

Should the Indian Government Investment in Water Harvesting Drought Mitigation Programs

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are needed to see this picture.

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EESC W4401

Quantitative Models of Climate
Sensitive Natural and Human Systems

Rajasthan, India



- Total land area of 3.42 km²
- Est. pop. of approximately 54 million
- Avg Rainfall:
 - 10 - 65cm/yr.
 - Holds the Thar - most populated desert in the world

Drought in Raj

- Faced 84 droughts in the last 100 years
- Extreme case was the 2001-2003 drought
- Rainfall ~ 10cm/yr (monsoon only - jul to sept)
- Out of 32 districts, 31 drought prone, 75% of villages
- 57% of total geographical area
- '01-'03 event affected 33million people
- Men seek work in neighbor states



Issues For Women



- Fetching all water, fuel, wood and fodder for the communities

Takes 12-14 hrs/day

Pregnancy problems

Domestic Violence issues

Low female literacy rate ~ 1.7%

- Less meals

Iron, calcium, etc deficiencies lead to health problems

like anemia, night-blindness, etc.

- HIV/AIDS increase



Current Efforts

- *Largely UN, AUSAID, DfID w/ NGOs*
- Traditional monsoon water retention techniques: *johads, beris and tankas*
- Peer Sex Education Programs



Problems Discerning Impact of Drought on Women

- 83 % of men and 46 % of women “work” in Rajasthan
- Women’s work is often under-represented or not reported as work at all
- Female work, esp domestic work is invisible & culturally not considered contributing to household income
- Estimates of their contribution eludes the gov’t, even up to now.

Lessons from The 2002 Drought Example

- “Drought 2002 was in fact more of a ‘water famine’ than a ‘food famine’.
- An unprecedented water crisis that surfaced during this drought is a pointer to the shape of things to come as droughts continue to occur with much more frequency and intensity in the State.

- Ministry of Agriculture, Government of India

Impacts

Direct physical effects and subsequent effects

- Agricultural and livestock production
- Hydroelectric power generation
- Water intensive non-agricultural prod. like textiles and domestic availability of water, latter means health and household activities, including time to collect water
- Combination of inflation, unemployment and reduced industrial output leads to depression of demand in the economy, reducing expenditure savings and GDP.
- HIV rates to increase (5 mil HIV+ in India); Generic ART is \$33 per month (since 2003)

Impact on Daily Use Water To meet contingent needs of water supply	Rs. 508 crore*
Impact on Rural Employment (81 million lost man-days) - Relief work employment	Rs. 5600 crore
Impact on Crop Production (42 Lac Hectares Rabi sown instead of 70 Lac Hectares, 60.89 lac Hectares sown instead of 129)	Rs. 12114 crore
Impact to Livestock (45.2 million cattle)	Rs. 1400 crore
Hydro Power Replacement (with costlier sources: thermal and nuclear)	Rs. 200 crore

***\$1 = Rs. 45. 1 crore = 1,000000 Rs. or US \$22,392.66**

Desert Rainwater Harvesting Initiative

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- **An International partnership designed to provide fresh water to rural communities in drought affected regions in Rajasthan India**
- <http://www.yogaindailylife.org.au/rainwater>
- Budget of US \$420,000
(\$120,000 available, \$300,000 still needed)

Probability of drought is always high because it occurs every 2 to 3 years.

		States of Nature	
		No Drought	Drought
Actions	Gov't \$ Investment in Programs	\$500,000 = < 3 crore	3 crore
	No Gov't \$ Investment in Programs	0	Rs. 508 crore

$$EMV (I) = 0.1 * 3 \text{ crore} + 0.9 * 3 \text{ crore} = 3 \text{ crore}$$

$$EMV (NI) = (0.1) * 0 + 0.9 * 508 \text{ crore} = 457.2 \text{ crore}$$

Future Expected Conditions

- Future Expected Conditions:
Monsoons are expected to have increased rainfall
- However:
- Certain districts in the state experienced 2 to 3 consecutive years of below average rainfall in 1998, 1999, 2000.

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