



CAZRI DEN NEWS

Volume 8 (1)

January 2005

In this issue : • Combating desertification • Drought in western Rajasthan • Wind erosion and its control
• Grazing land degradation • Miscellany

Combating desertification

CAZRI is an active network partner in the Thematic Network Programmes (TPNs) for Asia under the UN Convention to Combat Desertification (UNCCD), and is contributing in this endeavour.

Desertification monitoring and assessment (TPN-1):

Methodology for mapping desertification processes under a hierarchical classification system is being standardised in collaboration with Space Application Centre, Ahmedabad. Interpretation of medium-resolution IRS LISS-III images of different seasons, backed up by ground information, in a pilot study in northern part of Pali district (Fig. 1) revealed 19.7% area under different degradation processes, largely due to human pressures. Croplands accounted for 40% of degraded area, mostly due to salinity-alkalinity, and water and wind erosion, followed by degraded rocky areas (29.4%), where vegetation degradation and water erosion are dominant, and scrublands (22%), where water erosion is dominant.

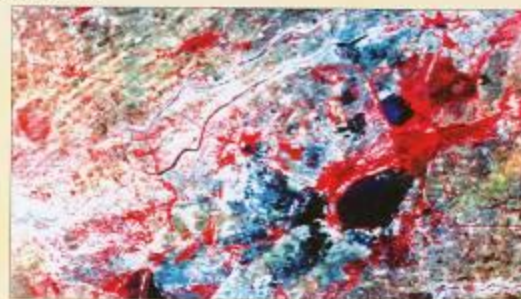


Fig. 1. Satellite image of Naya Gaon area to show wind erosion and salinity in cropland

Agroforestry and soil conservation (TPN-2): Agroforestry with multipurpose trees, crops, grasses and animals is a traditional way of life for survival and protection of fragile ecosystem in western Rajasthan. CAZRI has developed improved agroforestry practices for arid region (Table 1). To provide arid zone farmers more remunerative options under the changing global scenario, CAZRI has also taken up new initiatives to evolve systems with medicinal, aromatic and hydrocarbon plants that can additionally help in combating desertification.



Fig. 2. An improved agroforestry with *Hardwickia binata* tree and *Cenchrus ciliaris* grass

Table 1. Yield ($q\ ha^{-1}\ y^{-1}$) and net return ($Rs.\ ha^{-1}\ y^{-1}$) from traditional and improved systems

Agroforestry system	Rainfall (mm)	Pearl millet yield		Fruits	Fuelwood/ Fodder	Grass biomass	Net return	B:C ratio
		Grain	Stover					
<i>P. cineraria</i> based	250-400	6.2	14.6	-	11.2	-	4000	2.1
Jujube-based	<250	2.0	4.5	-	5.5	-	1500	0.6
Jujube-green gram	200-300	2.0	2.8	8.0	27.7	-	8000	-
Jujube-Cenchrus	300-400	-	-	20.0	30.6	-	15200	3.5
<i>Hardwickia</i> -Cenchrus	300-400	-	-	-	21.3	15.0	6200	3.0

Traditional agroforestry

Improved agroforestry

Drought in western Rajasthan

Drought is a recurring phenomenon in arid regions, impairing the availability of drinking water, food and fodder, with a cascading effect on human and livestock health and mortality when it occurs in a row. Between 1901 and 2004 western Rajasthan experienced 57 moderate to severe droughts. There were five occasions when drought occurred in successive years: 1903-05, 1957-60, 1966-71, 1984-87 and 1998-2000. Droughts of 1918, 1987 and 2002 were most severe, when rainfall departure from the normal was -81, -65 and -70 per cent, respectively, but no sowing rain during monsoon of 2002 made it the worst, a 'century-scale drought'.

