



1st Africa Food Security and Adaptation Conference 20-21 August 2013

**Submission from the Climate Emergency Institute by Dr. Peter Carter
August 2013**

The organizers and promoters are to be congratulated for putting on this most important conference.

Summary

The only way sure to mitigate catastrophic food production losses in Africa is an emergency rapid world de-carbonization response, to slow global warming and climate change.

Today's record atmospheric greenhouse gas (GHG) levels and GHG emissions will result in the worst ever food losses and insufficiency for huge populations in Africa, both through direct food production losses and indirectly through increasing world food prices.

The most important climate science for food security is committed (already locked in) future temperature increases.

The 2C target is disastrous and 1C is the danger limit, from paleo- climate past data and observed rapid climate change trends.

A global warming of 2C means food catastrophe for Africa. 1C is known to lead to crop yield declines in Africa (IPCC TAR 21000, AR44 2007)

This demands a global emergency rapid emissions reduction response to mitigate unprecedented suffering and death to Africa over the coming decades.

The priority for African security is to declare an African [committed (locked) climate change] food emergency.

Adaptation must be implemented on an emergency basis, but because African agriculture is most vulnerable to climate change it is least likely that adaptation will mitigate crop declines in Africa.

Agricultural economic (inadequately developed) computer models have for years projected that the Global North will benefit from global warming due to assumed increase in food production, while the Global South and particularly Africa will suffer severe economic losses due to large reductions in crop yields. It is likely that this is behind the intransigence of Global North governments to deal with global climate change.

... The combined model and scenario experiments demonstrate that the world, for the most part, appears to be able to continue to feed itself under the SRES scenarios during the rest of this century. However, this outcome is achieved through production in the developed countries (which mostly benefit from climate change) compensating for declines projected, for the most part, for developing nations. (Effects of climate change on global food production under SRES emissions and socio-economic scenarios M.L. Parry 2004).

However policy makers have recently misinterpreted the results of the climate crop models and the effect of the loss of Arctic snow and sea ice albedo cooling, that indicates food productivity is very vulnerable to the multiple adverse effects of global warming and climate disruption in Northern hemisphere.

The nightmare scenario for Africa is that as Africa is suffering food production losses, world food prices will be escalating due to unreliable food production in the northern hemisphere (NH), due to increased climate variability and extreme weather events. This results from the combination of more rapid NH warming and the effect of declining Arctic snow and summer sea ice albedo cooling.

Today's situation

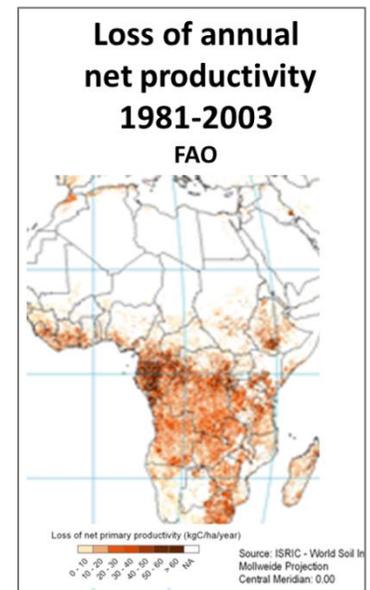
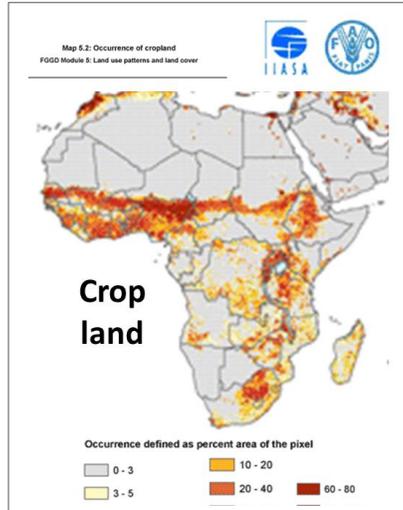
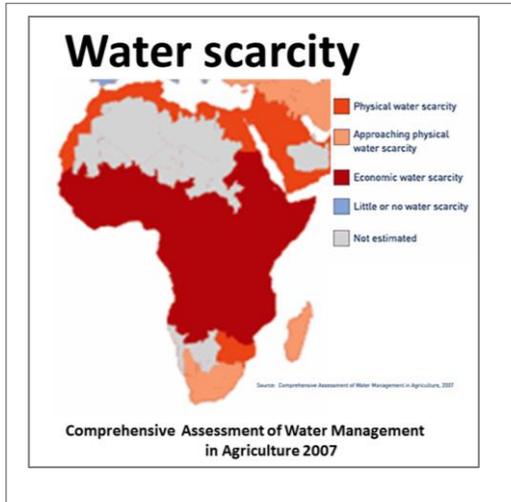
Certainly without a drastic emergency mitigation response, we are committed (locked in) to a warming of at least 3C. (P. Carter (2012). Minimum Climate Change Commitment and Its Food Security Implications. International Journal of Climate Impacts and Responses 4(1), pp.83-100.

