

## CLIMATE CHANGE AND CONFLICTS IN SUB-SAHARAN AFRICA: TRENDS, CHALLENGES AND POLICIES SUSTAINABILITY

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### ABSTRACT

Since the 1990s when articles began to appear with such titles as “Can Climate Change and Conflicts Be Linked?”, there has been a steady growth of both scholarly and popular interest at the point of intersection between climate change and the conflicts. But the perception that the two realms are connected in crucial ways dates back many decades. One of the first manifestations of popular consciousness of some of the connections between climate change and conflict questions emerged in the 1960s and 1970s; a number of observers also expect that climate change will generate into a great impact and intensity of conflicts around the world will grow. Sub-Saharan Africa has been portrayed as particularly vulnerable to such a rise in conflict, owing to its poverty, exposure to climate impacts and weak levels of state organization. But what is the evidence and analysis that might support such a view?

This paper starts by looking at the links between conflict and climate change. It goes on to examine current patterns and causes of conflict in Sub-Saharan Africa, the consequences of climate change, and argues that it has and will produce two different types of conflict: “Cold Conflict” and “Hot Conflict”. It also assesses the likelihood of their increase as consequences of climate change in sustainable development. The evidence shows that while climate change may not cause conflict, it will increase its likelihood. It concludes by putting forward policy responses that could reduce the likelihood of increased violent conflict, stemming from climate change impacts in sustainability.

**Keywords:** Climate Change, Hot Conflicts, Cold Conflicts, Ecotone and Sub-Saharan Africa

### INTRODUCTION

Climate change and conflict are already a reality! The Sub-Saharan African region is facing a formidable challenge of navigating a transition to a sustainable world. Sub-Saharan African region must meet the needs of growing and diverse global population by reducing poverty, hunger, ethnic violence, preserving human well-being, maintaining a healthy environment and natural resources base and moving towards sustainable human development and violence free pattern. To flourish in this context, the Sub-Saharan African region must be able to respond effectively to changing social, economic, environmental trends to meet sustainability goal.

It is therefore imperative to know how climate change and conflict affect our environment and how the environment in turn affects our national development as a result of hot conflict in the region. Climate change and conflict have always shaped human experiences. Climate change and conflict cases are a mix of short and long-term processes. Short-term conflict may occur as the gap between resource demand and supply reaches a critical point, similar to how earthquakes

occur when tectonic plates move. Nature can also cause rapid changes that lead to substantial casualties in a short period. These sudden events will directly kill people. The aftermath is destruction of food stocks, ruining crops, or spreading diseases which may also indirectly kill people over a prolonged period.

Due to climate change, the chances for conflict and sustainable development will gradually accumulate and appear as a long-term process. Consider the climate change conflict as being more like an extended hot conflict and unlike World War II, which was short and extremely violent. Although the hot conflict did not result in all-out violent, it was the cause of millions of deaths over nearly half a century. Major conflicts such as those in Liberia, Sudan, Sierra Leone, Ivory Coast and other places produced substantial fatalities. Deaths from slow conflict build up over time, and have a certain momentum. Consider a “fast” violent where 20,000 people die in a year. Now think about a “slow” violent conflict, where 2,000 die annually for 20 years or 40,000 dead in total. The latter conflict will cause twice as many deaths as the first, and its prolonged effect may do more to destroy the social fabric for many more years to come. In the end, slow conflict may be more dangerous and more volatile. Climate change is a type of slow-moving environmental disaster, and conflict in it will occur over a long period. As the gap between needs and resources increases, so too will the intensity and duration of the potential conflict. Where short-term (or sudden) conflict may last a few years, long-term (or prolonged) conflict will continue for ten or twenty years, or more.

### **TRENDS IN SUB-SAHARAN AFRICA**

However, linking climate change to conflict begins by looking at two major types of possible convergence. These convergences are especially pronounced on the regional level. First, a group of regions likely to show convergence would possess a greater than average level of conflict. In Sub-Saharan African regions with existing high conflict propensity, it may not require too much climate change to exacerbate and incite conflict conditions. Also, areas of higher than average climate change may converge with small levels of conflict to incite tension. There is the possibility that even in areas where there is little historic conflicts, greatly increased climate change may reveal hidden conflicts. The areas of convergence point to places where climate change will influence conflict. Each convergence embodies differing types and locations of conflict. To support the idea of hot violent conflicts, regions of climate change and conflict should occur in the equatorial tension belt and the polar tension belt. The ultimate goal, though, is to refine these broad swathes of the planet into more discernible genres of conflict, and identify the likely parties involved. Thus, there will be different regions even within a particular portion of the polar tension belt or equatorial tension belt that show attributes of climate change and conflict.

