National Conference

On

ENSURING FOOD SECURITY IN A CHANGING CLIMATE

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IMPACT OF CLIMATE CHANGE ON FOOD SECURITY

Climate change and its impact on agriculture and food production is of great concern to tropical countries like India. The developing countries in the tropics are less able to adapt and are more susceptible to climate change damage than the temperate countries, many of which will be beneficiaries.

Changes in rainfall patterns and temperature regimes, influence local water balance and this disturbs the optimal cultivation period, available for particular crops. Disturbing these periods, known as Length of Growing Period (LGP) can throw food and agricultural production out of gear. Adequate LGP is needed to ensure that medium to long duration crops are able to grow to maturity. Some crop varieties ripen quickly and are ready for use in a shorter period (short duration varieties), others, specially among cereals require a longer period to ripen and become ready for use. When the growing period available in an agro climatic zone is long, it means that a variety of crops, from short duration to long duration, can be cultivated there, throughout the growing seasons. This obviously means higher food production. When the LGP contracts, the growing season is shortened, with implications for food production. Most climate change models predict large increases of LGP in current temperate and arctic regions leading to larger LGP. This means that temperate regions which are currently one crop zones will become two crop zones, thus increasing agriculture production and benefiting from climate change.

There is a broad consensus that tropical areas are slated to see an expansion of arid zones. This will be accompanied by a contraction of 31-51 million ha of favorable cultivation areas and a significant reduction in food production in the most vulnerable areas where population density is high and food is already scarce. Nearly one billion affected people live in these vulnerable environments, dependent on agriculture. These vulnerable populations have limited capacity to protect themselves from the environmental hazards that will accompany climate change, like drought and floods and will suffer most from climate damage like land degradation and biodiversity loss.

Coping with changes induced by global warming will require early detection and careful management of factors like land degradation and aridity, diminishing water bodies and water scarcity, reduced forest cover and biodiversity loss. Policies that reduce pressure on resources, and improve management of environmental risks, will help to improve adaptive capacity and increase the welfare of the poor by developing better coping mechanisms. If climate change impacts can be incorporated in the design and implementation of development programs right away, it will help to reduce vulnerability.

The Polluter gets Paid.

Climate related impacts on food production will be geographically unevenly distributed. In a perverse irony, the developed (industrialized) countries will experience an increase in agriculture productivity potential as temperate regions get warmer. The regions which because of their industrialization and huge emissions of Greenhouse Gases (GHGs) are responsible for the climate change phenomenon will actually end up being its beneficiaries with respect to food production. On the other hand, today's developing world in the tropics, which has not contributed to creating this climate hazard, will be its worst victim, and will suffer a loss in agriculture productivity, with serious consequences for food availability and hunger.

About forty poor and food-insecure countries, with a projected total population (in 2080) of 1-3 billion will lose 10-20 % of their cereal-production potential. Of these, Africa will be the worst affected and South Asia will be badly affected. Crop production losses as a result of climate change could further worsen the prevalence and depth of hunger. This burden will fall disproportionately on the poorest and most vulnerable. To compound the damage, the overall trend of reduced food production will create market imbalances, which will push up international prices, making it even more difficult for governments of food scarce countries to access food for their poor.

According to estimates, a little less than half the production potential in certain developing countries could be lost. Even if this were to be on the higher side, the situation should be considered alarming enough. In South Asia, the biggest blow to food production is expected to come from the loss of multiple cropping zones. The worst affected areas are predicted to be the double and triple cropping areas. This means areas where two to three crops are produced in a year and which are predicted to turn into single crop zones, where only one crop can be taken in a year because the rest of the season will be too hot and dry to support cultivation.

Coping with wheat loss

For South Asia, particularly India, one of the most serious impacts is anticipated in wheat production. Wheat is the single largest winter crop of North India and states like Punjab, Haryana, Western Uttar Pradesh produce the surplus wheat that goes into the Public Distribution System (PDS). Wheat is a particularly temperature sensitive crop and it has been estimated that for every one degree rise in temperature, wheat producing areas in India and South Asia will lose about four to five million tons of wheat production. This will have a cascading effect on the supplies to the PDS and food availability for the poor.

The immediate challenge is to find a substitute for wheat as the dominant winter crop for North India and other parts where wheat is cultivated. Tubers like potato, can be part of the solution. These could fill the shortfall to some extent but the cereal deficit will have to be made up by some other cereal. Corn could be suitable as a supplementary crop and a partial wheat replacement. Millets are as yet an unexplored option in this regard and have not been assessed for their potential. Although millets typically grow during the summer season in Asia, there are also several millet types which are cultivated at high altitude. Such millet germplasm could form the basis of developing new millet varieties suited for cultivation during the winter season of a changed, warmer climate regime.

