

Farmers and food systems need support to adapt to climate change

London, 6 Dec (Teresa Anderson)-Parties at a recent workshop on agriculture and climate change at the Warsaw climate talks outlined many present and future challenges that their food production face, and also shared strategies, experiences and priorities for adaptation.

The vulnerability of developing countries to climate change impacts was made particularly clear, along with their urgent need to adapt.

A workshop on 'agriculture', and in particular on 'the current state of scientific knowledge on how to enhance adaptation of agriculture to climate change impacts' was held in Warsaw on 12 Nov under the 39th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA 39).

The workshop was held following a decision from the agriculture discussions at SBSTA38, and additionally covered issues of rural development, sustainable development, productivity of agricultural systems and food security in all countries, particularly in developing countries.

In summary, from the interventions, every region reported vulnerable and impacted agriculture, as well as future anticipated impacts, highlighting the urgent need for agriculture to adapt to climate change impacts. The vulnerability of developing countries was made particularly clear. This is partly because they are in the regions mostly likely to be hardest-hit, and also because the majority of many developing countries' populations depend on agriculture for their livelihoods. A wide range of adaptation strategies have been taken up and proposed by Parties, from diversification of crops to weather forecasting systems. The need to focus on adaptation in agriculture, to work closely with farmers and indigenous knowledge systems, and to facilitate this through finance, transfer of appropriate technologies and capacity building was emphasised by many Parties.

Strategies and issues raised by more than one countries included: enhancing seed diversity (**Bolivia, US, China**), recognising traditional and indigenous knowledge (**Uruguay, Bolivia, EU, Saudi Arabia and South Africa**) and the need for finance and technology transfer of environmentally sound technologies (**Uruguay, Argentina, China and South Africa**)

Jean-Yves Ypersele of the **Intergovernmental Panel on Climate Change (IPCC)** drew attention to a Special Report on Managing the Risk of Extreme Events (SREX) published 2 years ago. Impacts of climate change depend on severity of the events, the vulnerability of countries, and their level of exposure. The SREX report indicates that extreme climate events are having greater impacts, such as floods, droughts and changes in temperatures. Agriculture as an economic sector is particularly vulnerable to climate change, especially in developing countries. Food security is linked to the ability to adapt.

Ypersele gave examples of how different regions are affected in different ways: in Africa, rain-fed agriculture is significantly impacted by floods and droughts. In Asia, rice is sensitive to high temperatures. American agriculture is affected by heavy precipitation and floods. New Zealand is affected by drought and El Nino events, while the heat wave across Europe some years ago led to economic losses of 13 billion euro. Management of risks will therefore depend on each region's unique vulnerabilities and exposure. Ypersele noted that the 4th Assessment Report of the IPCC (AR4) indicated that the agriculture sector could contribute to mitigation.

Alexandre Meybeck of the **Food and Agriculture Organisation (FAO)** highlighted that 2.5 billion households in the world depend on agriculture. In many developing countries, over 50% or even 75% of the population may depend on agriculture for

their livelihoods. Agriculture can represent over 30% of GDP for some countries. 2 billion people are currently malnourished, and most of these people are dependent on agriculture. Food production will need to increase by 60% by 2050. But even a small change in weather can lead to large crop losses. Plans also need to take into account sea level rise. The countries that are currently hungriest are also the most impacted by climate change. However, breadbasket regions will also be severely impacted.

Meybeck emphasised the farmers' and communities' role in adaptation, as it is the farmer who decides what to do. Adaptation is a social learning process. Policies must also enable up-scaling of adaptation to be meaningful for regions or countries. Diversification of genetic resources will be critical, and the importance of pollinators and wild relatives in crop production should also be taken into account. Many African countries' climates will change, so genetic resources will need to move all over the continent.

Responding to a question from **Indonesia** about 'Climate Smart Agriculture' (CSA), Meybeck emphasised that there were various understandings of the term. For FAO, the priority is to address food security needs through adaptation to climate change and mitigate where possible. Adaptation is of growing importance for the FAO. **Argentina** echoed that different bodies seem to have different understandings of the term CSA to FAO.

Egypt speaking for the **G77** emphasised that the focus of SBSTA must be on adaptation, taking into account livelihoods, small farmers and local contexts.