The westernmost district of Jaisalmer and parts of adjoining Bikaner and Ganganagar districts have the maximum probability of drought recurrence, even during good rainfall years (Fig. 3). Production of pearl millet, the major cereal crop of the region grown during kharif rains, is depleted by 10-30% during mild drought, while moderate drought depletes it by 35-60% and severe droughts by 75-90%. Surface water availability also declines with the drought severity (Table 2), creating drinking water problem. Fodder scarcity, commonly 20-30% of the demand, touches 80-100% during severe droughts. Consequently, large-scale migration for food, fodder and water, as well as work takes place.

Table 2. Drought and its impact (2000-2004)

Year	Rainfall (mm)	Rainfall departure from normal (%)	Overall drought intensity	Irrigation tanks filled (%)
2000	243.2	-18.4	Mild	26
2001	305.1	+0.7	No drought	43
2002	92.2	-70.2	Severe	5
2003	383.9	+32.0	No drought	24
2004	201.8	-32.5	Moderate	11

CAZRI has developed a number of drought resistant, short-duration crop varieties, which are better yielders of grain and stover, and can avoid terminal drought that is normal in the region. The Institute has also developed a number of alternate land use systems that help to minimize the impact of drought. Though government drought relief is common in the region, gravity of drought warrants an exclusive policy of drought proofing.

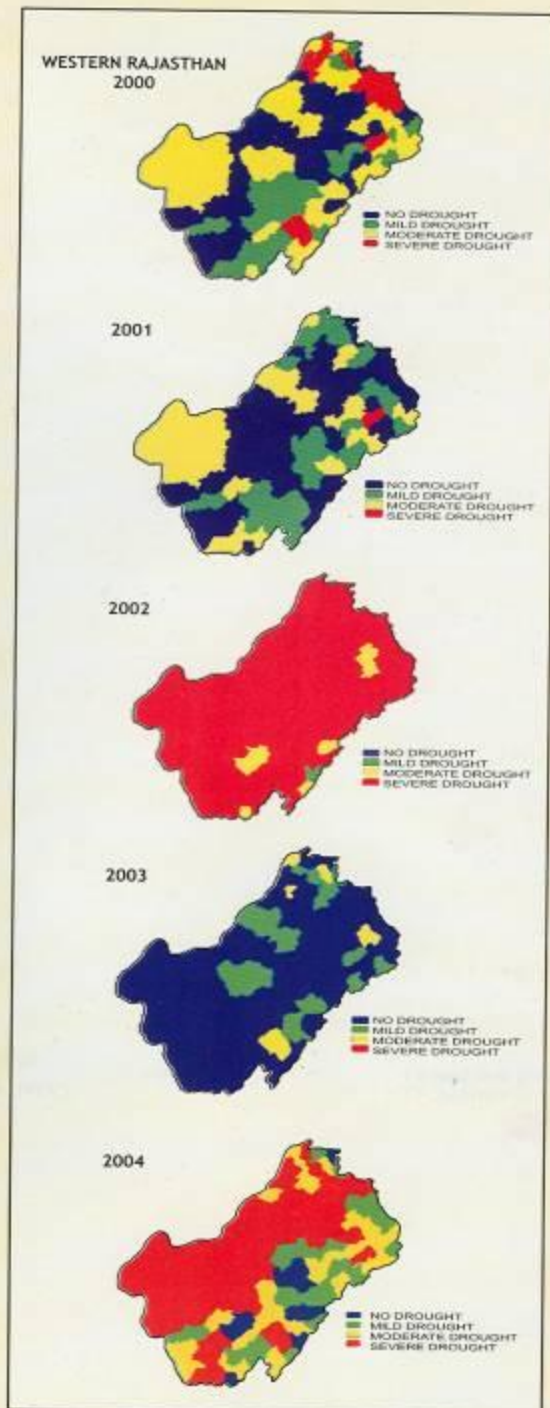


Fig. 3. Drought scenario in western Rajasthan (2000-2004)

Wind erosion and its control

Wind erosion, causing shifting of sand dunes and deposition of sand in cultivated fields, canals and other infrastructures, is a serious menace in western Rajasthan, necessitating huge expenditure. The spatial pattern of erosion has been found to be guided by erosivity of wind, erodibility of soil and human interventions like overgrazing, deforestation, cultivation on marginal land and deep ploughing through tractors. Based on satellite image interpretation and field data about 75% area of western Rajasthan has been found to be affected by different degrees of wind erosion. Broadly, 15% area is severe to very severely affected, while 35% area is moderately affected, and 25% slightly (Fig. 4).

