources, land, forests and ecosystems, all of which will threaten livelihoods and food security. In developing countries the effects of climate change will manifest as increased and deeper exposure to vulnerabilities, with the previously attained development gains being compromised. Together these factors will impact on the achievement of the MDGs. Although Africa contributes negligibly to Greenhouse Gas (GHG) emissions, it will be worst affected due to its geographical location, its dependence on climate-sensitive resources and its overall inherent limitations financially, institutionally and human resource wise. Although most of Africa will feel the adversity that climate change will engender, certain African countries are at greater risk than others given their vulnerability and their subdued development credentials. We use a number of proxy variables as indicators of countries sliding further down the development stakes due to increased risk from climate change expounded as decreases in income or economic growth or increased expenditure on food that will siphon off development funds. The paper will look at the impact of climate change in developing countries and in Africa as a whole, with an analysis of why certain African countries will be worse off from the after-effects of climate change. Lastly, policy options will be briefly touched on.

The reality of climate change and Africa's development agenda

Introduction

Developing countries are most exposed to climate change as erratic weather patterns will cause the occurrence of droughts and floods, rising sea levels and rising temperatures. This will directly affect an array of dimensions such as agricultural production, water resources, livelihood patterns, the ability to secure food and the health of people. Developing countries still lag behind in a number of development indicators and it is likely that climate change will cause further detriment. Even though African countries contribute the least to GHG emissions (only 4%), its geographical location and its dependence on natural resources together with its weak financial, institutional and human resource capability threaten to make it especially vulnerable to the consequences of climate change (UNECA, 2009:103). Although most of Africa will feel the adversity that climate change will engender, certain African countries are at greater risk than others given their vulnerability and their subdued development credentials. We use a number of proxy variables as indicators of countries sliding further down the development stakes due to increased risk from climate change expounded as decreases in income or economic growth or increased expenditure on food that will siphon off development funds. Africa will need to strike a balance between perusing poverty alleviation, increasing economic growth and keeping up adaptation efforts so that further jeopardy is averted (UNECA, 2009:103). The paper will look at the impact of climate change in developing countries and in Africa as a whole, with an analysis of why certain African countries will be worse off from the after-effects of climate change. Lastly, policy options will be briefly touched on.

Effect of climate change in developing countries

Developing countries are saddled with major imbalances and backlogs with as much as one-quarter of the population living on less than \$1.25 a day, one billion people not having access to clean drinking water, 1.6 billion being without electricity, 3 billion lacking adequate sanitation and the proportion of malnourished children standing at over a quarter (World Bank, 2010:10). These realities imply that developing countries still have a lot to accomplish in terms of the human development paradigm and it is likely that climate change will dent development initiatives.

Developing countries will be hardest hit by the dynamics of climate change given that they have to contend with extreme poverty levels and waning levels of economic growth. In developing countries the effects of climate change will manifest as increased and deeper exposure to vulnerabilities, with the previously attained development gains being compromised. Together these factors will impact on the achievement of the MDGs (World Bank, 2010:1).

With the warming of the planet will come changes in rainfall patterns, the occurrence of droughts and floods, crop failures, loss of livelihood, disease, food insecurity and hunger. Estimates imply that even a 2° C warming above pre-industrial temperatures (which is the minimum the world is likely to experience) will give rise to two eventualities:

1. GDP in Africa and Asia to fall by 4 to 5% as opposed to a 1% GDP loss in high income countries; and
2. Unleash variations in the weather, putting between 100 million and 400 million people at risk of hunger, and 1 billion to 2 billion more people of not having enough water to meet their needs (World Bank, 2010:5-10).

In a nutshell, the principal consequences of climate change in developing countries will be that:

- It will erode resources away from development;
- It will pose a challenge to the design of development policy; and
- It will cause GDP to fall (World Bank, 2010:1).

