

*National Conference on*  
**Climate Change and Indian Agriculture**

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NASC Complex, DPS Marg, New Delhi-110012

Organised by: Indian Council of Agricultural Research

## **Recommendations**

### **RESEARCH AND ASSESSMENT**

#### **Impacts**

1. Strengthen research on impact assessment of climate change on production resources, crops, livestock, fisheries, and microbes using field and controlled environment facilities, and simulation models: The key aspects could be:
  - Spatial and temporal availability of surface and groundwater for irrigation
  - Sensitive processes such as pollen germination, spikelet sterility and grain development.
  - Agricultural production (demand and supply of commodities, prices, trade, regional and societal differences)
  - Quality of produce
  - Germplasm variability and evolutionary trend
  - Diversity and dynamics of key insects and microbes including fungi, bacteria and viral pathogens
  - Livelihood of farmers and fishermen
2. Institutionalize the monitoring of phenology, especially of perennial crops, as a bio-indicator of climatic variability and change

#### **Adaptations**

1. Develop new genotypes
  - Intensify search for genes for stress tolerance across plant and animal kingdom
  - Intensify research efforts on marker aided selection and transgenic development for biotic and abiotic stress management

- Develop heat and drought tolerant genotypes
  - Attempt transforming C3 plants to C4 plants
2. Develop new land use systems
    - Evolve new agronomy for climate change scenarios
    - Explore opportunities for maintenance /restoration/ enhancement of soil properties
    - Use multi-purpose adapted livestock species and breeds
  3. Enhance value-added weather management services
    - Develop spatially differentiated operational contingency plans for temperature and rainfall related risks, including supply management through market and non-market interventions in the event of adverse supply changes
    - Enhance research on applications of short, medium and long range weather forecasts for reducing production risks.
    - Develop knowledge based decision support system for translating weather information into operational management practices
    - Develop pests and disease forecasting system covering range of parameters for contingency planning and effective disease management.
  4. Conduct an integrated study of ‘climate change triangle’ and ‘disease triangle’, especially in relation to viruses and their vectors
  5. Develop a compendium of indigenous traditional knowledge and explore opportunities for its utilization

### **Mitigation**

1. Improve inventories of emission of greenhouse gases using state of art emission equipments coupled with simulation models, and GIS for upscaling
2. Evaluate carbon sequestration potential of different land use systems including opportunities offered by conservation agriculture and agro-forestry
3. Critically evaluate the mitigation potential of biofuels; enhance this by their genetic improvement and use of engineered microbes
4. Identify cost-effective opportunities for reducing methane generation and emission in ruminants by modification of diet, and in rice paddies by water and nutrient management. Renew focus on nitrogen fertilizer use efficiency with added dimension of nitrous oxides mitigation
5. Assess biophysical and socio-economic implications of mitigation of proposed GHG mitigating interventions before developing policy for their implementation

### **Capacity building**

1. Establish automatic weather station in each KVK for agromet observations. A system for remote access of data at a central place and its on-line distribution to ICAR/SAU scientists should be developed. Weighing lysimeters should also be established in key centers
2. Develop specialized, state of art, climate control facilities (CO<sub>2</sub>, temperature, water and ozone). These are expensive, not available in the country, and hence international collaboration in this area, including research partnerships and training, should be developed.
3. Enhance national capacity on decision support systems, especially on integrated, dynamic, agro-economic modelling based systems.
4. Enhance national capacity on carbon trading in agriculture.
5. Intensify efforts for increasing climate literacy among all stakeholders of agriculture, including students, researchers, policy planners, science administrators, industry as well as farmers.

### **DEVELOPMENTAL PROJECTS FOR ADAPTATION**

1. Strengthen surveillance of pest and diseases. Increasing climatic variability and change could lead to rapid movement of pathogens and insect pests.
2. Develop mechanisms for integrated management of rainwater, surface, and ground water. Augmentation of the water resources will be highly complimentary.
3. Weather based insurance products should be provided to increasing number of farmers at an early date for management of enhanced temperature and rainfall risks.
4. Establish a science based *Agricultural Intelligence System* to facilitate understanding of impact of real-time weather and other inputs on production of important commodities.
5. Establish Weather Watch groups for climate sensitive commodities in ICAR commodity institutes for real-time monitoring of weather impacts and to enable appropriate policy response.
6. Support community partnerships in developing food and forage banks to manage scarcity during projected increased periods of drought and floods.

### **POLICY SETTING**

1. Mainstreaming adaptation in current policy considerations: Climate change impacts and adaptations should be considered in all major development planning activities.
2. Develop new infrastructure, policies and institutions to support the new land use arrangements identified by science and technology.
3. Enhance investment in water harvesting and conservation options; and promote small farm mechanization and efficient water use technologies.

4. Facilitate greater adoption of scientific and economic pricing policies, especially for water, land, energy, and other resources.
5. Explore international partnerships for joint food security.
6. Consider financial incentives and package for improved land management including resource conservation/ enhancement (water, carbon, energy), and fertilizer use efficiency.
7. Establish an inter-ministerial institutional mechanism for strategic follow-up action.
8. Consider incentives for industry and farming community for producing and using slow release fertilizers and Green House Gas inhibitors.
9. Explore CDM benefits for mitigation strategies for farmers and agriculture-based industry.
10. Explore international partnerships for collaborative research on adaptation of climate change research.
11. Establish 'Green Research Fund' for strengthening research on adaptation, mitigation and impact assessment.

#### **ACTION PLAN FOR RESEARCH AND ASSESSMENT**

1. ICAR has already established a Network project with the involvement of 15 institutes and SAUs for critical research on crops, livestock, and fisheries. The network partnership will be expanded.
2. NAIP has also identified climate change as a thrust area. Grants are especially available for climate change related research and development projects.
3. Human resource development; workshops for carbon trading will be organized shortly; for capacity building in other areas training courses would be organized.
4. A multi-disciplinary expert group in ICAR would be constituted for developing short-term programmes for XI Plan and a road map for medium- and long-term programmes.
5. Recommendations will be circulated to all concerned departments for their necessary action