The ability of a country to cope with the impact of climate change on agriculture will depend on a number of factors. The total amount of arable land and available water resources will be critical determinants of the ability of regions to adapt to the changes brought by a warming world. Apart from land, the availability of water could become a critical limiting factor. For instance, the impact of global warming on the Tibetan Plateau and Himalayan glaciers will affect the ten or so main rivers like the Indus, the Mekong, the Yangtze and the Brahmaputra that come out of there and flow into China, India, Pakistan, Bangladesh and Myanmar. Harnessing these river waters as the ice caps and Himalayan glaciers recede and the water flow in all rivers diminishes,

will need skilful diplomatic negotiations so that river waters can be shared in such a manner as to ensure that requirements of agriculture are met in all affected countries.

India has technical skills in the agriculture sector and a sophisticated farming community capable of combining indigenous knowledge with recent scientific advances, to overcome challenges. The country is rich in biodiversity and community experiences from the diverse agro ecological zones in the country offer a number of options to find solutions to the current problems. All this would enable the agriculture of the region to cope with climate change impacts provided a comprehensive and effective policy response is put into action right away.

Suman Sahai

Proceedings

Gene campaign and Action Aid organized a two-day conference on '*Ensuring Food Security in a Changing Climate*' on 23 and 24 April 2010 at the Constitution Club, New Delhi. The conference aimed at focusing attention on Climate Change and its connection with food security and agriculture. Climate Change is a topic that has been in international focus due to the ongoing negotiations at the United Nations Framework Convention on Climate Change (UNFCCC) whose 15th Conference of Parties (COP15) was held at Copenhagen. At this conference, countries that are a party to the UNFCCC arrived at a weak and inadequate consensus for dealing with Climate Change, that reflected in the decision of the COP15 to take note of the Copenhagen Accord. Completely absent in all these deliberations was the connection to agriculture and food security that has received considerably less attention not just in the international negotiations but also within India. Adapting our agriculture timely to climate change is the key to minimize its impact on our food security and rural livelihoods.

While it is quite natural and understandable for an organization like Gene Campaign to be involved in discussing and deliberating about the impacts of climate change on food security and agriculture, ActionAid joined hands in this initiative since Climate change would further marginalize those people who have been exploited through ages i.e. the dalits, the adivasis, and other marginalized sections of society that are engaged in doing agricultural labour and for whom Agriculture is the main source of livelihood and survival. The deep and pervasive agrarian distress that already exists in India will deepen further due to climate change. Adaptation to climate change must begin immediately, if the impacts of climate change are to be avoided or minimised. In the inaugural session of the conference, a brief welcome by Mr. Sandeep Chachara, Executive Director, ActionAid was followed by a quick overview of the issues that

are at stake by Dr. Suman Sahai, Convener, Gene



Mr. Sanddep Chachra (Action Aid)

Campaign. She pointed out developing that most countries including India would be more vulnerable to climate change due to their geographical location - the tropics in Asia and Africa as well as Latin America - and currently prevailing weather conditions. Vulnerability of the developing countries is further enhanced due to the



Dr. Suman Sahai explains why this conference

lack of capacities to adapt at the grassroots. Further, turbulence in the weather resulting in greater occurrence of extreme weather conditions would have a major impact on rainfed areas. In this regard, sustainable agriculture needs to be promoted, not only to adapt but also to mitigate climate change, for which policy measures and budgetary support must be provided immediately.



Farmers inaugurating the conference

In order to provide to the house a first hand account of the impacts that climate



Jhamman Matho, Farmer, Jharkhand

change is having, some farmers from Jharkhand, Rajasthan Uttarakhand, Uttar Pradesh (Bundelkhand) and West Bengal (Sundarbans) shared their experiences. They narrated how the change in the climate had affected their livelihoods. They reported that there are new types of diseases that have come up, the life cycle of animals have been affected, the quality of seeds available has degraded because of the changing climate since the traditional methods of storing seeds are no longer as effective as they used to be, which has further affected the conservation of the seeds. In some cases the seeds degrade after as short as a period of 2-3 months. The availability of water has been affected. The

moisture of the land has gone and the crops are suffering. Pushpa, a small farmer from Bundelkhand (U.P), said, "*pehle hum bees mann phasal lete the, par abb sirf paanch*-

saat mann phasal lete hain kyuki aajkal pani ki kami hai", (earlier we used to grow at least 800 kgs of crop, but now the produce has fallen down to 200kgs -240 kgs, this is a consequence of low rainfall). Pushpa also raised the issue of suicide amongst the farmers, as they are heavily indebted. Ramkrishan Choudhary, a farmer hailing from the state of Rajasthan also raised the issue of outward migration of the farmers that have been selling their lands due to lack of gainful returns from agriculture.

A participant from Vidarbha, reacting to the sharing of experiences by farmers remarked that in order to ensure



Farmer, Bundelkhand (U.P)

food security, there was need to ensure the security of the food producers. He also stressed that there was a need to provide economic support to the farmers in rainfed areas.