There are three main parts to this. First, it lays out the dimensions and depth of future climate change based on the Intergovernmental Panel on Climate Change (IPCC) forecasts. These forecasts reflect regional configurations. Second, trends in conflict also need to be explored, both those in the recent past and those extending into the near-term future. Third, the climate change and conflict forecasts are examined on a regional basis. By examining the prospective areas of climate change and of conflict together, it is possible to identify where these two forces might converge and point to the lessons from historic cases. The climate model for Sub-Saharan Africa contains four major sub-sectors: Sahara, West, East and South Africa. The impacts are especially prominent in the Sahara, which will grow hotter, and Southern Africa, which will receive less rain. Both of these consequences could be catastrophic when coupled with other trends. Africa is one of the places most vulnerable to climate change (IPCC, 2007a). For people already living on the edge in Sub-Saharan

Africa, climate change will be a disaster; climate change will fall heavily on Sub-Saharan Africa in a one-two punch. First, the Sahara and the Sahel will continue to creep south into the northern Sahel, and push marginal lands into desert. Second, a new widespread area of dryness will extend across parts of Southern Africa in a belt stretching roughly from Angola to Mozambique. The drying will descend on Africa with deadly consequences: “By 2020, between 75 and 250 million people are projected to be exposed to an increase of water stress due to climate change, if coupled with increased demand, this will adversely affect livelihood and exacerbate water-related problems” (IPCC, 2007b). Sub-Saharan Africa remains a region where livelihood has remained extremely reliant on agriculture as a source of income and of survival. Future agricultural production will be extremely compromised (IPCC, 2007b). These conditions will breed instability and this may lead to failed states. Sub-Saharan Africa is already a region with substantial civil conflict that has international dimensions. Conflict is often over specific environmental resources, such as diamonds and oil. The region will see warming, but perhaps less than in the Sahara region. Precipitation impacts are not clear. With an existing record of conflict, high population growth and moderately declining resources, the situation in Sub-Saharan Africa will be one of decline. The ultimate indicator of quality of life is life span, which in Sub-Saharan Africa has fallen since 1960. Sahara desertification will probably creep southward into heavily populated Sub-Saharan Africa. Human land use will amplify this trend. Over the last century, the Sahara has moved about 200 kilometers south into the Sahel and more tropical sub-humid areas. It is a marginal existence. Rates of food production trail population growth. Food is grown on marginal lands or fertile lands without proper fallowing periods. “The decreasing rainfall has also pushed northern pastoralists to migrate southward into lands occupied by sedentary farmers, causing conflicts and the widespread destruction of farmlands and cattle, with adverse implications for the region’s food and human security” (Nyong, 2006).

This persistent conflict between pastoralists and farmers was explored in the historic Fulani and Zarma case. The line of the Sahara and the Sahel will move south and this will push up against the line of religious orientation that divides West Africa between a Muslim North and a Christian or Animist south. Muslim populations will tend to move south with these trends, and it is likely that conflict will follow. In addition to marking a transition from pastoralist to farming livelihood systems, the Sahel is also a zone of cultural transition, where the Islamic culture from the north mingles with the traditional cultures of the south. The region’s large number of ethnic groups as well as immigration of several new ones – creates potential for conflict (Nyong, 2007). Sea-level rise will also impact poor African populations living on the coast. “Towards the end of the twenty-first century, projected sea-level rise will affect low-lying coastal areas with large populations” (IPCC, 2007b).

Sea-level rise will cost African countries 5–10 percent of the national output. “Mangroves and coral reefs are projected to be further degraded, with additional negative consequences for fisheries and tourism industries” (IPCC, 2007c). Sub-Saharan Africa will also see livelihood conflicts resulting from climate change. The Sahara Desert, expanding southwards, will encroach on currently habitable lands. Population pressure and a number of failed states will add to general instability.