The degradation of natural resources is likely to affect poverty trajectories, given that the poorest ones are those that utilize natural resources the most. This is compounded by the fact that close to 70% of the world's extremely poor people live in rural areas. It is estimated that by 2050 the global population is likely to total 9 billion and developing countries will have an additional 2.5 billion people. A larger population will create additional demands on ecosystems and natural resources, land, water and energy (World Bank, 2010:40).

It is the reduced agricultural productivity that engenders the most vulnerability to climate change in developing countries. The implications of climate change for poverty from changes in GDP growth are profound. Evidence points out that a 1% point of agricultural GDP growth in developing countries increases the consumption of the poorest third of the population by 4 to 6% points (World Bank, 2010:40).

Climate change is likely to induce migration and the relocation of people. This type of migration will be from rural areas to cities, putting added pressure on urban infrastructure (World Bank, 2010:108). Also there will be a displacement of people, prompting urbanization to be dealt with in a more efficient manner (World Bank, 2010:40). There will also be migration to areas that have more water resources to improve crop yields which may result in greater encroachment on the environment (FAO, 2010:5). Natural disasters also exert economic consequences. Economic losses due to storms, floods and droughts are such that in developing countries about 90% of the economic losses is borne by households, businesses and governments. It is estimated that developing countries will bear most of the cost of the damages ie. 75 – 80% (World Bank, 2010:99).

Developing countries are more vulnerable to the effects of climate change because of the presence of several factors (World Bank, 2010:6):

1. Developing countries have limited human and financial means and weak institutions which add to their vulnerability. Their financial and institutional capacity to adapt is also weak;
2. Geographical and historical factors also underpin its vulnerability. Developing countries rely primarily on climate-sensitive resources. Most of their population live in physically exposed locations and under fragile economic conditions; and
3. The case of sub-Saharan Africa is clear. It is exposed to natural fragility (two-thirds of its surface area is desert or dry land) and high exposure to droughts and floods which are likely to worsen with climate change. Most economies in this region depend on natural resources. Biomass supplies 80% of the domestic primary energy supply. Rain-fed agriculture comprises 23% of GDP (excluding South Africa) and employs about 70% of the population. The lack of proper infrastructure could undermine adaptation efforts. Also, the spread of malaria to higher, previously safe altitudes will increase human suffering (World Bank, 2010:6).

This adversity will be borne more so by the poor in Africa (World Bank, 2010:1). The poor are inextricably affected by climate in their capacity as either subsistence farmers or landless squatters in urban areas as they lack the capacity to withstand physical and financial risk and undertake long term adaptation efforts. Thus the vulnerability of the poor is implicitly tied to lack of entitlements, unproductive assets and lack of voice (FAO, 2010:89).

Effects of climate change in Africa

The anticipated losses in GDP will be primarily due to falling economic activity in the agricultural sector which is the mainstay of most African economies. In Africa almost 60% of the population depend on agriculture and natural resources and it is because the continent is so embedded in natural resources utilization that livelihoods will be threatened (Fay, 2009).

Climate change is likely to rescind the gains made in the area of development in Africa as resources are reallocated to finance adaptation measures (World Bank, 2010:40). It is estimated that economic losses due to climate change will amount to 14% of GDP if adaptation measures fail to be implemented. If this were to happen it means that resources would be reallocated away from development projects to short term emergency needs (World Bank, 2010:41).

Already climate variability is evident in sub-Saharan Africa in the lower rainfall patterns and shrinkage of most natural resources eg. Lake Chad's surface area has been reduced from 20 000 Km² before 1970s to 7000 Km². By the 1990s the lake became shallower and split into two parts with water only been found in the southern parts (FAO, 2010:2).

What climate change entails for women and children in Africa

In rural areas the efforts of both men and women are garnered towards food security but women also see to the nutritional needs of the family (FAO, 2003). The allocation of tasks in Africa is often such that most women participate in subsistence agriculture (in sub-Saharan Africa it is almost two-thirds) whilst men are confined to cash cropping and larger livestock (FAO, 2010:4).

