Submission by LMDC on Agriculture, including Fisheries

Submitted by Mali on behalf of the LMDC

A. Background and Mandate

SBSTA 38 invited Parties to submit their views on "*the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries. This should take into account the diversity of the agricultural systems and the differences in scale as well as possible adaptation co-benefits*." (FCCC/SBSTA/2013/L.20)

The SBSTA conclusions call for an in-session workshop at SB 39 in Warsaw, with a report on the workshop to be considered at SB 40 in June 2014. Therefore the consideration of the results of the workshop to be held at COP will need to be discussed by Parties next year.

B. Context within the Convention and General Principles

The agricultural sector is particularly vulnerable to the effects of climate change. In view of the need to feed a growing world population in the next decades, it will be necessary to increase the adaptive capacity of the sector and to improve the productivity of the agricultural systems.

*A*daptation must be pursued cognizant of the fundamental role of agriculture in food production and food security, the interests of small and marginal farmers, indigenous and or traditional knowledge and practices, and the role of women in agriculture. In particular, it must be recognised that in developing countries a large proportion of the population depends on agriculture for its livelihood, and that agriculture is of critical importance for social and economic development and for poverty eradication of those countries.

Work related to agriculture must be governed and guided by the principles and provisions of the Convention, in particular the principles of common but differentiated responsibilities. *Also, it should be* taken into account that the developed countries shall assist, according to Article 4 of the Convention, developing countries that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.

C. Promoting rural development, sustainable development and productivity of agricultural systems and food security in developing countries

There is a need for an assessment of the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts, while promoting rural development, and productivity of agricultural systems and food security, particularly in developing countries. This should take into account the diversity of the agricultural systems, and the differences in scale, as well as possible adaptation co-benefits.

Further, responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter taking into full account the legitimate priority needs of developing counties for the

achievement of sustained economic growth and the eradication of poverty. It is important to recognise the specific economic and social circumstances and needs of developing countries and their specific regional, national and local contexts.

D. Current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change

A 2°C world is likely to have unacceptable consequences for agricultural production in most parts of the developing world. Food production is already threatened by the temperature rise of the last century, and the committed warming due to greenhouse gas emissions of the last decades. A doubling of the warming seen to date – to 1.5°C – will mean crops in some regions will fail too often for crop producers to maintain that livelihood strategy. Pastoralists in many areas will be forced to migrate distances too far and too frequently for water and pasture to remain pastoralists. Fisheries will be affected by the triple threat of temperature rise, sea level rise, and ocean acidification. Two degrees of warming will have implications affecting millions of livelihoods based on agriculture and fisheries – in such instances, adaptation in many areas will simply not be an option due permanent damage to agricultural systems.

In its Fourth Assessment Report, the IPCC projects that crop productivity would increase slightly at mid- to high latitudes for local mean temperature increases of up to 1-3oC (depending on the crop) (Easterling et al., 2007). However, at lower latitudes, especially in the seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1-2oC). In some African countries, yields from rain-fed agriculture, which is important for the poorest farmers, could be reduced by up to 50 percent by 2020 (IPCC, 2007). Further warming above 3oC would have increasingly negative impacts in all regions.

Recent studies suggest the IPCC may have significantly understated the potential impacts of climate change on agriculture. New research by Stanford University, for example, suggests that production losses across the continent of Africa in 2050 (consistent with global warming of around 1.5oC) are likely to be in the range of 18 to 22 percent for maize, sorghum, millet and groundnut, with worst-case losses of up to 27 percent to 32 percent (Schlenker and Lobell, 2010).

The International Food Policy Research Institute (IFPRI) suggests that rice production in South Asia, one of the most affected regions in terms of crop production, could decline by 14.3 to 14.5 percent by 2050, maize production by 8.8-18.5 percent and wheat production by 43.7 to 48.8 percent, relative to 2000 levels. IFPRI concludes that unchecked climate change will have major negative effects on agricultural productivity, with yield declines for the most important crops and price increases for the world's staples – rice, wheat, maize and soybeans (Nelson et al., 2009).

