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Global Climate Change And Agricultural Production

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Abstract: ***Global climate change, if it occurs, will definitely affect agriculture. Most mechanism and two-way interactions between agriculture and climate are known, even if not always well understood.***

It is evident that the relationship between climate change and agriculture is still very a matter of conjecture with many uncertainties. It remains largely a conundrum. Most uncertainties affect both the global circulation models (GCM) and the response of agriculture, as illustrated by difference among models, especially as regards effects at the national and sub regional levels. In addition many of the models do not take into consideration Co2 fertilization and improved water-use efficiency the effect of cloud cover on both climate and photosynthesis or the transient nature of climate change.

The rising Co2 concentration in the atmosphere is currently the primary cause of climate change. The correlated changes in the environmental conditions (temperature, precipitation, O3, UV-B, humidity) etc. Are likely to be as important as Co2 in determining the responses of managed ecosystems to determine and needed changes in management practices of graziers or ranchers, farmers and foresters, both positive and negative response need to be fully understood and tested in field conditions. In spite of many certainties, global warming, if it happens, can be a serious problem that could have great implications on agriculture and on natural ecosystems.

Keywords: ***Soil Fertility, Ecosystem, Cropping System, Agricultural System, Land-use Emissions, Regional Vulnerability, Economic Growth, Ozone and temperature, Crop Growth and Development, Growing Season, Green House Gases.***

I. INTRODUCTION

The Risks associated with climate change lie in the interaction of several systems with many variables that must be collectively considered. Agriculture (including Crop Agriculture, Animal husbandry, Forestry and Fisheries) can be defined as one of the systems, and climate the other. If these systems are treated independently, this would lead to an approach which is too fragmentary, this issue is more global. It is now held as likely that human activities can affect climate, one of the components of the environment. Climate in turn effects agriculture, the source of all food consumed by human beings and domestic animals. It must be further considered that only climate may be changing, but that human societies and agriculture develop trends and constraints of their own which climate change impact studies must take into consideration.

Firstly, sustainability of agricultural and rural development, how will the links between environmental resources and demography be affect in the coming 50 years will it be possible, at the same time, to increase food production without irremediably losing environmental resources like soils or biodiversity.

Secondly, improved food security and nutrition two members of a spiral which also includes rural poverty and demographic pressure, what are the prospects of breaking the vicious poverty circle in many developing countries under changing climate conditions.

II. GLOBAL CLIMATE CHANGE AND AGRICULTURAL PRODUCTION

The predicted changes in climate, especially increased atmospheric Co2, temperature and precipitation, associated

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with changes in nitrogen deposition, Troposphere and Stratospheric ozone levels. UV-B radiation etc can have great impacts on world agriculture production and supply patterns in order for agricultural production to be sufficient to meet the demands of the ever-growing human population; the impact of the climate must be understood and integrated in any future planning. The food and agricultural organization of the United Nations is much concerned with this issue. The organization formed an interdepartmental working group on climate change and charged it with coordinating FAO activities in the critical area.

Global climate change and agricultural production direct effects of Hydrological and plant physiological process.

The effects of higher atmospheric carbon dioxide Co2 levels, higher ultraviolet radiation, higher near surface ozone concentrations, higher temperatures and changing precipitation on plant growth and food production.

We believe that there are strong interactions between agricultural and natural ecosystems and these natural ecosystems play a significant role in the global carbon cycle which can greatly impact agriculture.

Agriculture is totally dependent on weather and climate. Despite much effort by climatologists, there is considerable uncertainty about the potential impact of climate change on this sector. Little is known as to how, when, where and to what extent climate change will occur, one in contestable fact is the rising concentration of carbon dioxide (Co2) in the earth's atmosphere.

III. CLIMATE EFFECTS

Many indirect effects of climate change on agriculture can be conjectured as,

- ✓ The overall predictability of weather and climate would decrease, making the day to day and medium-term planning of farm operations more difficult.
- ✓ Loss of biodiversity from some of the most fragile environments, such as tropical forests and mangroves.
- ✓ Sea-level rise (40 cm in the coming 100 years) would submerge some valuable coastal agricultural land.
- ✓ The incidence of diseases and pests, especially aliens ones, could increase.
- ✓ Higher temperatures would allow seasonally longer plant growth and crop growing in cool and mountainous areas, allowing some areas increased cropping and production. In contrast, already warm areas climate change can cause reduced productivity.

IV. AGRICULTURAL ENVIRONMENT

Climate constitutes a complex of inter-related variables. On average, through a set of regulatory mechanisms, a smooth change in one variable triggers smooth change in most others. With the exception of possible qualitative and abrupt variations, which will be mentioned below, such inter-relations are independent of atmosphere carbon dioxide (Co2) the latter and other green house gases play a part largely through their effect on the radiation balance of the atmosphere.