### **HOT CONFLICTS IN SUB-SAHARAN AFRICAN**

Climate change leads to two different conflict types: Hot Conflicts and Cold Conflicts. Hot conflicts, located around the equator, have a long historic precedence. Climate change has led to and will exacerbate hot conflicts. Cold wars, located near the poles, especially in the north, have been relatively rare. Climate change will mark the ascendance of cold

conflicts. The terms “hot” and “cold” with respect to conflict, refer to differing types of response to climate change that may result in conflict. The two zones characterize the basic types of seasonality that occur in the world, one based on wet and dry seasons (Hot Conflict lands) and the other based on warm and cool seasons (Cold Conflict lands). By altering seasonality patterns, climate change will upset prevailing patterns of subsistence. In some instances, this means humans will no longer be able to survive. In other instance, the type of technology and economy must adapt to the new conditions.

The role of climate change in conflict can be significant or contributory, meaning that as a causal factor it can be large or small in consequence. Climate change and other factors produce inter-twined, dynamic outcomes. The role of climate change, though, can be one of an instigator of causal trends that have multiple influences. A hot conflict in Sub-Saharan Africa is conflict where climatic heating leads to loss of water and desertification of habitats, driven especially by changes in precipitation patterns. While some climate change may lead to increases in precipitation, a hot conflict occurs when precipitation declines. There is, of course, feedback: a warming climate will lead to greater evaporation of water and will compound problems of aridity. A hot conflict in Sub-Saharan Africa region is prone to occur in the equatorial tension belt and there are three types of such conflict, caused by changes in habitat, movement of populations and adaptations to new types of economic systems. The first type of possible hot conflict Sub-Saharan Africa is the “new desert”, where a semi-arid area transforms into an arid area and the ability to support human population substantially declines. This might be the case where, for example, fringe areas of the Sahel become even drier and lose what little vegetation exists. This Sahel area would be functionally “annexed” into the Sahara Desert. Nomads who live a meager and marginal existence in Sahel would be forced to move to areas that match their style of subsistence and economy.

Other nomads, however, might already be living in these places, or might also be fleeing from other areas of desert annexation. This sets up a possible conflict situation. The second type of hot conflict in Sub-Saharan Africa is the “new transition zone”, where a temperate or tropical region loses precipitation and becomes semi-arid or Sahel-like. In this circumstance, the size of the population that can be supported substantially decreases. A significant part of the population will need to migrate to other places and economic systems may be substantially impacted. This might occur due to changes in water availability through both loss of precipitation and greater evaporation. The third type of hot conflict in Sub-Saharan Africa is when a tropical region dries or deforests and the region transitions from a tropical forest to tropical grassland. Tropical forests are known to create some of their own precipitation patterns, and deforestation would probably combine climate and human pressures. The change would require adjustment of economic and livelihood systems over a long period. This type of hot conflict is already occurring in large parts of Sub-Saharan Africa. The hot conflict is usually internal to the state. The equatorial tension belt has generally weaker state governments, and forced movements of people will generally fall along ethnic or tribal lines. The duration of the conflict in a hot conflict occurs over the long term, with “push” migration factors. The areas usually have lower levels of development, and resource impacts are generalized into concerns of water, arable land, and forest resources.

Conflict drivers are livelihood based, meaning they are often issues of human and not state security, though at some point the two meet. “If climate change results in reduced rainfall and access to the natural capital that sustains livelihoods, poverty will become more widespread, leading to increased grievances and better recruitment opportunities for rebel movement” (Nordas and Gleditsch, 2007). A cold conflict involves a different process, that of temperature changes. The

cold conflict also relates to changing patterns of precipitation. In this instance it is not more or less, necessarily, but a frozen versus a liquid form. In a cold conflict, an area that is relatively uninhabitable to humans due to cold temperatures becomes habitable. The cold conflict type is most often common to the polar tension belt. The degree of change over time in a cold conflict is more episodic compared to the long-term nature of hot conflict in the equatorial tension belt. The cold conflict is driven by temperature increase and the warming of cooler parts of the planet. Where the hot conflict is characterized by the breakdown of state functions and internal strife, the cold conflict exemplifies conditions of expanding state control and external conflict. These conflicts are often short term and witness more pronounced swings in climate and habitat conditions. The situation is quite different in “Hot Conflict” Sub-Saharan African countries. There, climate change through loss of precipitation will cause livelihoods to deteriorate. These areas consist largely of developing countries that lack substantial stored resources. The result is that where more adaptability is needed, less ability to adapt exists. The greater the adaptability gap, the greater the chance for conflict. This relationship may not be linear; conflict may be more likely as the gap becomes apparent, rather than at its widest point. By the point of the most extreme gap between resources and demands, simple survival may be paramount.