Impacts of Climate Change on Agriculture



Dr. P.K. Aggarwal, Coordinator, National Network on Climate Change at ICAR gave a presentation on *Adapting Indian Agriculture to Climate Change*. He briefly gave an overview of some global climate trends and their impacts in India so far. The issues that he highlighted were:

- Temperature changes as well as climatic risks are rising faster with time
- Future climatic changes are expected to be larger
- Food security of the world will be affected by climatic changes
- Climate change is likely to reduce yields of most crops in long-term (by 2050 and beyond). In short-term (till 2020) effects may be small. Increased climatic variability including floods and droughts could, however, cause significant fluctuations in production.
- Imbalances in food trade are likely to occur due to positive impacts of climatic changes in Europe and North America and negative impacts on tropical regions including India
- Climate change is already having an impact on food prices. Much of the global increase in wheat prices can be attributed climate change



Dr. M. R. Garg, Senior Scientist, NDDB, gave a presentation titled Managing

Livestock in a Changing Climate. He crucially mentioned that emission data from Indian livestock was based on secondary sources and that there was a need to carry out actual measurements of emissions from Indian livestock to find out the contribution of this sector to the GHG emissions of India. He listed

various direct negative impacts of climate change on the livestock sector that are listed below:

- Elevated body temperature & increased respiration rate.
- Increased maintenance energy requirement due to energy loss on account of panting etc.
- Decrease in feed intake by 5-20%.
- Decrease in nutrient utilization –due to change in acid-base balance arising due to loss of sodium & potassium.
- Decrease in milk production by 10-40%.
- Decrease in reproductive performance

In addition, Dr. Garg also listed some indirect impacts that were;

- Low land and water availability for livestock production.
- Decline in feed quality & availability
- Emergence of new diseases
- Certain breeds of animals especially cross bred animals may not perform optimally

Dr. D.K. Pal, Division of Soil Resource Studies, National Bureau of Soil Survey and

Land Use Planning, ICAR spoke on *Climate Change and its Impact on Soils and Rainfed Agriculture*. He informed that more than 50% of India's geographical area falls under arid and semi-arid conditions. Such areas are prone towards sodicity and are also by and large used for rainfed agriculture.



Large parts of India's rainfed areas are experiencing sodicity of soils. Rainfed agriculture needs to be dealt with holistically unlike at present, and available technologies must be used especially in the Indo-Gangetic Plains and areas having deep black soils to improve the productivity of rainfed agriculture.

Dr. S. Ayyappan, Director General, ICAR, made a presentation on Impact, Adaptation

and Vulnerability of Indian Fisheries to Climate Change; He gave a broad overview of the fisheries sector to begin with. He informed that certain commercially important species had increased their range, while certain other fish species were experiencing climate related stress and also highlighted the vulnerability of India's coral reefs to climate induced changes in the marine areas and coasts. The impacts of climate change on the fisheries sector according to Dr. Ayyappan were the following:



- Impacts and vulnerability in marine fisheries
 - Oil sardine and Indian mackerel have extended their distributional range to the northern latitudes in the Arabian Sea and Bay of Bengal
 - Shift in the spawning season of two demersal fish species off Chennai
 - Shift in the season of abundance of copepods and fish eggs & larvae off Mangalore
 - Decline of many of the coral reefs of India will commence by 2020
- Impacts and vulnerability in inland/freshwater fisheries
 - Fish spawn of Indian Major Carp showing a decline in middle stretches of river Ganga.
 - Warm water fish have extended their range in the Ganga and cool water fish availability has been adversely affected
 - These trends imply that there will be adverse impacts on fish production of certain commercially important species of fish

Dr. Celia Chalam, Senior Scientist, National Bureau of Plant Genetic Resources



presented a paper on *Coping with Changing Pest Profiles*. The presentation explained how plants or crops could become more susceptible to diseases with increase in temperatures. In addition, an increased rainfall regime would mean favorable environments for pests, parasites and

predators, resulting in a complex and changing set of dynamics. Further, increased

CO2 levels in the atmosphere could also result in physiological changes to the host plants that could increase host resistance to pathogens.

Therefore climate change would have both positive and negative impacts on the pest profile. However, even though many of the unfolding impacts are as yet unknown, there is growing knowledge and data of new and emerging threats that were not earlier present in India. The specific threats and impacts that Dr. Chelam highlighted were:

- Impact of temperature increase
 - Cereal host plants become more susceptible to rust diseases with increased temperature.
 - Some forage species become more resistant to fungi with increased temperature.
 - Earlier threat from pathogens such as late blight with the potential for more severe epidemics and increase in the number of fungicide applications.
 - There will be more types and higher populations of insects as temperature increase affects insect survival, development and geographic range.
 - Besides, temperature can impact insect physiology and development directly or indirectly through the physiology of hosts.
 - "Migratory" insects may arrive earlier, or the area in which they are able to overwinter may be expanded.
 - Soil-borne pests may be more gradually affected because soil provides an insulating medium that will tend to buffer temperature changes more than the air.
- Impact of moisture increase
 - Pathogens causing apple scab, late blight, and several vegetable root pathogens are more likely to infect plants with increased moisture – forecast models for these diseases are based on leaf wetness, RH and precipitation measurements.
 - Pathogens causing powdery mildew species tend to thrive in conditions with lower (but not low) moisture.