Subsistence agriculture pushes African women to be more reliant on climate-sensitive resources, especially rain-fed agriculture (IPCC, 2007). These women are also constrained in other ways in that they tend to cultivate marginal lands, have limited access to land, labour, water, equipment, technology and information (World Bank, 2008). They are also stifled by institutional impediments such as customary laws that forbid them from inheriting or owning land, the inability to access credit and agricultural extension services (Brody et al, 2008). It is likely that climate change will worsen gender inequalities. The depletion of natural resources and waning agricultural productivity will intensify women's workload. (FAO, 2010:4). Women therefore have a disproportionate share of the food insecurity burden. Women's tasks such as collecting firewood and other natural materials will be affected by weather changes (World Bank, 2010:105). Children too will be affected and will have

to walk longer distances to locate water, fuel, wood and fodder which will ultimately affect their human capital acquisitions (FAO, 2010:4).

Health outlook, schooling and copying by households

Agricultural output and food security depend on the availability of a healthy population. Given that agriculture in African countries is labour intensive in nature, ill-health that results from climate change will have a direct impact on agricultural output and the ability to secure sufficient food (FAO, 2010:5). Ill-health will undermine the ability to work (FAO, 2010:5).

Climate change will trigger health complications especially among the poor. The inability to secure food will hasten the onset of malnutrition, thereby making people more susceptible to illness. It is estimated that there will be an additional 150, 000 deaths a year due to climate change. The WHO points out that climate change caused a loss of 5.5 million disability adjusted life years in 2000, 84% of them in sub-Saharan Africa (World Bank, 2010:41). Indirect effects of climate change will filter through via water resources, sanitation, food production and living conditions (FAO, 2010:95). Diseases that will be off spins of climate change, namely, malnutrition, diarrhoeal diseases and vector-borne illnesses (especially malaria) constitute a huge challenge to the health situation currently in Africa (FAO, 2010:95). Diarrhoeal diseases from climate change are estimated to increase up to 5% by 2020 in countries with per capita incomes below \$600 (World Bank, 2010:41). It is children that are most prone to diseases such as diarrhoea. In Ghana and Pakistan, malnutrition and diarrhoeal diseases currently consume about 9% of GDP (FAO, 2010:95).

Rising temperatures will expose greater numbers of people to malaria and dengue especially in developing countries. Currently malaria cripples countries in tropical areas and causes almost 1 million deaths, mostly of children. Climate change is estimated to expose 90 million more people (a 14% increase) to the disease by 2030 in Africa alone (FAO, 2010:97). Drought activity which is likely to increase, especially in the Sahel region could result in more cases of meningitis (World Bank, 2010:41). Dengue is becoming more geographically widespread and climate change will put almost 60% of the population (up from 30%) at risk by 2070 (World Bank, 2010:97).

Climate change has different effects on different groups of people. For poor households, climate change will mean a loss of human and physical capital. On children, the impact could cause a depreciation of human capital as children withdraw from school after extreme weather events and

their health is compromised (World Bank, 2010:105). It is poor households that will struggle to cope with climate variability. For example, when Hurricane Mitch swept through Honduras in 1998, its impact on poor households was more profound than rich households as the poor lost 15 to 20% of their assets while the rich lost only 3%. The poor's destitution persisted into the long term. Whilst the acquisition of assets was slow for all households, it was slower for poorer households. There were also gender connotations ie. Whilst male-headed households recovered quicker, enjoyed greater access to new accommodation and work, and stayed for a shorter period in post disaster shelters, female-headed households encountered numerous difficulties in rebuilding their lives and stayed in shelters longer (World Bank, 2010:42).

Empirical evidence on poverty traps (defined as consumption permanently below a given threshold) is not clear-cut. But the evidence does show that both the recovery of physical assets assumes a long time and growth of human capital growth are delayed after catastrophic events (World Bank, 2010:42).