Malawi on behalf of the **African Group** emphasised that adaptation in Africa is a life or death issue for much of the population. Concerted efforts are needed to address adaptation in the agriculture sector, which is mostly rain-fed and carried out by small-scale farmers, and hence highly vulnerable. Some positive improvements such as improved rainfall forecasting have had limited benefits, as although they predict seasonal rainfall amounts, they do not indicate distribution and timings - a key issue for farmers. The promotion of improved varieties, conservation agriculture, water management, irrigation technologies, agroforestry, fertiliser management and index-based group weather insurance has been useful. Indigenous knowledge used by communities to manage climate risk should be integrated with scientific knowledge.

Adaptation strategies also have co-benefits such as economic growth and poverty reduction.

Africa identified 4 key areas for support from the international community: finance for adaptation, capacity building, tools, modelling and downscaling; finance for assessment and development of science and technical options to enhance adaptation in agriculture; identification of technology needs and proven technologies; and financial support for the National Adaptation Plans (NAPs) process, where agriculture will be key.

The Gambia speaking for the **LDCs** drew attention to the lack of synergies between agriculture and climate change policies, and the low number of scientists and technologies in LDCs, which needs to improve. They proposed a number of approaches that were echoed by other Parties. These included early warning, forecasting and modelling systems (**Thailand and EU**), insurance schemes (**Egypt**), conservation tillage/conservation agriculture (**Australia, Brazil, US, China and Canada**), agroforestry (**Australia**) and rainwater harvesting for irrigation (**Sri Lanka**).

India said that two-thirds of their workforce is engaged in agriculture. Irregular monsoon rains in 2009 impacted on rice production, and many other crops have also been affected. Dairy cows have also been impacted by heat stress.

Colombia emphasised the vulnerability of their agriculture. Crops, soil and livestock are all affected. Vulnerability assessments indicate that between now and 2050, close to 80% of crops will be affected. Assessments also show that there is insufficient knowledge of climate change impacts, insufficient capacity to carry out adaptation plans and communicate risks in time, as well as insufficient knowledge transfer to local populations.

Bangladesh emphasised that adaptation needs to be considered as part of the package of finance.

Costa Rica said that their Nationally Appropriate Mitigation Actions (NAMAs) focuses on livestock and low emissions. An alliance of scientists from ministries and academia, scientists and extension agents are sharing information on pastures and resilient varieties.

Uruguay emphasised the importance of agriculture for livelihoods and food security. While agriculture has increased productivity in the last decade, sensitivity to climate change has also increased the economy's vulnerability. Adaptation is therefore a priority strategy, and there are synergies with adaptation's co-benefits.

Vietnam said it is at risk from climate change and rising sea levels, and has experienced 1.5% loss of GDP from natural disasters. Adaptation approaches they have used include cropping pattern changes, and changing from rice to corn to cope with shorter water availability. Vietnam has a 'Climate Smart Agriculture' programme that encourages co-benefits.

Sri Lanka reported that although total rainfall has not changed much, onset and variability of rain has changed. Serious droughts can lead to losses of 10-15%. A lack of information about the animal sector was noted. The farming community has adapted their rice growing and is increasingly growing dry rice varieties.

Argentina emphasised the need to increase food production, and thus to adapt and diversify agriculture, and to promote adaptation technologies to farmers. Argentina is collecting data, and has adaptation projects in different regions of the country, including improving varieties of seed adapted to thermal stress, water stress and pests.

Brazil reminded participants that the IPCC AR5 showed that global agriculture faces losses of up to 40% variation in this century, and that losses could be as high as 20% before 2020, and that tropical agriculture is particularly vulnerable. Brazil highlighted the need for more information, analysis and mapping of climate vulnerability and risks relating to temperature increases, water availability, crops and diseases. They referred to their written submission, highlighting a possible role for the UNFCCC to developing a platform where key information systems can interact and facilitate shared learning and technology transfer.

China has a population of 1.3 billion, and food security is thus a huge issue. Higher temperatures and more extreme weather are already impacting on food production, and thus adaptation is very important.

The challenges faced by **Thailand** in the face of climate change include floods, drought, landslides, sea level rises, biodiversity loss and health risks. Agriculture is fundamental to the Thai economy, poverty reduction and sustainable development. However it is a vulnerable sector facing a lack of technology, infrastructure and low adaptive capacity. Promotion of adaptation is a priority to strengthen farmers' capacity.