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- More and longer periods with favorable environments for pests, predators and parasites, resulting in a complex dynamic.
- Impact of CO₂ Increase
 - Some of the observed CO2 effects on disease may counteract others.
 - Pathogen growth can be affected by higher CO2 concentrations resulting in greater fungal spore production.
 - However, increased CO2 can result in physiological changes to the host plant that can increase host resistance to pathogens.
 - Generally CO2 impacts on insects are thought to be indirect impact on insect damage results from changes in the host crop favouring insects to expand their geographic ranges, and increase reproduction rates and over wintering success.

Possible Strategies for Adapting to and/or Coping with the Impacts of Climate Change on Agriculture

Dr. PK Aggarwal put forth a strategy with the following components

- In short-term, several options relating to technology transfer, its adoption, policies, and land and water management can help minimize negative impacts.
- In long-term, better adapted genotypes are needed to adapt to multiple stresses linked with climate change.
- Costs of adaptation are less understood but likely to be high; costs of inaction could be even higher.
- Adaptation practices take time to become effective. Time to act now!!

Dr. PK Aggarwal also suggested that a framework for action be adopted that would include the following points:

- 1. Provide value-added weather services to farmers.
- 2. Provide greater coverage of weather linked agri-insurance.
- 3. Provide incentives to farmers for resource conservation and use efficiency.
- 4. Provide technical, institutional and financial support for establishment of community banks of food, forage and seed.

5. Provide more funds to strengthen research for enhancing adaptation and mitigation capacity of agriculture

Dr. Himanshu Pathak, Senior Scientist, Division of Environmental Sciences, IARI did

a presentation on *Climate Change Mitigation: Can Farmers Beat the Heat?* His presentation focused primarily on the issue of greenhouse gas emissions in the agricultural sector, how such emissions could be mitigated, and what the major constraints were. Some of the measures that could be taken for both mitigation as well as adaptation in the agriculture sector include:



- Using system of rice intensification, direct seeded rice or aerobic rice instead of the traditional method of transplanting rice to reduce methane emissions
- Judicious use of nitrogenous fertilizers to protect both land as well as reduce emissions of nitrous oxide
- Use of biogas technology to reduce both methane as well as carbon emissions
- Adaptation strategies could include the following elements
 - Changing land-use management to make it compatible with the changing situation
 - Developing climate-ready crops that are more climate resilient
 - Diversifying crop and livestock to minimize risks
 - Improving pest management
 - Harnessing indigenous technical knowledge wherever relevant and useful
 - Developing insurance and forecast systems

The crucial issues that he highlighted were that despite the availability of technologies for both mitigation and adaptation in agriculture, farmers were unable to adopt them due to various constraints that include a lack of financial incentives, lack of or unavailability of water, soil problems, variable weather, lack of market linkages etc. His topline message was that farmers needed support for adaptation and mitigation. Dr. MR Garg's suggestions for adapting and coping in the livestock sector were as follows

- Indigenous breed improvement programmes
- Productivity enhancement of dairy animals by:
 - Implementation of ration balancing programme.
 - Feeding bypass protein & bypass fat supplements.
 - Supplementation of area specific mineral mixture for improved productivity & reproduction efficiency.
 - Propagation of fodder varieties which can withstand high ambient temperature.
 - o Growing dual purpose varieties of cereal crops.
- Ration balancing programme (RBP) for improving productivity & reducing methane emission
- Use of bypass protein supplement in the balanced ration
- Use of bypass fat supplement in the balanced ration
- Use of area specific mineral mixtures in the balanced ration

Dr. DK Pal's suggestions on what needs to be done to protect and improve soil health were

- Unlike the holistic approach taken for irrigated agriculture in green revolution area in India, subsistence rainfed agriculture has so far been dealt with in a fragmented manner with compartments, such as soil conservation, water management, improved cultivars, fertilizer application etc
- The full potential of the technologies (developed by CSSRI, Karnal for sodic soils of the Indo-Gangetic Plains and for Deep Black Soils with subsoil sodicity by ICRISAT, Patancheru) has neither been realised nor have been adapted on a sufficiently large scale to have substantial impact.
- The total area of the IGP is 43.7 m ha which produces 50% of the total food production. On the other hand the black soils are less cultivated even though they occupy nearly 66 mha area.
- Therefore, the black soil areas deserve immediate national attention to avoid the pitfalls encountered in the high productivity regions of the Indo-Gangetic Plains.

• The adoption of the improved management system (of CSSRI and ICRISAT) can thus make the black soils and the Indo-Gangetic Plains soils of dry climate resilient and capable to produce more amount of food grains required for the populous Indian Subcontinent.

