

National Rainfed Area Authority

Managing rainfall deficits: a technical advisory note

Rainfall and snowfall are the ultimate sources of water for meeting needs of drinking, irrigation, rainfed agriculture, and environmental flows, flood and farm income securities. Analysis of long period rainfall records reveals that probability of drought occurrence in India vary from once in two years in Rajasthan to 15 years in Assam and in between 2-15 years elsewhere. Major deficiencies or anomalies in the amount of rainfall as well as variation in time and space require proper management. Some of the suggestions in this regard are summarized below:-

Drinking/domestic water supply

1. Drinking water is always a major casualty of the rainfall deficiency. Therefore maintenance and servicing of water storage structures, hand pumps, borewells, tubewells, conveyance system and water tankers, setting up of new water storage structures at strategic locations and linkages with the road/railway transport is called upon. Supply logistics at house level may be planned.
2. States may identify and requisition sources of water supply exclusively for drinking or domestic purposes for lifting/filling tankers from irrigation projects and tapping of ground water resources wherever feasible.
3. Deepening of dried up wells, digging new wells and drilling of new hand pumps/tubewells may be taken up on priority for domestic water supply wherever technically feasible.

Livestock sector

4. Livestock sector is a traditional safety net against risks and uncertainties of rainfall and its deficits. Fodder and feed supply is possibly next to drinking water for supporting livestock based livelihood. Setting up of fodder and feed depots at strategic locations, availability/sources of fodder, collection arrangements, densifying, bailing and transport logistics both by the roads and railways may be reviewed to respond to any kind of contingency.
5. Procurement of the bailing and block making machines for efficient transport of densified fodder supply, repairing and servicing of the already existing machines,

maintenance and servicing of feed mills, procurement of raw material for feed mills, etc. may be strategized.

6. Migration of animals out of the fodder/feed/water scarce areas is normally resisted or discouraged by the neighbouring States to avoid spread of diseases and infections. Entry points of the traditional and alternative migration routes could be identified and vaccination of animals organised so as to ensure health and unrestricted movement of livestock from one region to another as scarcity avoiding or survival mechanism.
7. List of *Gaushalas* and their capacities could be updated and financial assistance assured for setting up fodder/feed banks and livestock camps. Sites for additional temporary cattle camps or home delivery of fodder/feed may be identified. Scientific disposal of carcasses may be designed.

Forestry sector

8. *In situ* conservation of rainfall in fringe forest land to improve productivity of grasses, shrubs, fodder trees, non-timber forest produce (source of livelihood of forest dwellers) may be undertaken.
9. Chances of fires in forests and elsewhere increase with rainfall deficit. It destroys biodiversity and burns protective cover of litter on the ground leading to high run-off and soil erosion during subsequent rainfall events. Fire lines should be maintained or created wherever lacking. Similar precautions are required to be taken for other fire hazards.

Other measures

10. Food grain stocks could also be built up at strategic places so as to avoid over burdening of the roads and transport system if some contingency appears in future.
11. A shelf of the projects may be prepared by the drought frequented states/regions for providing employment and generating productive and durable assets of land and water and making best possible use of MGNREGA. There should be appropriate technical and intellectual inputs in designing the projects.

Contingency Crop Planning

12. There are four broad scenario of the rainfall inadequacies consisting of (i) delayed onset, (ii) early/right onset but sudden breaks in between, (iii) early/delayed

withdrawal of monsoon, and (iv) other permutation and combinations of (i) to (iii). A separate contingency plan for various scenario of rainfall deficiency is called upon. The major consideration consists of alternative crops/varieties of different duration, availability of the seeds of alternative choices as elaborated in the Position Paper 2 of NRAA published in 2009 may be ensured (NRAA website: www.nraa.org). Of course some additional information after that is also available and could be included.