CAZRI developed a vegetative method of sand dune stabilization (Fig. 5), which has been used by the State for stabilizing about 0.3 million ha of dune-covered area. CAZRI's technology on micro-wind breaks of grass and legumes, strip-cropping, stubble mulching, ridge-furrow cultivation, shelterbelts and roadside plantation have also helped in wind erosion control and halting eastward march of the desert.

Grazing land degradation

Most of the grazing lands in western Rajasthan are severely degraded. CAZRI developed 52 degraded grazing lands across Rajasthan and handed them over to the State. CAZRI has also developed a number of nutritious grasses and evolved management practices for improvement of the grazing lands.

In order to find a reliable tool for quick mapping of vegetation status in the degraded grazing lands, the low-density vegetation cover of such lands in Shergarh area near Jodhpur was measured through satellite remote sensing under an Indo-Australian project. It was found that PD54 index was better than NDVI method, especially during low rainfall years. In the test area PD54 index (blue in Fig. 6) highlighted vegetation status in the protected area properly, but NDVI (blue in Fig. 7) mapped these better-vegetated areas as degraded (yellowish).

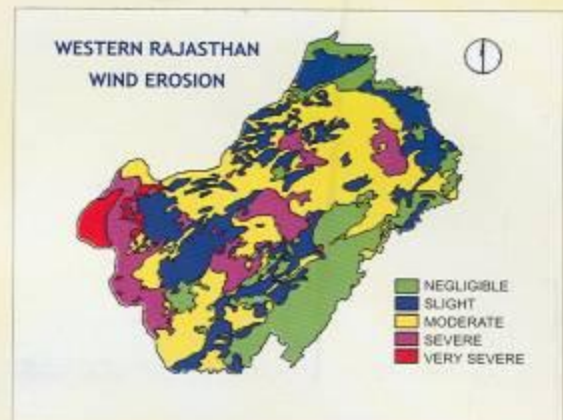


Fig. 4. Wind erosion in western Rajasthan



Fig. 5. A stabilized sand dune

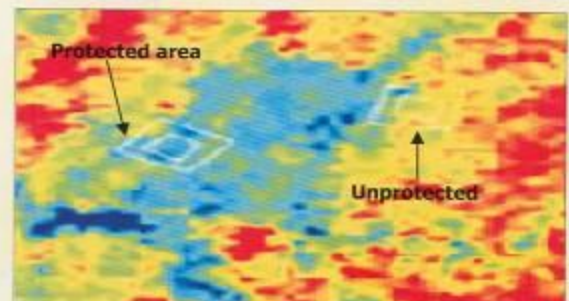


Fig. 6. PD54 image of Shergarh area

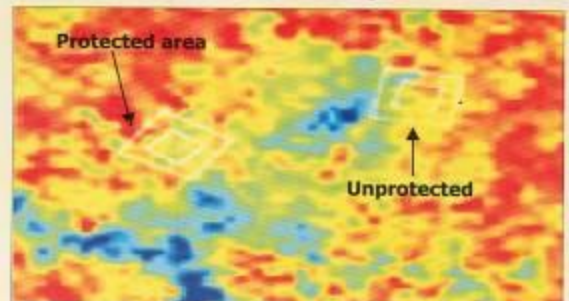


Fig. 7. NDVI image of Shergarh area

Achievements of ENVIS Centre on Desertification (established 1991)