### **Fulani and the Zarma**

For most of history, human contribution to climate change was non-existent or minimal. The ability of humans to cope with and adjust to climate change was vital to survival. Natural events like climate change often led to conflict, as occurred between the Fulani and the Zarma in Sub-Saharan Africa. Climate change creates new ecotones or transition areas of habitation that impact economic livelihood patterns. As climate zones move, so also do the people who live in them. People may bring along the old economic subsistence patterns and because of this mismatch, these transformations are not always successful. Desertification is a characteristic of a warmer climate period, and particularly of concern in the equatorial tension belt. “Desertification exacerbates poverty and political instability. It contributes significantly to water scarcity, famine, the internal displacement of people, migration, and social breakdown. This is a recipe for political instability, tensions between neighboring countries, and even armed conflict” (United Nations, 2008). Desertification also is part of a feedback process with climate change: climate change can cause desertification, which in itself, can produce climate change (United Nations, 2008). This feedback, coupled with the rising populations, creates a downward spiral in carrying capacity.

There are also cases where farmers, who generally outnumber pastoralists, push into traditional grazing areas. Between 1940 and 1960, more precipitation than normal fell in the Sahel, and farmers pushed north and encroached on traditional pastoralist lands (Herrero, 2006). The Sahel is also an area that is one of the poorest and least developed portions of the world, and one that has long witnessed social instability worsened by colonization. State control and impact in these areas has always been marginal. The influx of people fleeing drought areas also degraded environmental resources (Herrero, 2006). The conflict in Niger is a classic case of ecotone shift by climates and by people. The Sahara Desert, the largest arid area on the planet, moves periodically along a north–south line. The Sahel is one such ecotone, sitting between the extremely arid Sahara Desert and the tropical forests of West, Central, and East Africa. This ebb and flow of desertification brought on by the changing precipitation patterns, brings people into confrontation. The line between habitable and inhabitable areas moves not only through Niger, but also through the countries of Ethiopia, Somalia, Chad, Nigeria, Niger, Mauritania, Sudan and other parts of Africa. Archeologists believe there is a tendency for the Sahara Desert to “move” or “pulse” over time.

Climate oscillations corresponded to changes in the societal identity of late Stone Age people. This behavior pattern is not unique to them. The longer a community stays in one place, the more sedentary it becomes and the more sedentary the society, the more traditions it develops. When forced to move, traditions are upset, or lost, and specialization diminishes. Today, climate in the Sahel leaps abruptly and without warning from one mode to another in a completely different manner. It is likely that the same kinds of abrupt shifts occurred during the Medieval Warm Period, creating extraordinary challenges for people engaged in cattle herding, subsistence agriculture and long distance trade, (Fagan, 2008). Climate change today magnifies the precarious balance between environmental supply and demand in some parts of the world. This is especially the case in Sub-Saharan African region. Climate and weather conditions in fragile transition zones over the short term can have extreme consequences for inhabitants accustomed to seasonal and yearly migration patterns. No part of the world is as reliant on subsistence agriculture as Africa, exposing the people there to the vicissitudes of changing climate. Climate change can be broken into more discrete categories, especially according to dimensions of time and geography.

There are long-term climate patterns, but there are also shorter-term patterns that people ordinarily refer to as weather. Weather constitutes cycles of climate change that shift year-to- year or day-to- day, depending on the time perspective. Within certain climates and microclimates, changes in weather can be significant over the short term. Over the last century, Sub-Saharan Africa's temperature has been on the rise, mostly for natural reasons, such as shifting rainfall patterns: Observational records show the continent of Africa is warmer than it was 100 years ago. . . . The five warmest years in Sub-Saharan Africa regions have all occurred since 1988 and 1995 the warmest years. This rate of warming is not dissimilar to that experienced globally and the periods of the most warming-the 1910s to the 1930s and the post-1970s-occur simultaneously in Africa and the world. (IPCC, 2001a) Several diverse ethnic groups in Niger live in three different climatic zones. The three zones divide latitude and the degree of intersection with the Sahara. The northern part of the country is the Sahara Desert. The Sahel, to the south, is a transition zone characterized by a combination of desert and scrub. In the far southeast is the Niger River Delta with a tropical climate.