13. Around 1.74 million ha forestland has been allotted under the aegis of FRA 2006 which is mainly rainfed and therefore is likely to be afflicted the most. Soil and moisture conservation practices, rainwater harvesting, availability of seeds of drought resistant varieties and extension services may be ensured. Non-timber forest product based livelihood options may also be encouraged so as to ensure alternate income avenues as one of the safety net against crop failure.
14. In horticulture and tree based crops, *in-situ* moisture conservation, creating micro water harvesting catchments, strengthening of basins around tree trunks, trenching and *JALKUNDA* may be ensured to tide over moisture stress and micro-irrigation may be adopted for efficient use of available/harvested rainwater.
15. In plantations and perennial crops, *in situ* soil moisture conservation by trenching, contour or field bunding, gully plugging, etc. may be taken up for minimizing the impact of deficient rainfall.

Rainfall deficiencies in the irrigated area require different kind of response

16. Availability of the water in the reservoirs may be assessed, conveyance and distribution system should be repaired, efficient methods of irrigation may be employed and appropriate roasters for the canal irrigation should be designed.
17. Ground water irrigation would require un-interrupted supply of electricity and diesel and recharging ground water subsequently.
18. Efficiency of water lifting devices and distribution system should be optimized. It consists of maintenance, greasing, repairs and servicing of electric motors, engines, pumping sets, tractors and other machinery.
19. Ground water irrigation is still more amenable for adopting efficient system of sprinklers, drippers, piped conveyance, ridge and furrow irrigation systems, etc.
20. Ground water re-charging helps in maintaining and augmenting water repositories to meet futuristic demands and contingencies and should be given the highest priority.

Fringe forest area should be targeted for treatment to augment water availability in down-stream agricultural lands.

21. Conjunctive use of poor quality, good quality and treated sewage water can also augment water supply.
22. Practices of *in situ* rain water conservation and re-charging should be geared up in arable, non-arable and forest land.
23. Desilting of farm ponds, tanks and check dams may be accorded priority to restore and improve their storage capacity.
24. Digging of new ponds and dugwells especially under MGNREGA may provide one or two critical irrigations and minimize productivity loss if there is early withdrawal of terminal rainfall.

Compensatory production strategies

25. Deficiency in the production of one season or a region can be compensated by focussing on the next season or other region of normal or high rainfall to make up for the shortfall. This would require deployment of necessary inputs i.e. seed, fertilizers, extension services and credits on intensive basis.
26. Alternative off season crops like *boro* rice, winter maize, summer or spring crops, inter or relay cropping, etc. have tremendous possibilities to compensate loss of production due to deficient rainfall in the main season. Appropriate inputs may be organized. Removal of weeds will bring down water competition and mulching will conserve soil moisture.
27. Oil seeds, pulses and short duration cereals being more tolerant to the rainfall scarcity and having short duration for alternative seasons could play a significant role for preventing loss in production and reduce their imports.
28. Availability of fodder in rain deficient regions is a serious consequence. Under severe conditions sugarcane and grain crops could be used as fodder. Cultivation of fodder under irrigated conditions and its transport to scarcity zones can also be planned. Requirement of seeds of fodder crops may be assessed and made available to farmers.
29. In strategic areas, community nursery of crops like rice may be helpful in case of delayed or re-transplanting.

30. Between 22 and 78% of replenish-able ground water is unutilized in different States of India. These areas especially Eastern and NEH regions are best bet of investments for compensatory production on long term basis.

31. Promotion of alternative micro-enterprising, income and employment generation activities can also be strategized to compensate livelihood losses.

32. States should be geared up for using information from modern tools like remote sensing, GPS and GIS together with weather station data to settle timely insurance claims and provide immediate relief against risk of rainfall deficiencies.

Protected Cultivation

33. Cultivation in net/shaded/poly houses provide protection against rainfall deficits, insects, pests, diseases and 5-10 fold higher productivity, high quality, off season production and very high prices. It also saves water and fertilizers in the range of 30-60%.