Dr. Ayyappan's recommendations on adaptation in the fisheries sector were the following:

- 1. Strategy for adapting to Enhanced Water temperature
 - a. Changes in feed formulations and feeding regimes
 - b. Substitution by alternate species of fish
 - c. Monetary input to the changes in operational costs(hatcheries
- 2. Strategy for adapting to Floods due to changes in precipitation
 - a. Embankments for frequent and shallow flood protection (however this is an expensive option, as well as controversial when considering their effectiveness historically)
 - b. Alternatively- harvesting fish at smaller size- focusing on fish species that require short culture period and minimum expense in terms of input
 - c. Continuous supply of seed from hatcheries (raising production)
- **3.** Strategy for adapting to Drought (as an extreme event, as opposed to gradual reduction in water availability). The suggested adaptive strategy in this case is using smaller ponds that retain water for 2-4 months that can then be used for fish production with appropriate species (catfish) and management practices
- 4. Strategy for adapting to Intense storm surges in the coastal regions
 - a. Early detection systems of extreme weather events
 - b. Communication protocols for early warning systems
 - c. Acceptance of certain degree of loss
 - d. Development and implementation of alternative strategies to overcome these periods
 - e. Maximizing production and profits during successful harvest
 - f. Suitable site selection and risk assessment work

Mr. Sanjeev Chopra, West Bengal administration, made a brief intervention. He

stressed the need for creating local markets for local crops. In addition, he articulated the need for Government subsidies to be well-targeted and designed so that they can reach the small and poor farmers. He also stressed upon the need to shift to organic fertilizers and to create protocols for that. On the issue of resources for agriculture, he did not think that there were any constraints; rather, the main challenge lay in utilizing the resources properly. He was of the opinion that weather-based insurance schemes were perhaps not feasible and that credit and access to finances



could be facilitated through promoting the use of *Kissan Credit Cards*. Finally, he urged that there was a need for alliance building among bureaucrats, scientists and local farmers.



Participants from 22 states

Dr. Suman Sahai, Convenor, Gene Campaign, did a presentation titled Agrobiodiversity – Key to Climate Change Adaptation. Dr. Sahai made a case for

conservation of biodiversity, both cultivated agro diversity as well as wild biodiversity as a primary strategy for effectively dealing with the expected turbulence that climate change will bring about. She provided examples where genetic diversity had been used for dealing with diseases and developing crop resistance.



Her major recommendation for conservation of agro biodiversity was that it must be used, in order to be maintained and further enriched and that replacement of local varieties of crops by high yielding, hybrid, GM and exotic varieties is causing diversity loss in all agricultural systems. The major recommendations made by Dr. Sahai were:

- Setting up village level Gene and Seed Banks.
- Training local youth to set up Gene/ Seed banks
- Multiplication of seed samples to create seed source for farmers
- Identifying new genes

The benefits of such an approach were already visible and possible solutions had already been found for some diseases. In addition, this approach had resulted in farmers again having the option to mix varieties which helps to distribute risk, and for formal plant breeding to develop varieties to cope with climate change

Dr. Celia Chelam highlighted several research priorities to be urgently taken up. These were:

• Identifying economically important insect pests and pathogens (fungal, bacterial, viral, nematode) at national level that are most sensitive to changes in temperature, moisture and CO2 regimes

- Studies on individual and combined impact of moisture, temperature and CO2 on survival, multiplication and dissemination of such important sensitive pests and pathogens including viral vectors
- Development of holistic mathematical models of forecasting disease covering ranges of different parameters of disease triangle
- There is also a need to study
 - How pest and pathogen evolve in the changing scenario?
 - What pathogen or pest characteristics affect the rate of adaptation?
 - What host characteristics affects rate of adaptation in both host populations and pathogen populations?
 - Are invasive plant species better able to adapt to climate change and move to new areas rapidly, leaving pathogens behind or at least limiting their evolutionary options through bottlenecks?

Dr. Chelam also urged that there must be an immediate focus on:

- Identifying the minor pests that may become a major ones especially for important food crops by using simulation models.
- Generation of comprehensive data on epidemiology for predicting the pest development especially in the context of climate change.
- Regular survey and surveillance is required to map the distribution of pests and to identify the new pests. To achieve this, there is a need to develop specific needbased survey and surveillance programmes.

