How to Win the Gamble of Monsoon in Orissa?

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The income and profitability from farming basically revolve around two key processes, namely, increasing productivity and better marketing of produce. Increased productivity can be made reasonably under control as it is mainly influenced by the local conditions, while marketing is a much complex issue influenced by both domestic, national and international factors. Although farmers definitely need to be assisted on both the points, here the discussion is limited to creating a favourable environment of farming for higher productivity that would mitigate the risk of crop damage and scale up the confidence and morale of a farmer, specially in the rainfed rice growing areas. Seasonal weather, particularly monsoon rainfall, is the most important factor of crop production. It is strongly believed that although its occurrence is not under our control, and it is becoming more unpredictable due to climate change, its impact can be reasonably under control, if suitable mitigation measures could be taken beforehand. On this background, this article is written to identify thrust areas as a package, instead of putting every point as in the Agriculture Policy document. Emphasis has been made to throw light on how best to cope up with the emerging challenges due to climate change that is going to exert more stress in the kharif cultivation in Orissa, as is the case of 2009.

Following are the eight-fold principles of adaptation and mitigation measures listed in the order of priority, which need immediate and careful attention to convert them into a time-bound action plan on a focused and targeted way, preferably as a package. A key element of each principle has been identified as a MANTRA.

1. Increased availability of water, the basic element of crop production.

Philosophy:

Next to weather, water is the driver of the crop production in Orissa. If a farmer has water he can grow a crop, whether with modern technology or not. Punjab and Haryana are going to harvest good kharif crops even in 2009 severe drought year due to assured water supply.

Suggested Action:

- **Water Harvesting (MANTRA # 1)**: It will assure one or two irrigations at critical times in kharif in deficit years and rabi crops in normal years.
- **Ground water use** through wells and bore wells.
- **Repair of LI**: A considerable number of LI points remain non-functional at any one time. Repair and maintenance may be made through public-private partnership.
- **Use of water from the Hydropower projects primarily for irrigation**: Power generation in the years of deficit rainfall reduces storage volume.

- **Checking water loss from minor irrigation projects**: Leakages and weed growing reduces the water.

- **Roof water harvesting**: It needs to be enhanced through law in cities and through assistance in rural areas for ground water recharge.

- **Scientific distribution of irrigation water** including change in timing and pricing of canal water supply.

**Justification of Mantra 1**

Climate change has increased number of heavy rainfall events (Fig. 1), and decreased number of rainy days and prolonged the dryspells (Fig. 2.). Most of rainfall is lost as runoff. Water harvesting into ponds shall provide life-saving irrigation to rainfed kharif crops, if dryspells occur and to rabi crops if kharif rainfall is good. Even in irrigated areas farm ponds will serve the purpose of early growing besides reducing the waterlogging and increasing the command area through increased field irrigation use efficiency.

**Considerations while implementing**:

- The interior districts require water harvesting more than the coastal districts as the recent rainfall data indicate the trend of increasing rainfall amount in the coastal districts and decreasing rainfall amount in the rest districts (Fig.3).

- Areas where crops are grown for seed purpose should be preferred first. For example, late harvest of kharif groundnut seed crop causes delayed supply in rabi. Early supply of seed shall help growing on residual soil moisture exploiting late September /early October rain.

- To start with locate the spots on natural drainage line in the medium lands in the first phase and at other spots of a village subsequently.

**Fig. 1.**

**Fig 2.**

2. **Growing right Seed, the primary input of crop production**

**Philosophy**

A field crop is basically centered around the variety uses. When a farmer has right kind of seeds, he can harvest something, even he does not use any other inputs like fertilizer. Hence, if
any assistance is to be given to the farmers, it is the truthful seeds of right variety to be supplied well before optimum sowing time. Requirement of short duration varieties is more now than earlier due to climatic change, specially for uplands and medium lands.

**Suggested Action**

- **Short duration HYVs (MANTRA # 2)**
  : Upland : 90 days, Medium lands : 120-130 and Lowland : 145 – 150 days duration varieties are required under rainfed conditions, whether it is a normal year or drought year. Under irrigated conditions, duration may be 15 days more than that for the above rainfed categories.

- **Drought and Flood resistant varieties**
  : Frequency of prolonged dry spells and heavy rainfall is increasing in Orissa. The nation experienced two severe droughts in 2002 and 2009 within a span of seven years. Some floods in the country, in both south and north, surpassed records of the last century. The HYVs including the popular cv Swarna cannot tolerate submergence of 5 to 7 days, as evidenced from September 2008 flood in Orissa. More research is required in this direction to develop drought and flood resistant varieties. Of course, Swarna Sub gene 1 needs to be multiplied urgently for flood-prone areas.