In Ethiopia evidence shows that low levels of rainfall indirectly affected consumption which remained remain low 4 to 5 years down the line. In Brazil drought activity caused rural wages to fall substantially in the short term with wages of affected workers only reaching the level of their peers after 5 years. Climate shocks also affected people's health and education. Research in Cote d' Ivoire analysing the link between rainfall patterns and investments in children's education shows that in regions experiencing greater than usual weather variability, school enrolment rates fell by 20% for both boys and girls (World Bank, 2010:43).

People who endured drought and civil strife in Zimbabwe during early childhood (between 12 and 24) were affected on many fronts. They experienced a loss of height of 3 to 4 centimetres, close to one year fewer years of schooling and nearly six month delay in starting school. The estimated effect on lifetime earnings was 14% which makes a substantial difference to the poor (World Bank, 2010:44).

The link between climate change and food security in Africa

Agriculture in Africa is tied to the issue of food security in 2 ways:

1. it produces the food that people consume

2. it is the main source of income for almost two-thirds of the working population in sub-Saharan Africa (excluding South Africa) (FAO, 2010:6).

Agricultural productivity, food security and climate variability are intertwined. When agricultural yields fall due to climate change, the basic livelihood of a huge proportion of people will be destabilized, rendering them susceptible to food insecurity (FAO, 2010:6). Most African countries are net importers, with over 50% of North Africa's food needs and between 25% and 50% in sub-Saharan Africa imported (FAO, 2010:5). The amount of cereals Africa has imported is estimated at about USD 21.728 billion in 2008 and USD 9.8 billion for sub-Saharan Africa for 2008, which is 30% and 35% higher than 2007 levels (FAO, 2010:5).

FAO (2008) sees food security as comprising 4 elements and climate change impacts on all of them. They are:

1. Food availability
2. food accessibility
3. food utilization
4. food system stability (ie. affordability) (FAO, 2010:6).

Food availability explains how climate change is coupled with physical location. Moderate warming (increase of 1 to 3 °C) in the tropical and dry regions of Africa will have an adverse effect on cereal crops (FAO, 2010:6). Climate change would affect the yields of some major crops eg. maize may be reduced by 6.9% by 2020 whilst drought resistant crop like millet would be unaffected (FAO, 2010:5). Food accessibility refers to entitlements in terms of the legal, political, economic and social means to access food. Climate change will influence food accessibility by altering the allocation of food, not only in markets but at a household level (FAO, 2010:6). Food utilization is tied to the nutritional value of food. Climate change will bring forth new diseases as well as pests that will attack plants and animals, affecting the safety of food (FAO, 2010:6). Food system stability is contingent on the state of agriculture. Agriculture in Africa is thwarted by low investment, reliance on rain-fed conditions, land degradation and very low levels of irrigation (namely, only 16%) (FAO, 2010:6).