Dr. Chelam also made some policy recommendations that were:

- Short term policy recommendations
 - reorienting research focus
 - developing an Emergency Action Plan
- Long term policy recommendations
 - establishing a Biosecurity Policy
 - protection of agriculture and biodiversity

Dr. Himanshu Kulkarni spoke on *Strategic Thinking: (Ground) Water Management* under the Climate Scenario in India. He briefly informed the audience about the



importance of ground water for Indian farmers, and the growing use of ground water for irrigation, outstripping irrigation from surface water. The result is depleting water tables and scarcity of water in many parts of the country. He broadly advocated a strategy for both augmenting ground water recharge or protecting catchments where they are intact coupled with demand management to reduce stress on ground water resources. His specific

suggestions were:

- Push for "disaggregation"
 - Developing 'micro-scale' understanding
 - Databases that are more 'local' than 'regional'
- Diversity spatial typology of impacts
 - Identifying the precise nature of the problem (e.g. type of scarcity, type of salinity etc.)
 - Scale of the problem itself
 - Resource characteristics
 - Use and user characteristics
- Variability temporal changes
 - Changes in resource
 - Supply interventions
 - Trends of demand
- Scenarios: resultant of diversities and variabilities
 - Geohydrological, land-cover, socio-ecological settings
 - Rainfall-recharge-abstraction scenarios
- Mitigation strategies tailored to scenarios

He also outlined some major challenges that were:

- Absence of data at "aquifer" scale.
- Lot of "leg work" needed to understand groundwater dynamics.

• Groundwater management also requires intensive integration from other disciplines.

Biggest challenge is that of "community participation" in demand management, but bits and pieces of success stories are emerging

Mr. Ramesh Rawal, Executive Vice President, BAIF Development Research



Foundation, Pune, spoke on Livestock and Fodder Challenges in a Warming World. He shared the experience of BAIF in dealing with climate change and emphasized that dealing with climate change required the promotion of renewable energy, efficient use of water and practicing of sustainable agriculture. In addition, there was a need to focus on development wasteland, and of soil water conservation, eco-friendly conservation, and

improving livestock productivity.

Mr. Kirtiman Awasthi, United Nations Development Program, New Delhi, spoke on

the *Impact of Climate Change on Biodiversity and Rural Livelihoods.* He gave a synopsis of the impacts that climate change is already having on biodiversity in India and the changes that are taking place in many natural systems, especially in the hills and coasts. He then gave a brief snapshot of the UN strategy for reducing the impact of climate change on biodiversity and some of the initiatives taken in this regard in India.



Risk Mitigation and Management

Dr. L.S.Rathore, Head Agromet Services, Indian Meteorological Department,



presented a paper on *Integrated Agro-Met Advisory Service in India*. He contextualized the importance of weather related information for farm management especially in the context of climate change. Dr Rathore then went on to give a detailed explanation of the various components of the Agromet Advisory System and how it is being made more and more precise. He also went on to

detail efforts for outreach and dissemination of weather related information systems that are underway.

In response to questions that were asked from the floor, Dr. Rathore further added that use of indigenous knowledge in weather forecasting that common people and farmers have are based on folklore and are often based on local observation. Thus, they are of little relevance and use to the Met Department.

Dr. K. N. Rao, Agriculture Insurance Company of India Limited, spoke on Crop

Insurance as a Tool to Manage Climate Risks. He informed about the evolution of crop insurance towards a weather based system that is now being used in the country. He however admitted that there were several gaps in the product that was being offered that needed to be filled. However, his view was that some systemic and policy level changes were required before a product could be developed



that would be useful for the farmer. Some of these recommended changes were:

• At present agriculture and crop insurance is being dealt with under the general insurance regulatory framework. This must change and a special legislation be enacted for crop insurance

- Educate farmers and other sections of society on insurance and how it is distinct from relief
- Raise levels of financial literacy in the country
- Create an appropriate product mix that can take care of the diversity of situations in the country
- Use remote sensing and weather related information to assess crop losses and damages
- Provide discounts on premiums for farmers that promote sustainable agriculture

Dr Rao, in response to a question added that performance and delivery of crop insurance if measured through the payment of claims against insurance was fairly high in India. His assessment was that upto 25% of the farmers availing insurance are able to get benefits. In order to improve upon this, State Governments needed to be more proactive. However, he conceded that livestock insurance has not been able to penetrate on the ground and that the emphasis is on crop insurance. This was an imbalance that needed correction

Community Perceptions of Climate Change

Dr. Glenn C Kharkongor, Vice Chancellor, Martin Luther Christian University, Meghalaya presented the findings of a research study done in three Khasi villages in Meghalaya He reported that people in these villages had been experiencing the problems of climate change since 1960. These included irregularity of rainfall, scarcity of water, low agricultural productivity, decreased bio-diversity, more illness, increase in temperature etc are some of the effects observed by these villagers. He emphasized the need to recognize



the role and contribution of traditional communities in protecting the environment and stressed that their indigenous traditional knowledge should be well documented. He also emphasized that the role of women as custodian of traditional seeds should be strengthened. He also reported that the study came across examples of both maladaptation as well as positive adaptation. The major recommendations of Dr. Kharkongor were:

- Affirm and protect the role and contribution of traditional communities
- Document indigenous knowledge, traditional practices and adaptations
- Empower traditional communities by placing decision making on agriculture, water resources and biodiversity conservation in their hands
- Understand the interplay between nature, culture and spirituality
- Recognize and strengthen the role of women
- Provide information and incentives

Mr. Mahadevan Ramaswamy presented a paper titled Water Woes of Pastoral

Communities. He stated that there is a need to adopt a holistic approach to the issue of climate change. Government interventionist policies are welcome, but these should be sustainable and should not disrupt the traditional ecology and lifestyles of pastoralists. He also stressed upon the role of traditional indigenous knowledge. He recommended strongly that the rights of pastoral communities should be acknowledged formally. In addition, pastoralists and their knowledge could be used as a resource for dealing with and designing appropriate interventions for effectively dealing with climate change.