Nomads like the Fulani inhabit the Sahel. Herding and animal husbandry characterize the livelihood of nomads. As animal stocks increase, grazing demands on the fragile ecosystem near the desert exhaust grassland supplies. These extra stresses on vegetation, in addition to the changes in climate, can heighten drought impact. The Zarma are a cultivating people who live in the Sahel, primarily in western Niger, but there are also some pockets of Zarma in Burkina Faso and Nigeria. The Zarma grow subsistence crops, such as millet, sorghum, rice, corn, tobacco, and cash crops such as cotton and peanuts. This production mode requires some irrigation. Milk is an important part of diet and culture for both the Zarma and Fulani. The Zarma own cattle, but it is the Fulani or Tuareg people who tend the animals. This complex rental system is an outcome of both economy and culture. When mature, the Zarma drive the cattle to coastal cities of Sub-Saharan Africa for sale. Animal husbandry remains one of the main economic activities of Niger. Livestock products include cattle, sheep, goats, and dromedaries.

The Fulani, part of a family of people known as the Peule or Fulbe tribes, are a primarily Muslim people found in many parts of Sub-Saharan Africa, ranging from Lake Chad to the Atlantic coast, with concentrations in Nigeria, Mali, Guinea, Senegal and Niger. The typical Fulani are nomads, who make temporary camps of portable huts, exchanging dairy

produce for cereal foods. After many years of integration with other cultures and depletion of herds due to environmental conditions, they now rely on farming for livelihood. Microenvironments that are safe havens during hot periods in the Sahel are disappearing. French colonization of Niger in the 1920s and commodity export policies produced desertification by overuse of resources. The result was a large-scale focus on grazing and cash crops that led to a decline in the health of the microenvironment. The Niger government and multilateral aid agencies hope to increase water supplies (small dams and deeper wells, for example) but some warn that the increase in water without an increase in appropriate grazing land is a recipe for disaster. More water attracts more farmers to the arid lands of the Fulani. Niger's agricultural policy intends to achieve food self-sufficiency regardless of climate change. Approaches include methods to survive short-term water stress (including dry cropping in rural areas), hydro-agricultural projects, and use of nitrogen-based fertilizers and manure. These measures will not be able to counter the larger trend of climate change, but only delay it. Colonization skewed traditional relationships. In Nigeria, British courts tended to side with pastoralists over cultivators. Colonizers who favored one group over another to secure allegiance also pushed the traditional pastoral-farmer relationship into often politically untenable areas. The conflict between the Fulani and Zarma is a recurring situation that exemplifies differing styles of subsistence systems. Pastoralist people had the advantage of developing a warfare system based on the animals (horses) that they reared.

The Mongols are a good example of a relatively small pastoral population that conquered large parts of the farming world. A similar tension exists between the Woolofs in Senegal, who are farmers, and the Peule and Fulbe people, who are pastoralists (Puigdefraegas, 1995). The line of the Sahel is a divide of more than climate. Not only does it separate pastoralists from farmers, but also pastoral peoples in the Sahel are largely Muslim and Caucasian while farmers are usually Christian or animist and Negroid. Country boundaries have little consequence for the pastoralist-farmer conflict and thus this type of tension is not limited to Niger.

For pastoralists like the Fulani, water and grazing land are essential resources. Farmers, like the Zarma, need water (for irrigation) and fertile land. Irrigation requires digging wells and building a water supply system. Conflict occurs when the land and water needs of the two groups clash. The southward drift of the Sahel in the mid-1990s during a dry period pushed Fulani herders south towards greener pastures. Unfortunately, this encroached on the lands of the Zarma. The two groups clashed over diminishing pasture and water resources. In 1997, seven people were killed and 43 wounded in separate clashes between Fulani herders and Zarma farmers in Niger. Seven died near the village of Falmaye southeast of the capital Niamey, (Furber, 1997). Zarma villagers allegedly attacked a Fulani camp, avenging the death of a Zarma in an earlier fight with Fulani herders. Three victims burned to death. In 2002 and 2003, violence broke out between the Fulani and various cultivating groups in central and northeastern Nigeria. The extended conflict killed at least 2,000, while about 23,000 Fulani fled Nigeria for Cameroon, (Herrero, 2006).