The combined national emissions formally filed with the UN, commits the world to a 4.5°C warming by 2100 (Climate Interactive).

It has been known for years that African regions and populations are the most vulnerable to global climate change.

- The African continent has the most amount of degraded land in the world.
- Africa has the most hungry and malnourished populations.
- Africa has the most land affected by water scarcity.
- The African population is the most socio-economically deprived population.

- The African population is the most dependent on local (labour intensive) production for food and income.



The future under global climate change

Future projections of declines in water, food and health under global climate change is the worst for African regions, and declines in Africa due to climate change have already been documented (Climate trends and global crop production since 1980 Lobel, Schlenker, Costa-Roberts Science 2011).

What is Africa being expected to adapt to?

Today's committed locked in warming

A. Policy

4.5C by 2100 (Climate Interactive)

The International energy Agency says without a strong binding agreement on emissions we are headed for a 6.0C warming by 2100.

All economic and energy plans are for continued constant economic expansion under a world energy supply heavily dominated by fossil fuel energy. There is no plan to reform the economy or change the energy supply to clean renewables. If there were- Africa would benefit greatly.

B. Climate science

A simple summation of all unavoidable sources of warming shows that, certainly with a drastic emergency response by industrialized nations, we are committed (locked in) to a warming of 3.0°C that could happen by 2050.

(P. Carter (2012). Minimum Climate Change Commitment and Its Food Security Implications. *International Journal of Climate Impacts and Responses* 4(1), pp.83-100.)

African Food losses at 2C and 3C

We estimate from model results and increased crop pests % diseases (not captured by any of the climate crop models) that African crop yields overall will drop at least 20 % for a 2°C warming and 30% for a 3°C. For some regions like South Africa and Northern Africa we estimate yields will drop by 50% or more for a 2°C warming.

This does not account for large crop losses due to increased human population ill health and to regional conflict over failing food supplies.

We think that food availability losses will be of a similar extent due to escalating world food process at a warming of 1.5C.

IPCC

Even the conservative IPCC AR4 2007 assessment recorded severe impacts to African food security at a global *warming from today's and increasing with global temperature.*

By 2020, between 75 million and 250 million people are projected to be exposed to increased water stress due to climate change.

If coupled with increased demand, this will adversely affect livelihoods and exacerbate water-related problems.

***[...]
Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change.***

The area suitable for agriculture, the length of growing seasons and yield potential, particularly along the margins of semi-arid and arid areas, are expected to decrease.

This would further adversely affect food security and exacerbate malnutrition in the continent.