During the floor discussions immediately following the presentations, Dr. Kharkongor acknowledged that the land ownership issues play an important role in Meghalaya. There was a need for clear demarcation of duties jurisdiction between State Government and Central Government. He also suggested that incentives were needed for farmers who grow traditional crops and market linkages developed for their produce.

When asked about how he sees to the problem of pastoralists in the realm of new situations and changing land rights, Mr. Ramaswamy stressed upon wider awareness-

building and the need to consider pastoral communities as an important source of knowledge. He insisted that should be treated as valuable resource persons.

Dr.M.V.Ashok, from NABARD, Jharkhand, spoke on *Combating Food Insecurity in Jharkhand under changing Climate*. He highlighted the vulnerability of Jharkhand to climate change and explained how NABARD is working to create resilience in that state. He highlighted the broad approach that NABARD works on in Jharkhand which includes several initiatives for water as well as soil and moisture conservation. Soil and moisture conservation is crucial for Jharkhand.

Strategic Issues related to climate change

Mr. Jayadeva Ranade, Former Additional Secretary, Government of India who spoke

on the *Strategic Implications of Melting Glaciers*. His argument was that melting of Himalayan glaciers was a future security threat for India, and provided a snapshot of the activities that China is taking up in the catchments of the Himalayan rivers that could lead to loss of water downstream which could have a negative impact on agriculture in India. He stressed that glaciers needed to be protected for not just food security but also needed to be looked at as an important issue of national security.



High Level Panel Discussion

This panel consisted of Dr. MS Swaminathan who chaired the session, Mr, Prakash Javadekar, Mr. Sompal Shastri and Dr. Abhijit Sen.

Mr. Prakash Javadekar highlighted that water was a critical input and government needed to enhance water availability to the farmer. Soil health was another aspect that needed attention. He demanded that scientific opinion regarding GM crops must be more coherent so that policy decisions on GM could be taken as early as possible. He called for an expansion of credit facilities, and improvement in crop insurance schemes.

Mr. Sompal Shastri did an analytical review of the Green Revolution and its impacts

on soils, human health and the environment. He pointed out that agriculture sector, since the end of the 4th plan had been progressively neglected and investments in agriculture had constantly been declining resulting in acute agrarian distress. Due to a squeeze of investments, the sector suffers from severe infrastructural bottlenecks. He highlighted several policy measures, ranging across price support,



marketing, research, extension services, insurance, biodiversity conservation etc that must be taken to bring good health back into agriculture.

Dr. Abhijit Sen, started by trying to dispel pessimism around agriculture by stating



that production levels had gone up in the last decade. However, he acknowledged that climate change will lead to greater fluctuations for which there is a need to prepare. He also stated that while successive governments had neglected the agriculture sector, the trend of declining investments had been reversed by this government and investment levels were once again beginning to rise even though they have not

yet have attained the desired levels. He went on to detail the various policy and

investment that the government has been taking to revive agriculture. He highlighted the issue of technological fatigue and stressed that new technologies needed to be deployed for greater yields and productivity. He also stressed that the State Governments needed to be more proactive than in the past.

Dr. MS Swaminathan began by stating that food security of India has been affected by

Climate Change. He stressed that investments in agriculture must be rapidly increased and attain desired and required levels to meet the challenges ahead. He drew attention towards soil health and availability of water and emphasized that the yield gap in rainfed areas between laboratories and farmlands must be bridged. There was a need for better procurement and storage to maximize gains from a good harvest and to protect against a poor one.



He called for better seed management and conservation of agro biodiversity. He insisted that Government must sit on the commanding heights of the agrarian economy and not leave it unregulated. There was a need for a holistic climate care movement in the country.

Several questions followed, to which responses by the panel were as follows:

Mr. Prakash Javadekar: Agreed that adequate attention must now be on rainfed areas and emphasized that India could not be import dependent on food. He stated that issues around GM technology must be clarified.

Dr Abhijit Sen: Was candid in admitting that equity in governance was not always forthcoming. However, he again stressed that neglect of the agriculture sector was being addressed and that issues of rainfed agriculture as well as better



food management, water conservation, insurance and contingency planning must be tackled.

Dr. MS Swaminathan wrapped up the discussion by stating that there was a need to ensure that investments in agriculture provided better returns than at present. The poor management of the agrarian sector needs to be addressed and efficiency of investments ensured.