## **CHALLENGES OF CLIMATE CHANGE AND CONFLICT**

Paradoxically, it is virtually the opposite angle that dominates discussions of the relationship between Climate Change, conflict and sustainability of environment. Rather than coming to grips with the consequences of hot conflict for climate change, the talk in high places revolves more and more around the consequences of sustainability for the likelihood of hot conflict. Since the end of the Cold Conflict, the climate crisis has increasingly come to be regarded as a potential source of violent conflict and the now abounding references in the popular press to "resource conflicts," "water conflicts"

and “climate conflicts” reflect a creeping militarization of discourse around the environmental crisis. Warnings by eminent scientists and statesmen in the West Africa that in the coming decades, the world will be plunged into a series of violent conflicts owing to the confluence of resource scarcity, climate change and demographic pressure are now commonplace.

Climate change could lead many people to migrate to areas with better conditions for sustainable growth. Some writers speak of the risk of many millions of environmental refugees being generated by drought and other changes to weather systems. Experience from the droughts in Sub-Saharan Africa and the Horn in the 1970s and 1980s shows how large number of people can be rendered destitute by a widespread failure of the rains, given the narrow margin of food reserves and assets available to them. A major reason for land conflicts in Sub-Saharan Africa today is the large flow of people seeking land where they can settle and farm. Relations between incomers in search of sustainable development and the indigenous inhabitants are often tense, especially where there are few social and cultural values shared in common. Uncertainties regarding the rights of different groups are aggravated by the plurality of laws and systems of regulation for control over land. When land starts to become scarce, and hence valuable and marketable, such uncertainties generate fears and suspicion between neighbors, and even within families. Government interventions and establishment of agricultural projects and commercial farm enterprises can further destabilize land relations. In the case of Sub-Saharan Africa, the droughts of the 1970s and 1980s led to a substantial movement of people from the low-rainfall Sahel into wetter, higher-potential areas farther south. In Mali and Senegal, for example, herders moved farther south to better grazing areas and sought farmland to complement their livestock activities.

Inflation in food and fuel prices – As the recent food riots in a number of African countries showed during 2008, food insecurity in the village of Zaradougou in southern Mali, all but two households have a plantation in Côte d’Ivoire and some have two or three holdings there. Established from the 1950s onwards, these cocoa and coffee farms have generated substantial revenues, allowing farm households in southern Mali to feed them and fulfill many other needs. On the average, the money sent by family members working the plantation makes up one-third of the total household revenue. Losing this asset and source of income would be a major blow to the viability of millions of Sahelian farmers (Brock and Coulibaly, 1998). It is not only the rapid increase in prices but also the high level of uncertainty as regards food availability, the long queues and struggles to acquire food which generate fear and insecurity, and affect the time available to carry out other essential productive and domestic tasks. Governments rightly fear the consequences of food shortages in their big cities, since a hungry mob constitutes a very powerful threat to their political future and sustainability. The overthrow of Emperor Haile Selassie of Ethiopia was linked to the El Niño events of 1972/73, which brought droughts to the Sahel and Eastern Africa. Subsequent famine and the angry response to the handling of the crisis by officials created the civil unrest that brought about the collapse of his regime (Comenetz and Caviedes, 2003).

Extreme events, sea level rise, disruption and damage from floods and storms – A changing climate will also bring a higher level of extreme events, such as hurricanes and storms, floods and droughts, causing damage to infrastructure, housing, energy and transport systems. Over time, sea level rise will force some people from their homes and necessitate the relocation of coastal settlements and farming areas. It is reckoned that those areas already adversely affected by weather-related hazards will experience an increase in their intensity and frequency. How will this affect conflict? It all



depends on how it is managed, levels of disaster preparedness, whether it triggers a wider sense of grievance and how far people choose to politicize such disasters.

Large-scale acquisition of land for food production – The rapid increase in food and commodity prices of 2007/08 and consequent scarcity in supply have provoked a number of countries to acquire farmland in other countries. The exact areas of land and the terms of such land acquisitions have not been published. So, it is difficult to be sure of the extent of such deals. But this is a growing number of governments and companies seeking land elsewhere, particularly in West Africa and Africa, where land is considered relatively abundant and local people's property rights are frequently poorly protected. A number of West African governments are actively courting foreign investors to come and acquire land (Senegal, Nigeria, Mali, Ghana, Tanzania), hoping thereby to transform their agricultural sector and modernize production and marketing systems for sustainability. It is too early to know how such deals will work, but there are reasons for serious concern about the likely impacts on local people who had been occupying and using land now handed over to large-scale investors. It is not clear whether such modern production systems will be viable, nor how far they will offer employment and livelihoods to people displaced from their land. The past history of land-takings by governments shows land users have rarely been compensated either financially or in terms of being resettled.