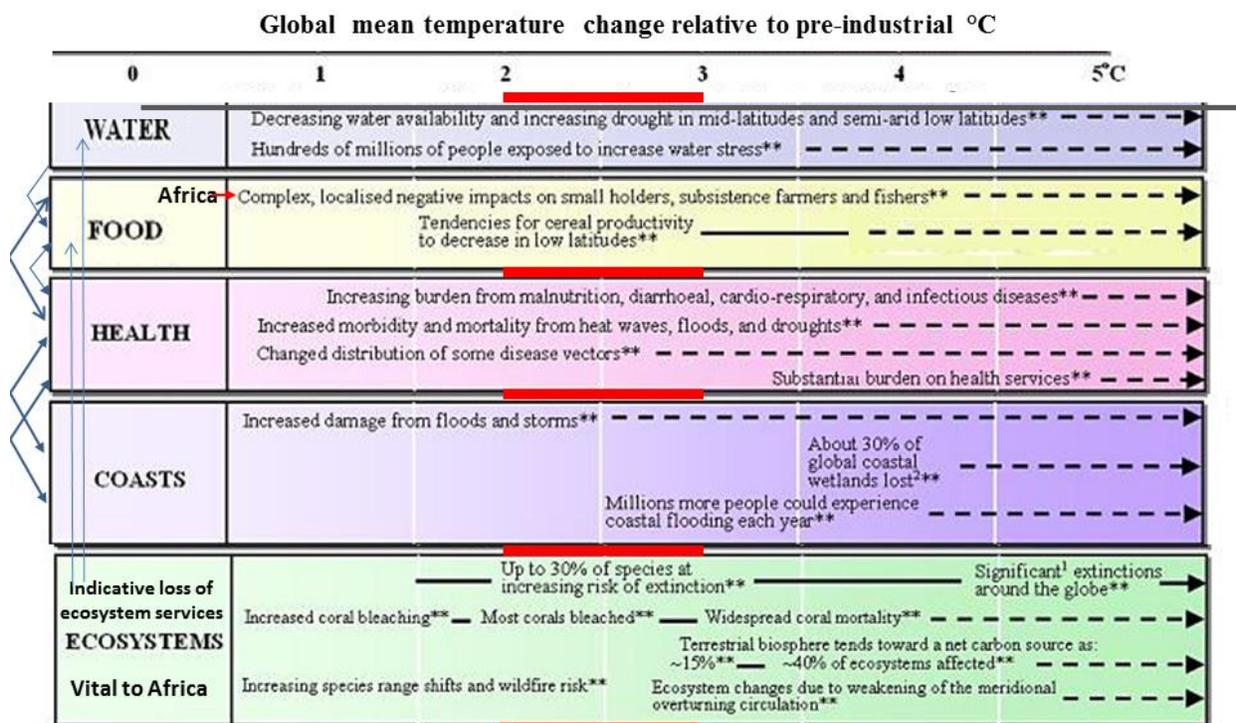
In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020 (+1.2°C from pre-industrial)

Local food supplies are projected to be negatively affected by decreasing fisheries resources in large lakes due to rising water temperatures

New studies confirm that Africa is one of the most vulnerable continents to climate variability and change because of multiple stresses and low adaptive capacity. Some adaptation to current climate variability is taking place; however, this may be insufficient for future changes in climate

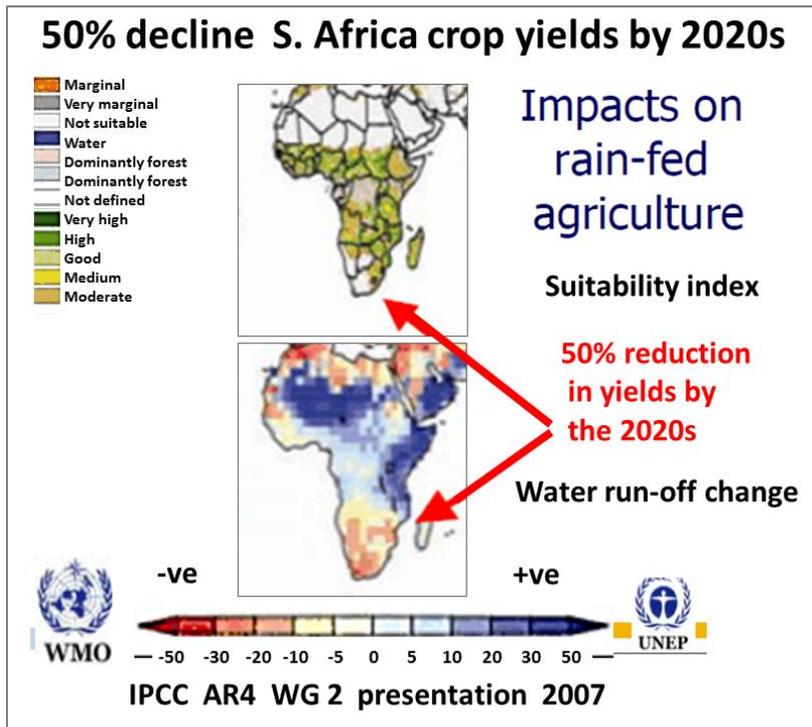
http://www.ipcc.ch/publications_and_data/ar4/wg2/en/spmssp-c-7-africa.html