Climate change and high risk African countries

Table 1: Selected African countries per indicator

COUNTRY	GHI 2009 ¹	COUNTRY	POPULATION BELOW \$1.25 A DAY ²	COUNTRY	VALUE ADDED AS A % OF GDP (AGRIC) 2008 ³	COUNTRY	PROPORTION MALNOURISHED (2003-2005) ⁴	COUNTRY	NET FOOD TRADE % OF GDP(2006) ⁵
Chad	31.3	Malawi	83.1	Tanzania	45.0	Angola	46.0	The Gambia	-24.7
Ethiopia	30.8	Mozambique	81.3	Ethiopia	43.0	Ethiopia	46.0	Benin	-7.3
Madagascar	28.3	Madagascar	76.3	Mali	37.0	Zambia	45.0	Lesotho	-3.1
Zambia	25.7	Tanzania	72.6	Malawi	34.0	Zimbabwe	40.0	Mali	-2.9
Mozambique	25.3	Burkina Faso	70.0	Burkina Faso	33.0	Chad	39.0	Mozambique	-2.8
Angola	25.3	Nigeria	68.5	Ghana	32.0	Mozambique	38.0	Uganda	-2.8
Tanzania	21.1	Zambia	64.6	Nigeria	31.0	Madagascar	37.0	Burkina Faso	-2.7
Zimbabwe	21.0	Mali	61.2	Mozambique	28.0	Tanzania	35.0	Angola	-2.1
Burkina Faso	20.4	Uganda	57.4	Madagascar	25.0	Kenya	32.0	Madagascar	-1.5
Kenya	20.2	Ethiopia	55.6	Uganda	23.0	The Gambia	30.0	Nigeria	-1.4
Mali	19.5	Cameroon	51.5	Chad	23.0	Malawi	29.0	Namibia	-1.0
The Gambia	18.9	Ghana	39.1	Kenya	21.0	Botswana	26.0	Zambia	-0.8
Malawi	18.5	Kenya	19.6	Zambia	21.0	Cameroon	23.0	Kenya	-0.7
Nigeria	18.4			Cameroon	20.0	Namibia	19.0	Ethiopia	-0.7
Cameroon	17.9			Mauritania	13.0	Benin	19.0	Botswana	-0.5
Benin	17.2			Angola	10.0	Lesotho	15.0	Malawi	-0.2
Mauritania	15.0			South Africa	3.0	Uganda	15.0	Mauritius	0.6
Uganda	14.8					Mali	11.0	Ghana	5.2
Namibia	14.4					Burkina Faso	10.0		
Botswana	12.1					Ghana	9.0		
Lesotho	12.0					Nigeria	9.0		
Ghana	11.5					Mauritania	8.0		
South Africa	7.0					Mauritius	6.0		
Mauritius	6.7					South Africa	5.0		

Source ^{1&4} : IFPRI, 2009.Source ^{2 & 3}: World Bank, 2010.Source ⁵: FAO, 2009.

Although most of Africa will feel the adversity that climate change will engender, certain African countries are at a greater risk than others given their vulnerability and their subdued development credentials. We use a number of proxy variables as indicators of countries sliding further down the development stakes due to increased vulnerability from climate change. We assess countries across a continuum of variables. The chosen variables have a bearing either on development status or economic potential as they are underpinned by the feedback effects of climate change.

Although the data are for different years and is not directly comparable, they can be used to provide an overall picture of a country's development standing. The five different variables can be construed as influencing either human welfare or economic growth. Firstly, the contribution of agriculture to GDP will reflect how climate change could lower GDP and economic growth, which will translate into dwindling funds for poverty alleviation and adaptation efforts. Secondly, the Global Hunger Index (GHI) is a index of the level of hunger in counties and its value ranges from zero to thirty, with a value of under 5 being signifying low levels of hunger and progressing in severity as the figure rises. It reflects the inability to secure sufficient food which will worsen with climate variability. Thirdly, the contribution of food as a percentage of GDP refers to whether a country is a net food exporter or net food importer. If a country is a net food importer, then there is a possibility that climate change will accompany food price increases that will be dire for the poor who will be faced with the prospect of greater food insecurity stemming from unaffordable prices. Fourthly, the proportion of population living on less than \$1.25 a day indicates the headcount measure of poverty in a county and the threat to people's livelihood that climate change will precipitate, could see more people slip into poverty. Fifthly, the proportion of malnourished people in a population is a directly mirrored by the state of poverty and would worsen when food security is threatened by climate variability.

