

# **National Mission for Sustainable Agriculture (NMSA)**

*by*

*DAC and ICAR*

*Ministry of Agriculture*

*Government of India*

# **National Action Plan on Climate Change (NAPCC)**

**The Eight National Missions Constituted are :**

- i) National Solar Mission,**
- ii) National Mission for Enhanced Energy Efficiency,**
- iii) National Mission for Sustainable Habitat,**
- iv) National Water Mission,**
- v) National Mission for Sustaining the Himalayan Eco-System,**
- vi) National Mission for the Green India**
- vii) National Mission for Sustainable Agriculture**
- viii) National Mission for Strategic Knowledge for Climate Change**

# OVERVIEW

- **Sustaining rapid economic growth along with the global threat of Climate Change**

**Development which is -**

- **Ecologically sustainable**
- **Create a prosperous, but not wasteful society**
- **Self-sustaining economy**

**With an effective, cooperative and equitable global approach**

# NATIONAL MISSION FOR SUSTAINABLE AGRICULTURE (NMSA)

- Prime Minister's Council identified Department of Agriculture & Cooperation and DARE to play the role of Lead Agency for preparation of Mission Document on NMSA.
- NAPCC has identified the following focus areas for NMSA:
  1. Dryland Agriculture,
  2. Risk Management
  3. Access to Information
  4. Use of Bio- technology

In addition, DAC & DARE, are also mandated for the Promoting Data Access covering i) Soil Profile, ii) Area under Cultivation, iii) Production and Yield and IV) Cost of Cultivation

## **Template :**

i) Background ii) Objectives iii) Strategies iv) Plan of Action and Timelines  
v) Collaborating Agencies vi) Institutional Arrangements VII) Monitoring and Evaluation and VIII) Financial Outlays

# RISK ANALYSIS FRAMEWORK

| Exposure<br>Scale  | Climate variability<br>(uncertain rainfall,<br>droughts, floods)   | Climate change (temperatures,<br>rainfall, humidity)  | Extremes<br>(heavy intensity precipitation, droughts,<br>floods, SLR, frost, hail storms, cyclones)  |
|--------------------|--|---|--|
| <b>Crop</b>        | Variability in crop yields, impacts on acreage, crop physiology including crop growth  | Reduced quantity and quality of crop produced; Crop and fodder productivity, livestock health and fish catch; increased susceptibility to pests and diseases; shift in cropping patterns  | Direct crop damages due to water logging/nutrient loss, frost, hail storm, salinity ingress and water stress, crop acreage affected  |
| <b>Farm system</b> | Water stress, impacts on livestock, milk production, increased burden on smallholder and subsistence farmers; utilization of landholdings, including lease in / lease out arrangements | Reduced soil fertility including soil moisture holding capacities and increased dependence on fertilizers and pesticides; soil quality, soil moisture, land conditions (degraded/desertification); acreage, water for irrigation, crop, fodder, forest, milk and fish production and associated products, incomes and livelihoods; poverty leading to adverse impacts on farmer health; migration and displacement, water scarcity, land and energy concerns. | Aggravated land degradation and soil erosion; Damage to farm infrastructure; loss of agricultural land, labour and livestock due to injury or mortality from extreme events; inundation of land due to rising sea levels |
| <b>Food system</b> | Production impacts, impact on market policy  | Food security, agro-processing units/cottage industries, self sufficiency; Changes in import/exports of agricultural produce; impacts on emergency reserves of staple food supplies; aggravated social inequalities and conflicts among society   | Temporary/ permanent displacement leading to water and food insecurity, aggravated malnutrition, “food riots”, food pricing  |

# MAPPING RISKS WITH ADAPTATION AND MITIGATION NEEDS :

Mapping of risks with adaptation and mitigation needs which clearly distinguishes short-term and long-term requirements

