SUMMARY OF THE FSN FORUM DISCUSSION

RESPONDING TO THE CHALLENGES OF CLIMATE CHANGE AND ITS LINKAGES TO FOOD SECURITY AND NUTRITION

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http://km.fao.org/fileadmin/user_upload/fsn/docs/PROCEEDINGS_Challenges_ClimateChange_LinkagesFSN.doc

I. ISSUES RAISED

- Climate change impacts: (Jost, S.)
  - It affects everyone, especially many vulnerable and food insecure people like small-scale farmers, fishers and forest-dependent people.
  - It is expected to affect the incidence of malnutrition caused by, among other factors, more severe drought and erratic rainfall that may also change food consumption patterns.

- Agriculture effects on climate changes (Hossain S.T.):
  - Agriculture is a major contributor to emissions of carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O);
  - Agricultural land use in the 1990s has been responsible for approx. 15% of all green house gas (CH4) emissions. One third of all carbon dioxide emissions come from change in land use (forest cleaning, shifting cultivation and intensification of agriculture);
  - Approximately two thirds of methane and most of nitrous oxide emissions originate from agriculture;
  - Agriculture is responsible for about 70% of nitrous oxide emissions. Agriculture ranks third after energy generation and chlorofluorocarbon production, contributing to greenhouse effect, the cause of climate change.

II. COUNTRY RESPONSES TO CLIMATE CHANGE AND VARIABILITY

- **Biofuels:** some countries have resulted to the development of biofuels to reduce the adverse effects of continuous burning fossil fuels and its implication for CO2 emission to the atmosphere. (Onimawo. I.)
  - **Opportunities**:
    - ✓The canvassed for use of biofuels is environmentally friendliness thus helping to slow down the rate of climate change (Onimawo. I.);
    - ✓Growing demand for biofuels and the resulting higher agricultural commodity prices offer opportunities for some developing countries in terms of income and employment. (Jost, S.)
  - **Constrains**:
    - ✓In a situation where there is already food crisis the use of food crops like maize, millet,

sorghum and cassava for biofuels could have drastic effects on food availability and therefore aggravate the food crisis situation. (Onimawo. I.). However, there are better feedstocks that can be used rather than cash crops. For example, Jathropha seed is taking over the use of Maize, millet, sorghum and cassava (Adewole, T.).

- ✓ Biofuels increase concerns for food security of developing countries that are highly dependent on imports to meet their food requirements and of poor urban consumers or poor net food buyers in rural areas. The questions of the availability of land and water and the environmental impacts of biofuels are also crucial (Jost, S.).

- **Organic agriculture:** This technique is not only a philosophy but it's also a means of achieving sustainability in agriculture. The soil is the most important media responsible for sustainable agriculture, where the organic matter from plants and animal is mixed with the powder of rocks (mineral), biological (micro-organism) activities and chemical action. The most common but limited organic materials which are currently used though out the world are bio fertilizer, humane fertilizers, manure spreaders, crop residues, green manure, bone meals, compost, farmyard manure, fish meal, fish wastes, liquid manure, sewage sludge etc. (Hossain S.T.)

  - **Opportunities for using organic agriculture** (Hossain S.T.):

    - ✓ By adopting organic, one could potentiality reduce carbon dioxide emissions and achieve sustainability in agriculture because in these types of practices, it gets rid of toxic chemicals pesticides and synthetic fertilizers and uses significantly less fossil fuel;

    - ✓ To ensure that the soil remains biological active, new sources of organic matter must be added at regular intervals.

  - **FAO tools to trade in organic agricultural products** (Jost, S.):

    - ✓ **Equitool** is a guide to help decision-makers assess whether an organic production and processing standard applicable in one region of the world is equivalent to another organic standard. This tool facilitates trade while also safeguarding organic production according to local socio-economic and agro-ecological conditions;

    - ✓ **IROCB** (International Requirements for Organic Certification Bodies) is a minimum set of performance requirements for organic certification bodies that will enable import of products certified under foreign control systems.

  - **Organic farming projects in Bangladesh:**

    - ✓ **Padakhep Manabik Unnayan Kendra**, NGO (Hossain S.T.): Declining productivity due to soil degradation is the major constraint in the country. The continuous and unbalanced use of inorganic nutrients in an intensive cropping system has been considered to be the main cause for stagnating or declining crop productivity. The NGO Padakhep Manabik Unnayan Kendra has therefore introduced:

      1) Integrated Rice-Duck Farming in the year 2001;
      2) The new FEROMON TRAPS technology against insect pests of vegetable crops and producing organic fruits in our homestead projects.
      3) Short duration high temperature tolerant rice varieties for kharif II and System of Rice Intensification (SRI) for boro season in wide areas under the disaster risk management program.