Twenty-four African countries were chosen although data is not available for all countries. All countries were ranked per variable from highest to lowest. The results permitted us to distinguish between so called "high risk countries" and "medium of low risk countries". A list of the top ten countries per variable was then obtained and these countries comprise the "high risk countries" as they are ranked high in at least three of the five variables. Some of the high risk countries that can be seen in Table 1 are:

- Ethiopia ranks highly in four variables with a GHI of 30,8; has 50,6% of the population living on \$1.25 a day, agriculture contributes 43% to GDP the and proportion malnourished standing at 46%.
- Madagascar is in the upper limit of all 5 variables ie. a GHI of 28,3; has 76,3 % of the pop living on less than \$1.25; agriculture contributes 25% to GDP, proportion malnourished is 37% and it is a net food importer (-1.5).
- Burkino Faso also features prominently in all 4 variables with a GHI of 20, 4; has 70,0% of the population living on less than \$1.25 per day; agriculture contributes 37% to GDP and it is a net food importer (-2.7).
- Mozambique also is highly placed for all five variables. It has a GHI of 25.3; has 81.3% of the population living on less than a \$1.25 per day, agriculture contributes 25% to GDP, the proportion malnourished stands at 38% and it is a net food importer (-2.8%).
- Tanzania has a strong presence in 4 variables ie it has a GHI of 21.1; 72,2% of the population lives less than \$1.25 per day; agriculture contributes 45% to GDP and the proportion malnourished is 35%.
- Mali also appears in 3 variables ie 61.2% of the population lives in less than \$1.25 per day; agriculture contributes 37% to GDP and it is a net food importer (-2.9)
- Angola features in 3 variables ie. 25% of the population live on less than \$1.25 per day; the proportion malnourished is 46% and it is a net food importer (-2.1).

Table 2: Selected heavily indebted poor countries (\$ millions)

COUNTRY	HIPC	MDRI
Burkino Faso	930	1226
Ethiopia	3275	3346
The Gambia	112	374
Madagascar	1900	2427
Mali	895	2006
Mozambique	4300	2058
Tanzania	3000	3877
Uganda	1950	3552
Zambia	3900	2797

Source: UNECA, 2009.

Table 2 shows that many of the countries that are so called “high risk countries” also have historically carried heavy debt burdens and have been given assistance under the “Highly Indebted

Poor Countries” (HIPC initiative) and the Multilateral Debt Relief Initiative (MDRI) as at the end of July 2009. With climate change, the likelihood of slipping into further debt looms large and development agencies need to cushion these countries from this occurring.

Policy

Developing countries, especially those that are deemed the poorest and the most exposed, must be helped to adapt to the changing climate. Such countries already endure extreme weather events necessitates changes to the way development policy is designed and implemented (World Bank, 2010:3). It is only logical that adaptation become a component of development such that adaptation measures and climate risk management are standard in all development policies and projects (Fay, 2009).

The nexus “climate-smart policies” are policies that include managing water more resourcefully, arresting the spread of diseases such as malaria, helping people to maintain their health, providing social safety nets to assuage those at risk and organizing people to deal with weather variations (eg. through the provision of flood risk maps) (Fay, 2009). A study by the UN indicates benefits forthcoming from flood warnings which can mean up 35% less damage (Fay, 2009).

Climate change will hasten the onset of a host of vulnerabilities. Food price hikes could follow from disasters and the inability to pay going prices will mean that the poor could experience food insecurity (World Bank, 2010:107). Safety nets and social assistance are needed for households to stave off further slump into destitution (World Bank, 2010:107).

By 2050, Africa’s onus will be to contend with a larger population and shrinking food supplies in a climate that is highly erratic (Fay, 2009). Africa is precariously positioned to deal with the ramifications of climate change given its meagre resources and will have to be supported to prevent further losses in human development.

Conclusion

Climate change will prove to be a serious challenge to developing countries and is likely to encumber its socio-economic well- being. Developing countries are most exposed to climate change they are also directly reliant on climate-sensitive natural resource for income generation and survival

(World Bank, 2010:10). Rampant poverty and hunger in developing countries implies that economic growth and poverty alleviation measures remain key policy initiatives (World Bank, 2010:1). The challenge is now for developing countries to foster development policies that do not depart from current development objectives, but which build adaptation measures into them so that the problem of climate change is tackled from a multi-pronged approach.

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