Biofuel production expansion – As with large-scale land acquisitions, there are powerful interests behind a rapid expansion in biofuel production in areas deemed abundant in the land. The expansion in biofuels for domestic and export purposes has been one of the major consequences of climate change policy, given the targets for renewable fuels set by European, US, Chinese and other governments. Conflict over land is most likely to occur where structures of governance are weak and where local people do not have firmly documented and recognized rights over land. In many African countries, governments hold the underlying interest in land on behalf of their citizens. In such cases, it is only too easy for commercial interests to get governments to allocate them large areas of land, with little or no provision for displaced people.

## **CONCLUSION AND POLICY OPTIONS**

Climate change is inevitable. It is important to understand that there are no general solutions to climate change problems. Solutions will need to be specific and targeted toward sustainability. Countries could join together in a series of large-scale technology cooperative projects aimed at meeting challenges of climate change in order to bring about sustainable development in Sub-Saharan African region. These projects could include developing new types of plants resistant to extreme temperatures, or more efficient systems for salt water desalinization. These investments would counteract warming trends in a hot conflict area, around the equatorial tension belt.

Are solutions to climate-induced conflicts possible? The answer depends on the type of link between climate change and conflict. Three types of problems are likely to emerge that can be met via mitigating, preventing, and uncoupling climate and conflict linkages. Each approach has a specific dimension related to the stage of the conflict and the ability of the society to adapt for sustainability. First, under a mitigating approach, there would need to be the capacity to contain or reduce violence that has broken out. This would be a joint response, using integrated assets of civilian and social support groups. The means resolution would be much more limited by situation. Outcomes will likely depend on preventive

choices already made. Second, a preventive approach would focus on the structural roots of the conflict in order to evolve a sustainable society.

This policy implies forward-looking measures on both fronts – climate change and conflict. If the Sub-Saharan Africa is expected to become drier, then policies should begin to examine means to provide more water or to use it more effectively (drip irrigation, for example). The policy would apply to instances of middle-term future duration and focus on emergent conflicts: Emergent conflicts may follow two paths. One path is from an incipient conflict of interest towards an overt conflict, which may become polarized and lead to violence which may hinder sustainability. Another path is towards negotiation and accommodation of the issues in conflict, leading to a peaceful change. The dynamism of the conflict process and the context determine which path to be taken. (Miall, 2007) Third, an uncoupling approach would focus on the trigger for conflict that lets loose accumulated structural forces. This line of thinking looks at essential structures and its long term in focus. The premise would recognize that the potential for climate-induced conflict might occur and mount significant steps to overcome it and the causes for it.

This approach might share some common features in either a preventive or mitigating situation. At the top of the list of general policy thrusts is the need to reduce human contributions to changes in climate and encourage sustainable development. These fall into four areas. First, slowing the overall rate and direction of climate change caused by greenhouse gas emissions is a key starting point. Changing the calculus of change rates is part of a dynamic response. Second, arable land remediation and recovery needs to coincide with agricultural adjustment policies to reduce land use loss. This means avoiding livelihood conflicts. Third, forests need protection from impacts of livelihood and climate. Forests can serve as important carbon sinks and tools for sustainable growth. Fourth, fresh-water resources are under considerable strain and require new strategies for sustainable use. Water conservation strategies will be essential to avoid conflict in some places. Scientific research up to this point has begun to lay out a baseline of climate expectations in a physical context. Much more is required to understand the consequences of climate change in the social context, in particular the triggers of climate-induced conflict.

Continuing and deepening this study will be essential to mounting a counter-offensive in the hot conflicts. A necessary step is to build socio-political modules into climate change models and begin incorporating the human element for sustainable development in a dynamic framework. The six future cases show a wide variety of climate change and conflict types. Each type requires distinct policies to combat problems. Ameliorating or limiting climate change will reduce conflict. A strong policy protecting and promoting forests worldwide is needed for sustainability. Ecotones need to be expanded. These transition zones are contracting, and at the same time attracting refugees. Special focus is needed to mitigate and push back desertification in the Great World Desert. Lands that now have marginal use cannot fall into an over-exploited category.