There is only a weak link between such factors are cloudiness and wind, temperature, evaporation and rain are strongly correlated which illustrates the likely intensification of the hydrological cycle. The projected pressure on land and water use, competition of land and water will certainly become a key social and political issue.

V. IMPLICATIONS AND NEEDS

Our current scientific knowledge provides a good understanding of plant physiology, morphology and growth.

- ✓ As some of the soils of the new lands made available through shifting of climatic zones may be unfavourable for crop production, it is important that they are categorized and mapped to avoid or lessen the chances of inappropriate land-use choices.
- ✓ Agronomists need to work closely with climatologists at a regional level to provide a sound basis for optimizing crop, soil and water management under the changing conditions. Special attention should be given to evaluating probabilities of extreme events (droughts, floods) and their effects on plant growth and yield. This should be accompanied by concerted projects on plant breeding by conventional techniques and by using genetic engineering and selection for stress- resistant genotypes.
- ✓ Better socio-economic data on household income and expenditure and also critically important. Most of this information does not exist or is not at a suitable resolution and consistency, and therefore is not directly comparable between or within regions.
- ✓ There is a lack of basic biological knowledge about how tree species and forest ecosystems are affected by climate change. The rate at which a particular species is expected to move into newly available areas needs to be studied, as well as the effects of elevated Co2, alone and in conjunction with other global change parameters on succession, mature, degraded and recovering forests in different world biomes.
- ✓ Readily available assessments (FAO's agriculture toward 2010) should extend their perspectives by enhancing their treatment of indicators of sustainability, with implications of climate change and consequences for green house gas emissions.

VI. EXPERTS CONSULTATIONS

- ✓ It is evident that the relationship between climate change and agriculture is still very much a matter of conjecture with many uncertainties it remains largely conundrum.
- ✓ In spite of many uncertainties, global warming if it happens can be serious problem that could have great implications on agriculture and on natural ecosystems.
- ✓ Past and present activities of the industrial countries are currently the major sources of Co2 it is their responsibility to reduce emissions first and prepare for the likely consequences, imposing reduction targets on

agriculture in developing countries is impractical and non-equitable.

- ✓ The scientific uncertainty surrounding the issue of climate change will not be resolved soon. The time scales of climate change are usually so long that observational studies are usually too short to provide adequate answers. The uncertainty is exacerbated by limitations in modelling techniques, especially at the local scale, and by the lack of knowledge about the complex biophysical responses in field conditions of global change.

VII. REGIONAL VULNERABILITY

The previous sections documented the wide range of uncertainty in the potential direction and magnitude of climate change impact. While many new studies have been conducted, most have focused on specific climate scenarios associated with 2xCo2 4cm scenarios or arbitrary changes in climate conditions to provide evidence of the general sensitivity of agriculture and crop production to climate change. The wide range of estimates limits the ability to extend interpolate or extrapolate from the specific climate scenarios used in these studies to more or less climate change or to draw implications for impacts beyond the sites where studies were conducted.

Given these uncertainties in both magnitude and direction of impact, a key issue is vulnerability to possible climate change. Vulnerability is used here to mean the potential for negative consequences that are difficult to ameliorate through adaptive measures given the range of possible climate changes that might reasonably occurs. Defining an area or population as vulnerable is, thus not a prediction of negative consequences of climate change it is an indication that across the range of possible climate changes, there are some climatic out comes that would lead to relatively more serious consequences for the region than for other regions.

VIII. LAND USE EMISSIONS

The land use emissions model relates global land use to the flux of emissions of CH_4, N_2o, Co, No, and volatile organic carbon. The model estimates the emissions resulting from biotic processes unrelated to human activity, such as N2o emissions from soil is an unmanaged forests and trace gas emissions from aquatic systems. The collusions are important in determining land use and cover related GHG emissions and can be used to evaluate strategies for reducing these emissions.

IX. PRODUCTION AND DEMAND

The standard reference projection, scenario REF-M, presents the perspective of a world in which the effective demand for food grows, substantially owing to higher incomes and larger populations. Technological progress and economic development assumed in the reference scenario allow this increase in demand to be met at somewhat decreasing world market prices for agricultural products, consistent with historical trends. The global production of agricultural commodities in the standard reference scenario REF-M and in the higher income scenario REF-H.

Global trade in the reference scenario increases somewhat faster than global-agricultural production. The global production is estimated to increase from 13% 1980 to 15% 2060, with wheat and coarse grains showing an almost three-fold and rice a four-fold increase in trade levels. In general the share of global trade in global production of commodity aggregates increases gradually overtime indicating a growing specialization in production increase demand in developing countries, due to rising incomes and growing populations, lead to a deterioration in the level of agricultural self-sufficient for this group of countries, which changes from a net surplus of about 3% in 1979/81 into 91% deficit by the year 2060 used by increasing deficits in cereals, meat and milk.

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