    - ✓ **FAO Livelihood Adaptation to Climate Change (**LACC) Project (Jost, S.). The LACC Project aims to improve adaptive capacity to climate variability and disaster risk reduction processes and capacities for sustainable food and livelihood security in

drought prone and coastal regions of Bangladesh. This project promotes notably "Climate field schools" where farmers learn about how to adapt to climate change, as well as energy efficient stoves which save fuel consumption by 30 to 40 %.

III. BIOCHAR IN SOILS: AN INNOVATIVE TECHNIQUE TO FIGHT GLOBAL WARMING

- **The holistic Biochar/ Terra Preta project, GoodPlanet / Action Carbone,** Non-profit Organization founded by the French photographer Yann Arthus-Bertrand: GoodPlanet/ Action Carbone, together with GEO, an Indian NGO, are building knowledge on this innovative measure called Biochar to fight global warming and to improve soils' fertility and therefore increase crop yields. Action Carbone finances a Biochar project aimed at small-scale farmers in India. The International Biochar Initiative is also dealing with the United Nations Convention to Combat Desertification to promote Biochar in Climate Change negotiations in Poznan. (Anaya de la Rosa, R. K.)

  a) **Background:** Ongoing research shows that carbonized materials (biochar) obtained from the chemical decomposition of organic matter by heating in the absence of oxygen (pyrolysis) are responsible for maintaining high levels of soil organic matter and available nutrients in anthropogenic soils (Terra Preta or Dark Soils, in Portuguese) of the Brazilian Amazon basin. Several variables have been identified (type of pyrolysis technology and its various factors, type of soils, depth at which this biochar is dug into the soils, amount of biochar per hectare, type of biomass to produce the biochar, etc. , etc.). Given its high potential, biochar has been recently considered to counteract global warming by sequestering carbon in soils, becoming a carbon-negative strategy, while enhancing agricultural practices and delivering other socio-economical and environmental benefits

  b) **Components - Pyrolysis** and **Terra Preta soil**:

  - **Pyrolysis** can convert sewage wastes, trees, grasses, straw, corn stover, peanut, coconut and chestnut shells, olive pits, bark, sorghum, rice husk and other crop residues into biochar;
  - **Terra Preta soils** are thousands of years old and charcoal, as a relative stable form of carbon, is still found in these soils. The duration of charcoal or biochar[1]s storage time ranges from millennial to centennial timescales. Whether biochar remains in soils for hundreds or thousands of years, it could be considered as a long-term sink for the purposes of reducing carbon dioxide emissions.

  c) **Advantages of Biochar in solis**:

  - It improves the structure and fertility of soils resulting in a higher productivity of degraded lands;
  - As a porous material, it increases water retention, stimulates symbiotic nitrogen fixation in legumes and creates a "cozy home" for the bacteria, microorganisms, fungi and nutrients required by plants;
  - It can reduce nitrous oxide emissions and leaching of nitrates into water and therefore it lowers soil acidity and aluminium toxicity;
  - The off-gases produced during the pyrolysis processes can be used to produce heat and electricity;
  - Biochar application in soils decreases the use of chemical fertilizers and water irrigation needs;
  - By increasing land's productivity and food production and by reducing the need of chemical fertilizers, points at a positive direction towards an enhanced food security and nutrition.

d) **Biochar projects:**

- **India:** In rural areas in India and in most developing countries women cook their food with biomass (mostly wood and charcoal) in highly polluting stoves, which represent a number of problems (deforestation, lots of time spent on wood collection and on cooking, back pains and other life-threatening risks from wood collection, respiratory and eye diseases from Indoor Air Pollution, high fuel prices if the wood is bought, etc.).

  Furthermore, charcoal is inefficiently produced in the earth-mound kiln, which is a pile of earth, leaves, hay, grass, etc. acting as an oven to heat in the absence of oxygen the wood cut (sometimes illegally) from forests and releasing considerable methane emissions. This process is called pyrolysis and, nowadays (because of Biochar's long-term potential to take carbon out of the atmosphere) a strong emphasis is put on technologies to improve this process. There are different technologies available. From just some drums to the big expensive industrial machines.

  This pilot project aims at involving approximately 5000 households and several farmers in rural India. The activities will be financed through the carbon market. Carbon credits will result from the savings of non-renewable biomass thanks to the diffusion of the charcoal-making stoves.

- **Senegal:** the project consists of the replacement of wood charcoal with "green charcoal" briquettes (there is no international consensus yet, green charcoal is defined as the char produced from organic matter and burnt to provide energy and biochar as the char produced from organic matter and applied underground for carbon sequestration and soils' fertility improvement). The green charcoal briquettes in this project are produced from rice husk, which is burnt otherwise, and from typha, an invasive plant in Senegal.

e) **Future plans**:

- The holistic Biochar/ Terra Preta project should include improved biochar-making stoves, improved biochar-making kilns and the application of the biochar produced in soils, specifically GoodPlanet/ Action Carbone is looking at financing:

1. The diffusion of **the 3rd generation stoves**, the so-called **Charcoal-Making stoves**: while cooking normally with wood, this technology converts part of the wood into charcoal which is then recuperated after cooking;
2. Approximately 10 small-scale efficient kilns (around 500 euros per kiln) to pyrolyse or carbonize the cotton stomps which are left and otherwise burnt openly on the fields of cotton farmers.