## REFERENCES

- Brock, K. & Coulibaly, N. (1998), *Sustainable rural livelihoods in Mali*, Research Report 35, Brighton: IDS.
- Comenetz, J. & Caviedes, C (2003) 'Climate variability, political crises, and historical population displacements in Ethiopia', *Environmental Hazards*, 4: 113–27, [www.vulnerabilitynet.org/OPMS/](http://www.vulnerabilitynet.org/OPMS/).
- Fagan, B. (1994). "A Case for Cannibalism", *Archaeology* 47(1): 11–16.

Fagan, B. (2008). “*The Great Warming: Climate Change and the Rise and Fall of Civilizations*”, New York, NY: Bloomsbury Press.

Furber, A.H. (1997). *Desertification in Niger, ICE Case Studies*, 29, June. Online Available at: [www.american.edu/TED/ice/niger.htm](http://www.american.edu/TED/ice/niger.htm) (accessed 19 November, 2008).

Herrero, S.T. (2006). Desertification and Environmental Security, The case of conflict between farmers and herders in the arid environments of the Sahel, in William G. Kepner, Jose L. Rubio, David A. Mouat, and Fausto Pedrazzini (eds), *Desertification in the Mediterranean Region: A Security Issue*”, NATO Public Diplomacy Division, Dordrecht: Springer, pp. 109–132.

Intergovernmental Panel on Climate Change (2001a) “Paleoclimate of Africa”, *ClimateChange 2001: Impacts, Adaptation and Vulnerability*, Cambridge, UK: Cambridge University Press. Online Available at: [www.ipcc.ch/ipccreports/tar/wg2/381.htm](http://www.ipcc.ch/ipccreports/tar/wg2/381.htm) (accessed 30 November 2008).

Intergovernmental Panel on Climate Change (IPCC) (2001b), “Selection of Figures from 174 *Bibliography* Various IPCC Reports”, *Synthesis Report*, Online Available at: [www.grida.no/publications/other/ipcc\\_tar/](http://www.grida.no/publications/other/ipcc_tar/) (accessed 10 December 2008).

Intergovernmental Panel on Climate Change (IPCC) (2007a). *Summary for Policy Makers*, in Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK and New York, NY: Cambridge University Press. Online. Available at: [www.ipcc.ch/](http://www.ipcc.ch/) (accessed 5 February 2007).

Intergovernmental Panel on Climate Change (IPCC) (2007b), *Summary for Policy Makers*, in Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E. (eds) *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press, pp. 7–22. Online. Available at: [www.ipcc.ch/](http://www.ipcc.ch/) (accessed 6 April 2007).

Intergovernmental Panel on Climate Change (2007c) *Summary for Policy Makers: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change IPCC 2007*”, Online Available at: [www.ipcc-wg2.org/](http://www.ipcc-wg2.org/) (accessed 15 December 2011).

Lecero, L.J. (2002). “The collapse of the Classic Maya: A case for the role of water control”, *American Anthropologist*, 104(3): 814–26.

Miall, H. (2007). *Emergent Conflict and Peaceful Change*, New York, NY: Palgrave Macmillan.

Nordas, R. & Gleditsch, N.P. (2007), “Climate change and conflict”, *Political Geography*, (26)627–638.

Nyong, A. (2006). Climate-Related Conflicts in West Africa in *Environmental Change and Security Program Report*, 12, Washington, DC: Woodrow Wilson Center, pp. 36–43. United Nations Convention to Combat Desertification, “Desertification, Global Change, and Sustainable Development”, Fact Sheet 10, updated January, 2008, Online. Available at: [www.unccd.int/publicinfo/factsheets/showfs.php?number=10](http://www.unccd.int/publicinfo/factsheets/showfs.php?number=10) (accessed 15 December 2011).

Nyong, A. (2007). Climate-Related Conflicts in West Africa in *Environmental Change and Security Program Report*, 12, Washington, DC: Woodrow Wilson Center, pp. 36–43. United Nations Convention to Combat Desertification, “Desertification, Global Change, and Sustainable Development”, Fact Sheet 10, updated January, 2008, Online. Available at: [www.unccd.int/publicinfo/factsheets/showfs.php?number=10](http://www.unccd.int/publicinfo/factsheets/showfs.php?number=10) (accessed 15 December 2011).

United Nations Population Division (2007) *World Population Prospects: the 2006 Revision*, Online Available at: <http://esa.un.org/unpp/index.asp?panel=1> (accessed 15 December 2011).

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