| <i>Risk from climate variability and change</i>   | <i>Adaptation and mitigation needs</i>  |
|---|---|
| Reduced yields (crops, animal produce, fish catch)  | <ul style="list-style-type: none"> <li>• Sustain/ enhance yield (crop, animal produce, fish, other agricultural products etc.,)</li> <li>• Ensure food security and control malnutrition</li> </ul>   |
| Impacts on acreage and utilization of landholdings  | <ul style="list-style-type: none"> <li>• Check land degradation, soil erosion, uncontrolled grazing, desertification</li> <li>• Land use planning; proper land policy and legal safeguards</li> </ul> |
| Direct damages to crop and infrastructure due to water logging/ nutrient loss, frost, hail storm, salinity ingress and water stress (drought) | <ul style="list-style-type: none"> <li>• Minimise losses (pre-harvest and post harvest)</li> <li>• Manage risk</li> <li>• Respond to emergency through preparedness</li> </ul>                        |
| Increased burden on smallholder and subsistence farmers   | <ul style="list-style-type: none"> <li>• Reduce social inequalities</li> <li>• Increase farmer household income</li> <li>• Promote diverse livelihood opportunities</li> </ul>                        |
| Adverse impacts on food markets, trade and prices   | <ul style="list-style-type: none"> <li>• Strengthen institutional arrangements (policies, finances, input and output markets)</li> </ul>  |
| Increased emissions from farm practices   | <ul style="list-style-type: none"> <li>• Manage resources sustainably (land and livestock management, irrigation efficiency, power efficiency)</li> <li>• Check excessive fertilizer use</li> </ul>   |

# Rainfed Agriculture

Priority Areas as indicated in NAPCC are

- 👉 **Development of drought and pest-resistant crop varieties.**
- 👉 **Improving methods to conserve soil and water to ensure their optimal utilization.**
- 👉 **Generate awareness through stakeholder consultations, training workshops and demonstration exercises for farming communities, for agro-climatic information sharing and dissemination.**
- 👉 **Financial support to enable farmers to invest in and adopt relevant technologies to overcome climate related stresses.**

# Risk Management

Priority Areas as indicated in NAPCC are

- I. **Strengthening existing agricultural and weather insurance mechanisms.**
- II. **Development and validation of weather derivative models by insurance providers. Ensure access to archival and current weather data for this purpose.**
- III. **Creation of web-enabled, regional language based services for facilitation of weather-based insurance.**
- IV. **Development of GIS and remote-sensing methodologies for detailed soil resource mapping and land use planning. All watershed and river basins to be covered.**
- V. **Mapping vulnerable eco-regions and identification of pest and disease hotspots.**
- VI. **Developing and implementation of region-specific contingency plans based on vulnerability and risk scenario.**



# Access to Information

## Priority Areas are

- I. Development of regional database of soil, weather, genotypes, land-use patterns and water resources.
- II. Monitoring of glacier and ice-mass, impacts on water resources, soil erosion, and associated impacts on agricultural production in mountainous regions
- III. Providing information on off-season crops, aromatic and medicinal plants, greenhouse crops, pasture development, agro-forestry, livestock and agro-processing.
- IV. Collation and dissemination of block-level data on agro-climatic variables, land use and socio-economic features and preparation of state-level agro-climatic atlases.

# Promoting Data Access

Priority Areas as indicated in NAPCC are

- I. To improve and expand the data bases on (a) Soil Profile, (b) Area Under Cultivation, Production And Yield, and (c) Cost of Cultivation.
- II. To digitize data, maintain database of global quality, and streamline the procedure governing access there to
- III. To build public awareness through “National Portal” on agricultural Statistics.

# Use of Bio - technology

Priority Areas are

- I. Genetic engineering to convert C-3 crops to the more carbon responsive C-4 crops to achieve greater photosynthetic efficiency for obtaining increased productivity at higher levels of carbon dioxide in the atmosphere and to sustain thermal stresses.
- II. Development of strategies for low input sustainable agriculture by producing crops with enhanced water and nitrogen use efficiency which may also result in reduced emissions of greenhouse gases, and crops with greater tolerance to drought, high temperature, submergence and salinity stresses.
- III. Development of nutritional strategies for managing heat stress in dairy animals to prevent nutrient deficiencies leading to low milk yield and productivity.
- IV. Development of salt tolerant and disease resistant fresh water fish and prawn.

# Action Points

## 1. Rainfed Agriculture

- I. The seeds of new varieties of various crops resistant to temperature which have already been released will be promoted and introduced. The production and distribution system would be revamped by strengthening public sector seed agencies and by involving private trade in seed multiplication and distribution system. The concept of National Seed Grid will be established to ensure supply of seed across the country as per area specific requirements as recommended in the NPF 2007.
- II. Strategic research would be taken up for evolving suitable varieties of seeds and cropping systems for various agricultural climatic conditions to enhance yield levels.
- III. For efficient use of water, micro irrigation systems will be promoted extensively in irrigated and rainfed areas in 40 Million hectares.
- IV. To overcome climate related stresses in rainfed areas, the additional activities such as, minimum tillage, contingent plan measures, organic farming, rain water conservation, etc would be undertaken as adaptation and mitigation measures. It is proposed to undertake these activities in 35 million ha targeted to be covered in 8 years (3 years of XI plan and 5 years of XII plan).