Bolivia said adaptation options are broad, and a better understanding of the range of expected impacts, timeframes and the severity of impacts is

needed. They emphasised the value of agro-ecological approaches for adaptation technologies and practices, as well as conservation of crop and livestock diversity, indigenous and traditional knowledge and seed sharing. Bolivia reminded participants that some climate change impacts could overtake the ability of farming systems to adapt and cope, and thus loss and damage consideration must therefore be integrated into discussion of agriculture and adaptation.

Indonesia highlighted that increases of 1 degree C in temperature could reduce food production by 8-10%, while water becomes scarcer. Indonesia is exploring other sources of carbohydrates that are less vulnerable to changes in temperature and water availability, such as cassava and breadfruit. They have developed an integrated dynamic cropping calendar which covers an area throughout Indonesia and which recommends planting times and rice varieties, and warns of potential pests and diseases for farmers based on seasonal climate forecasts.

Saudi Arabia reminded participants that the purpose of this workshop was to be about adaptation, and not about mitigation co-benefits. They also requested that the report should not be limited to discussions here, as time was short. Risk assessment and adaptation technologies need to be explored, all in the context of socio-economic development and food security.

South Africa emphasised the importance of adaptation in agriculture, as they are experiencing extreme weather such as floods and droughts, and food insecurity is a key priority. Drought-tolerant crops and other best practices can be interventions for adaptation. Critical areas of work and focus include identifying future research needs, adaptation needs, working at local, national and regional levels, and developing adaptive capacity stress systems.

Egypt reminded participants that the IPCC has identified them as one of the most vulnerable areas in the world, and they may lose 30% of land in coastal areas and the Nile delta, amounting to losses of billions of dollars, highlighting the need for a methodology for loss and damage in agriculture. They emphasised the importance of supporting farmers to adopt practices for community-based adaptation, and to develop measures to assess vulnerability.

S. Korea's fruit and pear production has shifted north, and arable area has increased as a result of climate change. However pests and diseases have also increased. New techniques in rice cultivation

are being developed, as well as systems to monitor pests and diseases.

Switzerland said that its agriculture is being affected by climate change, with 2011 the hottest year on record, and temperatures increasing 1.5 times faster than other landmasses. While total rainfall is the same, patterns have changed to more rain in autumn and winter, and less in summer, affecting agriculture. Summer heat stress is affecting dairy cows. Meanwhile, the Alps have traditionally acted as a cold barrier for pests and diseases, but this barrier is shrinking.

Japan highlighted their contribution to NERICA rice in Africa, a hybrid of African and Asian varieties that can be adapted to drought and has higher yields. In Japan, alternative-wet-and-dry systems of growing rice have been introduced to reduce need for water.

The EU is working to improve adaptation with mitigation co-benefits in agriculture, to develop policy on these areas, and to promote the EU adaptation platform. In **Ireland**, grassland management has enabled a lower input system that is more resilient to climate change, with longer grazing seasons, lower costs, less feed use, higher quality forage, better quality milk and meat and happier cows. This also reduces GHG emissions. Efforts have also been made to improve forage and crop breeding, use locally appropriate varieties and conserve local genetic resources.

The European Union asked participants whether adapting to a 4 degree C world was possible, and to ask how they can contribute bearing in mind the

need to integrate food security and farmers' needs. They drew attention to the importance of resilience, and the best way to achieve co-benefits such as poverty eradication while reducing GHGs.

The United States highlighted emerging commonalities, such as knowledge management, capacity building, needs assessment, co-benefits, technology transfer, research collaboration, knowledge gaps and lessons learned, droughts, pests, temperature variability, forecasting, conservation of seed varieties, water management and agroforestry, and that these could provide substantive ways to move forward. Their submission gave examples of soil conservation practices, technological advances and availability of data for farmers.

New Zealand reminded delegates to read their written submission, and supported the United States' comments.

A representative of the **Environmental NGOs**, the **Gaia Foundation** drew attention to the FAO's findings that 75% of global agricultural diversity has eroded in recent decades due to industrialisation of agriculture, risking a dangerously narrow gene pool for present and future farmers with which to spread risk and adapt new crops. The need for agro-ecological *in-situ* seed conservation strategies, and to recognise farmers' complex knowledge and their rights to save, adapt and exchange seed should be embedded in adaptation strategies. Ensuring that farmers can grow a wide range of seed varieties will help them to meet the unpredictable variability of climate impacts.