- **Go for few varieties and zone specific**
  : Large number of varieties create problem for marketing. The varieties may be narrowed down to 3 to 5 each for uplands and medium lands. Moreover, the consumer oriented super market culture requires to opt for the varieties according to their demand for better marketing.

- **Seed production and supply action plan**
  : Realistically hard numbers be fixed on quantity, time and place of seed requirement and procurement before the season in which seed crops are grown; Lifting and positioning be completed by May 1 for Kharif. Planning just before the crop season is not left with much time to procure sufficient quantities of required varieties.

**Justification of Mantra 2**

- Delayed onset of Monsoon and less rainfall in October are likely to be more common under climate change, leading to shorter growing season, which in turn requires short duration varieties.

- Farmers in Orissa use rice varieties of relatively longer duration in uplands and medium lands than optimum duration that the land types require. Uplands and medium lands together constitute 76.6% of cultivated area in the state. More than 85% of medium land and 36% of upland are grown with rice in a kharif season.

- Short duration varieties shall impart stability on production and productivity of rainfed rice.

**Considerations while implementing**

- Required short duration varieties are not available in adequate quantity in the state. These are to be produced in the state only, as less chance of availability in the other states. Private (both
agencies and individuals) and government agencies like NSC may be suppliers, signing agreements / MOU a year ahead.

- Priority may be given to rainfed farmers holding / cultivating only uplands and medium lands as the beneficiaries of short duration varieties.

Fig. 4

3. New Cultivation Method

Philosophy

Presently cultivated rice cultivars do not require submerged conditions, although rice was originated under these conditions. Continuous ponding of water under conventional method makes rice roots shallow and a great proportion of rice roots are dead or become less active by the time of flowering, when rice plant still needs to be active to absorb nutrients. Besides the soil is degraded and more water is infiltrated, which would be accelerated under climate change. SRI method is an answer to overcome these problems.

Suggested Action

- **SRI method (Mantra # 3)**: System Rice Intensification is a method of rice cultivation for resource use efficiency and higher productivity. However, it cannot be universally adopted in all the land types and both the seasons.

- **Increased use of organic manures**: This includes green manuring of Dhaincha and application of bacterial fertilizers (*Azospirillum* and *Azotobacter*) as a part of Integrated Nutrient Management (INM). INM shall improve soil organic C, which helps soil nutrient transformation and longer retention of soil moisture. Climate change is considered to reduce soil organic C. Production of Dhaincha seeds in the state should be enlarged.

Justification of Mantra 3

- Water is going to be scarce under climate change. SRI method requires less water, less seed rate and produces more yield. Besides it maintains soil health with enhanced microbial activity.

Considerations while implementing

- SRI method needs to be propagated in a modified form.
- In kharif it shall be limited to medium lands with some assured water supply and well drainage conditions.
- Simple weed control implements like Kono weeder must be available in adequate quantity for supply to the farmers. Weed menace is more under SRI method, which is otherwise controlled by ponded water in the field under conventional cultivation method.
- Irrigation water supply schedule in the adopted areas of SRI method needs to be changed to save water.

4. Diversify the production system

Philosophy

In case of crop failure, some income would be assured from other component enterprises.
Suggested Action

- Farming System (MANTRA # 4): Cattle, poultry, fruits like banana, flowers and vegetables in and around the Farm Pond.

- Diversify Rainfed uplands: Rainfed uplands are not suitable for rice crop due to shallow soil depth, poor fertility and higher infiltration and seepage loss of water, since rice is a crop of high water and nutrient requirements and less tolerant to stress compared with non paddy crops. Thrust should be given for covering marginal lands under fruit crops like cashew and unbunded uplands under fruit crops like mango besides other non-paddy crops.

Justification of Mantra 4

- Water use by other crops and component enterprises is much less than by rice crop.
- Non crop enterprises give more stable yield in dry lands.
- Farming system will supplement the benefits of the proposed farm ponds (Mantra # 1) as an irrigation source.

Considerations while implementing

- As it requires investment, only proven technologies must be filtered and passed on to the farmers.

5. Contingent plan

Philosophy

Preparedness for all kinds of situation makes one half successful at first go before application of any mitigation measures.

Suggested Action

- Blue print on Contingent Action Plan (MANTRA # 5): Various scenarios of possible crop damage due to drought, flood, cyclone and pest attack are to be chalked out on priority basis. The required contingent plan for each scenario must be well spelled out and ready on hand as a blue print. On pressing the panic button, the blue print is to be executed.

- Strengthening Rabi crop production: SEEDS, IRRIGATION, ADVANCED SOWING and MECHANISATION FOR LAND PREPARATION are the important elements.

Justification of Mantra 5

- Planning and execution are often delayed, even when a decision on crop damage is made.