- (V) The activities such as capacity building, training, workshops, demonstrations, farmer's school, etc. would be undertaken for creating awareness among various stakeholders including farmers.**
- (VI) The production of bio-fertilizer, compost, etc will be promoted in an organized manner and its use will be promoted by establishing proper marketing linkages and incentive mechanism, including a subsidy regime in line with chemical fertilizers. Increased use of such fertilizers is expected to maintain and improve soil health.**
- (VII) For utilizing large fallow lands, states to develop and encourage land lease markets under their respective laws to optimal use of privately owned fallow lands. It should be ensured that the land owner does not result in risk of losing land, and the cultivator has enough incentive to invest and continue his farming activity.**
- (VIII) Model codes on "Droughts, Floods and Good Weather" be prepared bringing out short term and long term mitigation measures, such as ensuring availability of quality seeds, planning for crops/varieties resistant to heat, floods, etc.**
- (IX) The measures listed at II, V & VI will be adopted even for irrigated areas in selected districts.**
- (X) Appropriate guidelines should be put in place for rotational grazing, scientific loping and pollarding to conserve fodder resources.**

## Action Points

### 2. Risk Management

- I. The National Agriculture Insurance Scheme will be further strengthened by introduction of various measures such as (i) reduction of insurance unit to village/ panchayat level (ii) improvements in computation of threshold yield levels (iii) on account payment of claims (iv) individual assessment of losses, etc.
- II. Weather insurance products will be developed further strengthened and used as potent instrument for managing risks. The compensation is expected to be more realistic and prompt to meet the needs of farmers.
- III. A revolving fund would be created with the Farmers Self Help Groups with contribution from member farmers, Government, banks & financial institutions to provide interim finance for income generating activities and repayment of loan in a crisis situation.
- IV. The Self Help Groups will be further strengthened as these groups have come up as viable organizations in delivering bank credit to poor and timely repayment of loans. In addition to individual farmers, such groups will be covered under insurance products. The capacity building and training of farmers of such groups will be given high priority.
- V. Provisions in the proposed model codes of Droughts, Floods and good weather” would be implemented to minimize the risk.

# Action Points

## 3. Data Access

- I. To fill the knowledge gap through creation of knowledge warehouse.
- II. Develop Collaboration, partnerships and strategic alliances between, Department of Agriculture and Cooperation, research organizations and other related organizations.
- III. To empower extension workers farmers, researchers, decision makers to understand the impact of climatic changes and provide timely forecast of weather agriculture situations well in advance.
- IV. Extensive use of ICT shall be promoted by linking all the Blocks by a wide area network and connectivity shall be provided up to the village level through Common Service Centers (CSCs).
- V. Flow of information for pest surveillance and livestock diseases would be streamlined.
- VI. An Autonomous Authority may be set up to monitor and implement National Agricultural Bio-Security System covering crops, livestock, fisheries etc.

# Action Points

## 4. Promoting Data Access

- I. Development of National Portal on Soil Resources including Detailed Soil Survey covering Block/Tehsil level data.
- II. Soil Resource Mapping and Land Resource Planning
- III. To Develop a National Portal on “Agricultural Statistics”;
- IV. Outsourcing of Block/Tehsil wise LUS data pertaining to the last ten years and their digitization;
- V. LUS data, under the nine-fold classification, at more disaggregated levels (i.e. at the Village / Panchayat level) in pilot districts;
- VI. Capacity Building through HRD for all Stakeholders of the System.



# Action Points

## 5. Use of Bio - technology

- I. Develop transgenic crops with inbuilt resistance to drought and heat stresses.
- II. Genetic engineering for developing genotypes (livestock, fish, poultry and microbes) resistant to high temperature and drought stress
- III. To produce transgenic plants with enhanced capacity for carbon dioxide fixation, which in turn can result in producing high biomass and increased productivity. The use of plant biotechnology is expected to increase the productivity of land already cultivated, reduce the need to cover additional land and thus contribute to conservation of biodiversity.
- IV. To develop strategies for managing heat stress in dairy animals to prevent nutrient deficiencies leading to low milk yield and productivity, and also salt and disease resistant fresh water fish and prawn.
- V. Functional genomics approach for enhancing the efficiency of re-fixing of ammonia generated through photo-respiratory nitrogen cycle

**Thank You**