Recent research strongly suggests that observed rising temperatures in the second half of the 20th century and early years of the 21st century, and accompanying changes in precipitation, have already had demonstrable and varying effects on agriculture across the globe (Lobell et al., 2011). There are dramatic regional differences in the recent past (1980-2008) in terms of change in growing season temperature: small changes are found in North America whereas

large increases are found in other parts of the world, particularly Europe and China. This translates into different changes in yields. Models that link yields of the four largest commodity crops to weather indicate that global maize and wheat production declined by 3.8 and 5.5 percent, respectively, relative to a counterfactual without climate trends. In particular, there is much research needed to understand the severity of slow onset impacts on agriculture and adaptation strategies required to address those impacts as limits to adaptation are breached.

Further research is needed on adaptation in agriculture to impacts of climate change and the workshop at COP 19 could pose a range of questions that must be addressed along these lines.

Questions that could be framed for further SBSTA consideration:

1. What further knowledge is needed on potential climate change impacts on agriculture?

In order to understand how to enhance the adaptation of agriculture to climate change impacts, it is essential to know what impacts are anticipated. The entire spectrum of adaptation options is broad, complex, and diverse. A good understanding is needed of the range of impacts that are to be expected, under which timeframes, and the degree of severity of those impacts. For this, a system for early identification of climate change manifestations and impacts on agricultural ecosystems designed in a manner that addresses concerns of interested developing countries could be a useful tool to enhancing knowledge.

Impacts on agriculture will have significant consequences for rural development, sustainable development, and food security. For example:

- In the tropics and sub-tropics climate change could cause crop yields to fall 10-20 percent or more between now and 2050 — even as population and demand for food increases;
- Entire regions face a shift to a different climate type and the geographic range for many crops will shift accordingly;
- Steadily rising temperatures are predicted to reduce yields of all the world's staple crops: maize, wheat, rice, and potato. For example potatoes (world's fourth largest food crop – accounting for more than half of global production from developing countries like India and China) are suited to cooler climates, and massive production shifts are likely.
- With the increase of temperatures, crops are requiring more water and regions such as the Arabian Peninsula are depleting their underground reservoirs and as a consequences the water will become salinized. This will cause lack of both drinking water and the main source of water used for agriculture.
- Water shortage and extreme events like flood and drought have significant impacts on crop production and livestock management.

Reviewing this background knowledge is essential to understand how to enhance adaptation and is within the SBSTA mandate (Article 9.2(a)): "to assess the state of scientific knowledge relating to climate change and its effects." It is key to understand the state of knowledge on staple crops and on crops, livestock, and fisheries resources that are important for the food security of the most vulnerable.

2. What is the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts?

Because the range of impacts is not well understood, the current state of scientific knowledge is incomplete. In particular, as emphasis has been placed on adaptation, insufficient attention has been paid to relevant temperature and precipitation thresholds that require changes on the conventional approach to adaptation.

Additionally, SBSTA could review the effectiveness of and provide advice on the development of necessary systems, technologies and institutions, ranging from agro-meteorological forecasting and early warning systems to other approaches to manage risk.

SBSTA also has a mandate (Article 9.2(d)) "to provide advice on scientific programmes, international cooperation in research and development related to climate change, as well as on ways and means of supporting endogenous capacity-building in developing countries."

The SBSTA could carry out a process of identifying research, capacity and technology needs, associated cost, deployment and upscaling of technology and practices, technical and priorities for international cooperation in research and development related to both climate impacts on agriculture and how to enhance adaptation to those impacts. The workshop could address a range of suggestions for research needs and priorities.

3. Collapse in agricultural systems due to climate change slow onset impacts

As noted above, insufficient attention has been paid to the situations that will require addressing conditions beyond feasible adaptation (i.e. where biophysical barriers limit options for adapting or where the cost of adaptation is beyond what developing countries are supported to do), and possible impacts on food security of billions with livelihoods dependent on agriculture, including livestock and fisheries, when there is no possibility for adequate and effective adaptation and when climate variability overtakes the ability of systems to cope.