Considerations while implementing

- The possible scenarios must be defined and described clearly, considering the spatial and time domain, land type, seasonal point of time, crop stage and extent of damage.
- The plan should take care of all stress situations, even the extent of damage does not attract declaration of a calamity.
- The mitigation measures prepared beforehand should not be considered fully static and it may need modification in a dynamic way for a particular situation.

6. Use of ICT

Philosophy

Information is powerful. Several decisions are delayed due to unclear information and its delayed outreach. Modern Information and Communication technology can be used to strengthen the information flow on real time to the out-reach.

Suggested Action

- Weekly Info (MANTRA # 6): Information on crop and animal resource status from
Panchayat is to be regularly prepared on a simple format and it should be of joint responsibility of Sarapanch, Executive Officer/ VAW and proposed cadre of Village Weather Man.

- **Monthly Meeting**: Meetings of the Panchayat and revenue Block Level Committees should be regularly held on scheduled dates to take stock of the situation.

- **Rain gauge installation**: One manually operated rain gauge station needs to be established at premises of each Gram Panchayat and a cadre of voluntary force to be called as Village Weather Man be created and trained.

- **District level Agroadvisory**: District level agroadvisory with outreach at village level was started in 2006 by ATMA with initiative from Agrometeorology Section of OUAT for the first time in India, but it got gradually weakened. It needs to be strengthened on content and dissemination.

- **Uniform, useful and simple Infosheet format**: It is required for ready reckoning of status at micro level and further data analysis.

**Justification of Mantra 6**

- Sometimes correct ground truth does not come out and reach the higher ups in time. The information on crop loss due swarming caterpillar on rice in 2009 kharif did not reach the higher ups in time with clear tone.

**Considerations while implementing**

- Awareness campaign and simplification of procedure are needed.
- Group insurance may be considered for lower premium and motivation.

7. Insurance

**Philosophy**

Insurance is the top most risk minimization tool among the off-farm tools available to the farmers.

**Suggested Action**

- **Insurance coverage to all farmers** (MANTRA # 7): It should cover all farmers of major crops, both loanee and nonloanee. Nonloanee farmers does mean that their economic strength is high in most cases.

**Justification of Mantra 7**

- As the capital investments increase in the modern farming, importance of insurance increases.
- Insurance acts as a psychological strength besides financial instrument of risk minimisation.

**Considerations while implementing**

- Awareness campaign and simplification of procedure are needed.
- Group insurance may be considered for lower premium and motivation.

8. Assessment and declaration of crop damage

**Philosophy**

Conventional method of damage assessment and devising matching mitigations measures have become obsolete under climate change and development of new scientific tools, and, hence, it now requires a new mechanism with more scientific back-up and less administrative procedural hack-up.

**Suggested Action**

- **Real time assessment and declaration of damage** (MANTRA # 8): A new mechanism of crop loss estimation under drought, flood, pest, hail storm, etc must be quantitatively codified.
• **Creation of an Autonomous State Authority**: It shall act as an independent advisory agency to monitor, assess and recommend the declaration of crop damage

• **Creation of a new Department of Agrometeorology**: Its creation in the Orissa University of Agriculture and Technology shall strengthen R & D for real time assessment of crop loss by Simulation Crop Modelling and other tools and developing mitigation measures.

• **Greater role of Agriculture Department**: It seems imperative that primary responsibility of data collection at microlevel on crop status, weather and other relevant information affecting agriculture should lie on either Agriculture Department on an Inter-Department mode or the suggested new State level Autonomous Authority.

**Justification of Mantra 8**

• Government can be able to support farmers to take up mid season correction and prepare for the next season.

• The relevance of Revenue Department in declaring drought, perhaps a legacy inherited from the British Raj with primary aim of collecting taxes, may be reviewed.

• Creation of the new Department of Agrometeorology in the state is an overdue, as other state universities have already created it, some even 3 decades back. Climate change has made its requirement more essential in the agrarian state like Orissa.

• Decision by the new State level Authority would be considered by the farmers transparent and impartial.

**Considerations while implementing**

• Quantitative method of damage assessment with indicators, criteria and time limit has been submitted by the Agromet Section of OUAT in 2006, which can be used with some modification of spatial scale until it is refined with integration of satellite and weather data.

• The new state level Authority may have members from people’s representatives, progressive farmers, academics, NGOs and administrators. It shall be an Advisory body to the existing implementing agencies.

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*Her Excellency the President of India
Smt. Pratibha Devisingh Patil
inaugurating the Cactus House in Raj Bhavan on 10.12.2009. His Excellency the Governor of Orissa
Shri Murlidhar Chandrakant Bhandare and Hon’ble Chief Minister Shri Naveen Patnaik are also present on this occasion.*