IPCC AR4 impacts chart showing adverse impacts for food security



Interactions amongst the impact categories are not accounted for

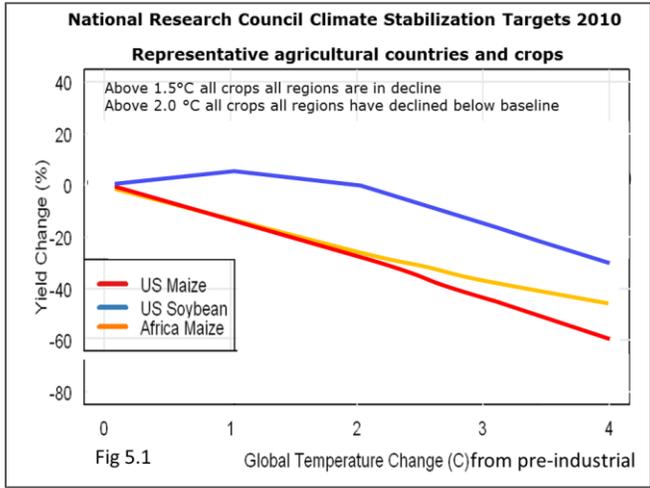
IPCC AR4 WG 2 Figure SPM.7. Examples of impacts associated with projected global average surface warming
The black lines link impacts; broken-line arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left-hand side of text indicates the approximate level of warming that is associated with the onset of a given impact.



This graph, taken from the NRC 2011 climate stabilization assessment, shows large losses of US soybean and US maize, just as bad as losses for African maize.

The result of this will be that Africans will grow less food and also be unable to afford food (world food price escalation).

Food aid will not be available for Africa with less NH food production.

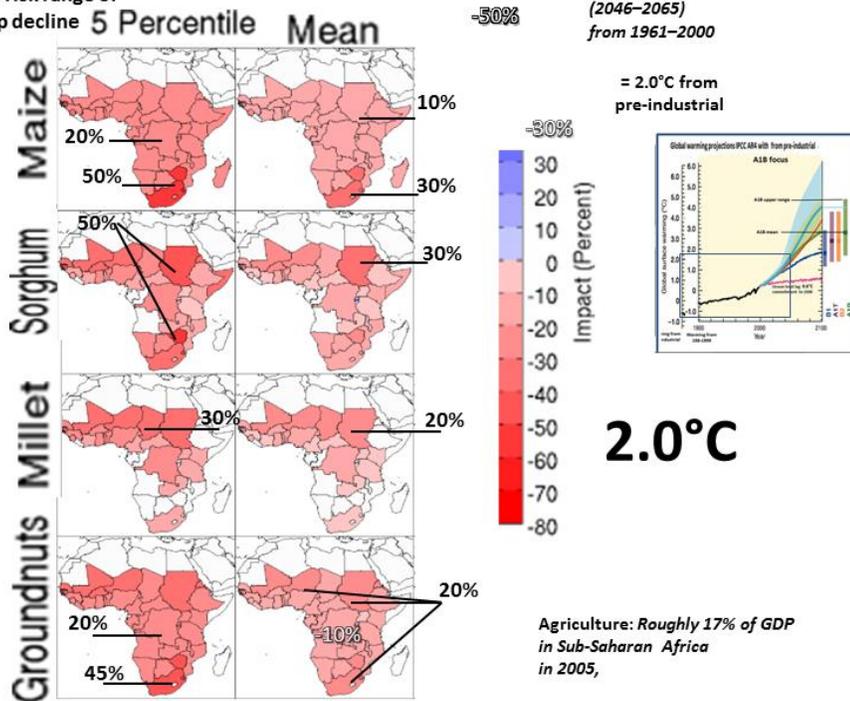


Robust negative impacts of climate change on African agriculture

W. Schlenker, D. Lobell 2010

Figure 6. Distribution of impacts from climate change
Top risk range of crop decline 5 Percentile Mean

changes under the A1b scenario for mid-century (2046–2065) from 1961–2000



Robust Negative Impacts of Climate Change on African Agriculture

Wolfram Schlenker David Lobell Stanford University
Environmental Research Letters February 2010