Mr. Sanjeev Chopra, Dr. Suman Sahai, Dr. PK Aggarwal, Dr Himanshu Pathak,

Dr. S. Ayyappan, Dr. D.K. Pal and Dr. M. R. Garg



Participants from 22 states

Conference Program

<u>National Conference on</u> <u>Ensuring Food Security in a Changing Climate</u> <u>Constitutional Club, New Delhi</u> 23-24 April 2010

09:30-10:00 - Registration

10:00-10:10 – Mr. Sandeep Chachra (Executive Director, ActionAid India,) -Welcome 10:10-10:30 – Dr. Suman Sahai (Chairperson, Gene Campaign)-*Why this Conference*

10:30-10:50-- Inauguration

Session : Climate Change ---Mitigation & Adaptation in Agriculture

Chair – Dr. Suman Sahai

- 10:50-11:20 -Dr. P.K. Aggarwal (Coordinator, National Network on Climate Change, New Delhi) Adapting Indian Agriculture to Climate Change.
- 11:20-11:40 -Dr. Himanshu Pathak (Senior Scientist, IARI, New Delhi) Mitigating Greenhouse Gas Emission from Indian Agriculture: Can Farmers Beat the Heat?
- 11:40-12:00 Discussion

Session : Adaptation to Ensure Food Security

Chair - Dr. S. Ayyappan (DG, Indian Council of Agricultural Research, New Delhi)

12:00-12:15 -Dr. M.R. Garg (Senior Scientist, National Dairy Development Board, Anand)-- Managing Livestock in a Changing Climate

12:15-12:30- Dr. Suman Sahai (Gene Campaign) -- Agro biodiversity: Key to Climate Change Adaptation

12:30-12:45 Dr. D.K. Pal (Head, Department of Soil Resource Studies, National Bureau

of Soil Survey and Land Use Planning, Nagpur) - Climate Change and

Impact on Soils and in Rainfed Agriculture".

12:45-13:00 -Dr. S. Ayyappan -- ICAR Strategies to Protect Indian Fisheries.

13:00-13:30 Discussion

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Session: Experiences of Local Communities with Climate Change

Chair – Dr. Gopi N. Ghosh (Assistant FAO Representative, New Delhi)

- 14:30-14:45 Dr. Glenn C Kharkongor (VC, Martin Luther Christian University, Shillong) Community Perceptions of Climate Change –Meghalaya
- 14:45-15:00 Mr. Mahadevan Ramaswamy & Mr Sanjay Barnela (Moving Images, New Delhi) *The Water Woes of Pastoralists.*
- 15:00- 15:15 Discussion

Session : Coping with Climate Change Impacts

Chair – Sri Nitin Desai (Member of the Prime Minister's Council on Climate Change, New Delhi)

- 15:15-15:30 Dr. Celia Chalam, (Senior Scientist, NBPGR, New Delhi) Coping with Changing Pest Profiles
- 15:30-15:45 Dr Himanshu Kulkarni (Executive Director, Advanced Center for Water Resources Development and Management, Pune) *Strategic Thinking: (Ground) Water Management Under the Climate Change Scenario in India*
- 15:45-16:00 Mr. Ramesh Rawal (Executive Vice President, BAIF Development Research Foundation, Pune)-- *Livestock and Fodder Challenges in a Warming World*
- 16:00-16:15 Mr. Kirtiman Awasthi (UNDP, New Delhi)-- Impact of Climate Change on Biodiversity and Rural Livelihoods
- 16:15- 16:30 Mr. Jayadeva Ranade (Former Addl. Secretary, Cabinet Secretariat) Strategic Implications of Melting Glaciers

16:30-17:15 - Discussion

24 April, 2010

Session : Managing Risks

Chair - Prof Jayati Ghosh (Department of Economics, JNU, New Delhi)

- 10:00- 10:15 Dr. L.C. Rathore (Advisor, Ministry of Earth Sciences, Govt. of India) – Agro-meteorological Services Available to Indian Farmers
- 10:15-10:30- Dr. K.N. Rao (Chief Manager, Agriculture Insurance Company of India

Ltd., New Delhi)-Climate Linked Insurance Options

- 10:30-10:45 Dr. M. V. Ashok (NABARD, Ranchi) Combating Climate Related Food Insecurity in Jharkhand
- 10:45-11:00 Mr. Raman Mehta (Functional Manager, Policy ActionAid)- *Reducing Risk with REDD*
- 11:00 -11:20 Discussion

11:30-13.00 - High Level Panel

Dr. M.S. Swaminathan (Members of Parliament {Rajya Sabha})

Sri Sompal Shastri (Former Minister of State for Agriculture and Water Resources, Govt. of India)

Prof.Abhijit Sen. (Member- Agriculture, Planning Commission, Govt. of India)

Mr. Prakash Javadekar (Members of Parliament {Rajya Sabha})

13:45-15:45 - Framing Recommendations for Action