- By the project in India, the idea is to create the platform for Biochar projects to become eligible for carbon finance and claim emission reductions in climate change negotiations.

- **Opportunities in using biochar in soils and developing bioenergy** (Jost, S.):

a) This technology appears quite promising as it connects well agricultural and rural development, soil improving practices, energy provision and climate change mitigation;

b) It has applications for households, farms or villages that could produce biochar for their own use (some are already doing it). Larger scale plants, connected to paper mills for example, could produce char for utilisation in neighbouring regions or export. Slash-and-burn farmers could therefore switch to a slash-and-char system;

c) Calculations and estimates on GHG savings and energy production look favourable. Pyrolysis, the process where biochar is produced, also produces biogas, thus impacting all rural energy expansion.

IV. FURTHER CHALLENGES AND OPPORTUNITIES

- **Challenges**

– A main challenge, especially in Sub-Saharan Africa, is the integration of the good scientific analysis and proposed actions into national and sub-national strategies and plans and budgets. This includes using the results of the assessments of the impacts of climate change in the very sensitive sectors for climate proofing the investments in those sectors (Opio-Odongo, J.).

– Producers, rural communities but also individuals and consumers have a role to play in adapting their practices and their consumption to limit the impact of climate change. (Jost, S.)

- **Opportunities**

– Agro-ecological and organic farming systems can be promising opportunity in both industrialized and developing countries to reduce GHG emissions. The allocation of carbon credits for converting to ecological or organic production systems may also enhance the financial viability of this option for a large number of farmers (Hossain S.T.).

– Raising awareness of the possible impacts of climate change on food security in each community is essential in order to take action (Jost, S.).

– The research institutes should pay attention to finding new technology such as an alternate organic fertilizer source (as cow dung needs a large volume), post-harvest and storage methods of an organic way. Considering all these things, different waste materials such as kitchen, municipal etc. are needed to more studies for better utilization to use in organic ways and energy production (Hossain S.T.).

V. REFERENCES

- FAO work on Climate Change: http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=578&nocache=1
- FoodClimate FAO's newsletter on climate change and food security: http://www.fao.org/climatechange/home/newsletter/en
- World Food Day 2008Leaflet: http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=579&nocache=1
- Background technical documents on the website of the "High-Level Conference on World Food Security: the Challenges of Climate Change and Bioenergy": http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=580&nocache=1
- IFPRI "Impact of Climate Change and Bioenergy on Nutrition," written by Marc J. Cohen, Research Fellow and colleagues at the International Food Policy Research Institute, the School of Public Health at the University of California-Los Angeles, and the Nutrition and Consumer Protection Division of FAO: http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=581&nocache=1
- "Bangladesh: land-related constraints", FAO 2004: http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=582&nocache=1
- "Adoption of organic rice for sustainable development in Bangladesh", *Journal of Organic Systems* (New Zealand). Hossain, S. T., Sugimoto, H., Ueno, H.. and Haque, S.M.R. 2 (2) : 27-37, 2007. http://km.fao.org/fsn/resources/fsn_viewresdet.html?r=583

- Summary article on Biochar:
  http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=586&nocache=1
- FAO Livelihood Adaptation to Climate Change (LACC) Project in Bangladesh:
  http://www.fao.org/climatechange/laccproject/en/

  FAO video on Bangladesh and partially on the LACC project (5.30 minutes):
  http://www.fao.org/climatechange/47742/en/
- FAO documents on organic guarantee systems:
  http://www.unctad.org/trade_env/itf-organic/welcome1.asp
- FAO's activities in organic agriculture:
  http://www.fao.org/organicag/
- FAO flagship publication State of Food and Agriculture (SOFA) 2008 on Bioenergy topics, in particular the report on "BIOFUELS: prospects, risks and opportunities". The report analyses the evolution of the demand for agricultural feedstocks (sugar, maize, oilseeds) for liquid biofuels.
  http://www.fao.org/sof/sofa/index_en.html)
- Studies and relevant recommendations on "Vulnerability and Adaptation Assessments and a Draft Regional Strategic Plan for Building Resilience to Climate Change", specifically the following topics:

  1. The regional STRATEGY to build resilience
  2. The effect on TOURISM & SOCIO-ECONOMIC components
  3. AGRICULTURE & FOOD SECURITY
  4. HEALTH AND NUTRITION
  5. HUMAN SETTLEMENT

  Contact Mr Spooner or Mahlung 876-929-3694 or www.metservice.gov.jm