- Published a bibliography, Desertification and Soil Conservation, 297 p. (1995)
- Publishes DEN News (since 1997); also at <http://cazri.raj.nic.in/envis.htm>
- Publishes 'Current Awareness Bulletin' (monthly)
- Subscribes to International database services: AGRIS (available since 1975; on CD), and CAB (since 1984; on CD)
- Developed a database on arid zone
- Also maintains a statistical database on desert of Rajasthan
- Databases are used extensively; average annual queries: national 293, international 65
- Celebrates World Environment Day (through guest lectures, brain-storming sessions, exhibitions, quiz competitions, etc.)

Recommendations of International Conferences and way forward

International Workshop on Drought Assessment and Mitigation in South West Asia

held at Colombo (7-8 October 2004), was participated by Drs P. Narain and M.A. Khan.

Drought early warning, drought risk and impact assessment, and drought mitigation and response strategies were recommended by the workshop for support by relevant policies. Details are:

- Prepare for drought when there is no drought. Preparedness is more cost-effective than relief measures of mitigation.
- Improve the availability of hydro-meteorological data through long-term regional study.
- Improve regional drought monitoring and early warning.
- Improve ground water governance.
- Establish regional drought information centres.

Forthcoming Environmental Conferences and Events

Delhi Sustainable Development Summit (DSDS): 2005. February 3-5, 2005, New Delhi.

Web: <http://www.teriin.org/events/upc/upc.htm>

17th Commonwealth Forestry Conference. February 28 - March 5, 2005, Colombo.

E-mail: libby.jones@forestry.gsi.gov.uk

CRIC 3 Third Session of Committee for the Review of the Convention, UNCCD. April 27 - May 6, 2005, Bonn.

Web: <http://www.unccd.int>

19th International Congress on Irrigation and Drainage: Use of Water and Land for Food and Environmental Sustainability. September 11-19, 2005, Beijing.

Web: www.icid.org/index_e.html

Biodiversity Conservation in Asia: Current Status and Future Perspective. November 17-20, 2005, Kathmandu. Web: http://www.conbio.net/scb/asiameetings_en.asp

Recent CAZRI publications

Pool of Traditional Knowledge in the Thar Desert of India and its Utilization (in Hindi). Eds. H.P. Singh, Z.D. Kavia and P. Narain. 80 p. CAZRI; 2004.

Towards Managing Soil-borne Plant Diseases in Arid Region. S. Lodha and U. Barman. 23 p. CAZRI; 2004.

Natural Resources Appraisal for Land Use Planning in Arid Agro-Ecosystem. Eds. B. Ram, P. Narain and D.C. Joshi. 106 p. NATP/ CAZRI; 2004.

Drought Management Policy for Drylands and Income Generation (in Hindi). Eds. H.P. Singh, M. Singh, N.L. Vyas, Z.D. Kavia and P. Narain. 180 p. NATP/ CAZRI; 2004.

Development of Entrepreneurship in Rural Women through Livestock Farming and Home Gardening (in Hindi). Eds. A. Waris, A.K. Sharma, A.C. Mathur and P. Narain. 57 p. NATP/ CAZRI. 2004.

CAZRI at a Glance. (information brochure) 6 p. CAZRI, 2004.

Doable Technologies. (information brochure) 8 p. NATP/CAZRI; 2004.

Improved Agricultural Practices for Henna: Problems and Solutions (in Hindi). (information brochure) 8 p. NATP/CAZRI; 2004.

Desert Environment Newsletter, Volume 8, Issue 1 (January 2005)

Central Arid Zone Research Institute, Jodhpur 342 003, INDIA

Web: <http://cazri.raj.nic.in> E-mail: root@cazri.raj.nic.in Fax: 0291-2740706 Phone: 0291-2740584

Editors: Pratap Narain, Amal Kar, Manjit Singh, D.C. Ojha, R.S. Singh and J.C. Tewari