According to recent academic research, particular cropping systems that look especially vulnerable are maize in most locations across the globe, wheat in Central and South Asia, and rice throughout South and East Asia. Slow onset temperature rise is already having and will continue to have serious consequences for farmers, pastoralists, and fisherfolk. The workshop at COP19 should consider the significant and widespread assessment of impacts from increasing temperatures on agricultural yields, food production, and the livelihoods of those dependent on agricultural and fisheries production. SBSTA should consider options for assessing impacts and possible means to compensate for losses and damage in the agriculture sector.

SBSTA should as a priority with regard to agricultural adaptation address the research and other needs related to adaptation and the impacts of climate change that may transform food systems. For example, water availability plays a crucial role in agricultural production, given the very high percentage of cropping systems that are rainfed or fed from underground water, and the dependence of livestock on both pasture and water supplies.

Further activities to continue addressing adaptation needs related to slow onset impacts and limits to adaptation could include:

- A technical paper on projected climate impacts, including slow onset temperature rise on agricultural yields, food and fisheries production, and livelihoods of those dependent on agricultural and fisheries production. There could be an analysis of different scenarios of climate change impacts on agriculture, considering the characteristics and the diversity of agricultural systems, as well as the known capacity at national level for awareness and dissemination of various relevant technical information to farmers.
- Identify in the workshop at COP19 scientific, technical, data collection and systematic observation gaps and needs regarding impacts of climate change on agriculture, including for the development and transfer of technologies.
- Support the establishment of a clearing house mechanism on adaptation action to assist Parties to obtain the appropriate tested technology for implementation of adaptation
- Encourage Parties to have national sustainable agricultural policies, including adequate provision for research and development in respect to adaptation in the sector with respect to the impacts of climate change

E. Support for the development and transfer of appropriate adaptation technologies and practices

Adaptation must be a key priority for technology transfer. In this respect, there is a need to ensure effective technology transfer to developing countries, in particular those technologies and practices which could contribute to increasing the adaptive capacity of agricultural systems. It is important to help developing countries to develop their endogenous capacities in relation to technologies for the adaptation of agriculture to the impacts of climate change. Technologies need also to be considered in relation to the different agricultural systems and climates and specific national, regional and local contexts.

Additionally, intellectual property rights on plant and animal varieties will be a stumbling block to the breeding efforts necessary for agriculture to keep pace with changing climates. The growing interest of multinational agribusiness is reflected in increased bio-prospecting in developing countries and accompanying IPR activity. An opposition to patents on any life forms is warranted in this regard. Protection of new plant varieties as required under the WTO TRIPS Agreement should be carefully considered to not result in depriving developing countries of their rights over their plant resources for continuous breeding and cultivation. All flexibilities and safeguards related to IPRs should be maintained and implemented fully.

F. Capacity needs

Agricultural challenges over the coming decades clearly necessitate additional support for capacity building at many levels. Such capacity building should be assessed in the workshop at COP19 and could include, but is certainly not limited to:

- Capacity in the meteorological sector, for early warning systems, data collection and interpretation. Early warning systems can provide seasonal rainfall information that can be useful to farmers in their planting decisions.

- Capacity to communicate seasonal weather information and possible responses with farmers. Meteorological information is of little value if there are not dissemination systems in place to communicate with farmers and pastoralists in rural areas.
- Conservation, breeding and seed multiplication capacity: climate-change-focused conservation and breeding programs, farmer-breeder linkages, seed multiplication systems at the local level are all necessary. As climates rapidly change, it will be difficult to keep pace with breeding for novel climates. Local, regional, and national, and systems of breeding and seed exchange are urgently needed.
- Promotion of agroforestry systems to reduce vulnerability to drought or excess rainfall, loss of soil, soil degradation and disaster risk reduction
- Appropriate systems for sharing of traditional and contemporary agricultural practices . Many agricultural practices that increase the adaptive capacity are in use across the developing world, but these must be disseminated more widely. Capacity in farmer-to-farmer knowledge sharing will be key to this effort.