

## ARTICLES

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### **Drought and Household Coping Strategies: A Case of Rajasthan**

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#### I

#### INTRODUCTION

Rajasthan has more than 9 per cent of India's geographical area but only one per cent of India's total water resources. The climate is hot and dry in two-third of the State area. The average rainfall varies from 15 cm. in the western districts (50 per cent of the States area) to about 90 cm. in the eastern districts. There are very few rainy days and 90 per cent of the precipitation takes place only in 3 to 5 days. Drought or inadequate rainfall is a common feature of the economy.

At least half of 33,000 villages of Rajasthan are under the grip of drought almost every year. The farmers have to adjust to this situation by evolving strategies to cope with drought.

#### II

#### CONCEPT AND DEFINITION

The term 'drought' is of meteorological origin. Drought results from long-continued dry weather, and lack or insufficiency of rains. This causes exhaustion of soil moisture, drying up of plants due to lack of water, depletion of underground water supply and reduction and eventual cessation of stream flow. In short, it is a period of abnormal dry weather, sufficiently prolonged for lack of water to cause serious hydrologic imbalance in the affected areas.

Meteorologically, severe to very severe drought conditions have been felt in the state of Rajasthan during 1951, 1958, 1965, 1968, 1972, 1980, 1987, 1991 and 1999 to 2002. At the district level, severe droughts affected Sirohi district nearly 17 times, Jaisalmer and Pali 15 times, Sri Ganganagar and Barmer 14 times, Bikaner, Jalore and Nagaur 11 times, Jodhpur, Churu and Sikar 13 times and other districts between 5 and 10 times during the 35 year period from 1957 to 1991. However, severe drought has been declared in the state more often than reflected by the meteorological data. Between 1970-71 and 1978-79 the affected villages exceeded 12,000 thrice and

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the affected rural population exceeded one crore twice. But, during the subsequent nine years, the affected villages vary between 21 and 36 thousands in seven years, with affected population varying between 1.7 and 3.2 crores. According to census figures, the population in the primary sector activities increased from around 2 crores in 1981 to 2.5 crores in 1991. This implies that the affected population during this period varied between 80 and 100 per cent.

Most parts of the state of Rajasthan is drought-prone. Vulnerability of the people to drought varies from region to region depending on its intensity. The state suffered from severe drought during 1999-2002. Yet, the people living in the affected villages managed to eke out a living and sustain themselves during the period. The role of the state, however marginal, is undeniable in managing the scarcity conditions. However, the most important factor is the strategies adopted by the people on the basis of an understanding of the constraints as well as the potential of the drought-prone environment.

An attempt is made in this paper to take a close look into the impact of drought on various aspects of rural lives in order to understand the strategies and practices adopted by the drought affected people to cope with drought. For the analysis, the following are regarded as 'coping' strategies:

- Livestock based farming system,
- Crop-mix and cropping pattern,
- Tree management and agro-forestry and
- Migration.

#### *Survey Methodology*

Three villages were selected from three different agro-climatic regions. These include one village from Jaipur district that lies in the semi-arid region, one village from the humid rainfed Rajsamand and one district from Nagaur district of the arid region. All the districts were under the grip of drought for two to three consecutive years.

The survey village was selected after visiting a number of villages in each district. The criterion for selection of villages was the occurrence of severe drought condition with more than 75 per cent crop failure. The households were selected after listing of all households in the village. The sample size was 40 households per village and this was distributed among different land size classes. A detailed questionnaire was canvassed.

### III

#### COPING STRATEGIES

##### *Livestock and Animal Husbandry*

Livestock provides supportive income, employment and nutrition to the household. Livestock income is more stable as ruminants, both large and small, have

the capability of converting plants and residues inedible by people into forms that provide several essentials for human survival. These include not only milk and meat products but also energy inputs for consumption and nutrients for the soil. Livestock has the extra advantage of mobility. In drought years, livestock is moved to areas where fodder availability is more assured. The impact of drought differs on different categories of livestock. Small ruminants that depend on grazing or browsing are more affected than large animals. Even, in a moderate drought year, one may not find any blade of grass in grazing lands. On the other hand, large animals are mostly stall-fed. Grazing is only supplementary feed, except in the desert part of Rajasthan where large sizes of cattle herds are totally dependent on grazing lands. Fodder for the larger animals can be transported and the cost borne as animals and their products are relatively higher value products. Small ruminants, on the other hand, have to move out in search of grazing.

The desire of farmers to protect a viable stock of livestock to ensure continuity of future income is evident in their decisions on the size of the herd. They pursue a course that involves extensive change in feeding sources and practices, a shift in the composition of livestock varieties, and movement of animals to areas perceived to have better pasture and water. Variations between these principal responses are conditioned on the rapidity and intensity of the drought, market conditions, and the resource capacity of the farm population.

The household strategy to cope with or reduce the impact of, drought by different livestock-rearing practices can be assessed by the number and composition of livestock owned, change in the number by sale or purchase of animals, and livestock contribution in the total household income.

Table 1 shows that the average livestock holding is 7.45 Standard Cattle Units (SCUs) per household in Jaipur, 9.1 in Rajsamand and 12.7 in Nagaur. Overall it is found that most of the households own 1-2 cattle. Buffaloes are also popular and the number of buffaloes owned increases with the size of land holdings. Small ruminants, particularly goats, are owned by most of the sample households and their number per households also increases with the size of holdings. Compared to large animals (cows and buffaloes) small ruminants are more convenient as their number can be adjusted quickly by sale/purchase. Natural growth is also more rapid as their calving rate is higher. The market is also better as there is no taboo against culling of goats/sheep for meat. It can be seen from the table that the marginal and small farmers keep larger herds of small animals per household than the large holding size households. The largest holding size households are an exception as their herd size even of small animals is the largest. The dependence of marginal and small farmers on the small animals for sustaining their livelihood is evident from the livestock composition.

TABLE 1. LIVESTOCK COMPOSITION BY SIZE-CLASS

Size of household (1)	Standard cattle units per household				Total (6)
	Cow (2)	Buffalo (3)	Goat (4)	Sheep (5)	
Jaipur					
Marginal	0.91	0.61	0.17	0.54	2.25
Small	2.18	0.23	0.18	0.07	2.65
Semi-medium	2.22	1.67	0.08	0.07	3.06
Medium	1.6	1.0	0.15	0.07	4.55
Large	1.0	4.0	0.30	1.80	5.30
Overall	1.64	0.76	0.15	0.59	3.15
Rajsamand					
Marginal	1.32	0.79	0.29	0.19	2.60
Small	0.63	0.17	0.16	0.04	1.0
Semi-medium	-	9.75	0.30	-	10.05
Medium	1.42	5.17	0.55	-	7.13
Large	-	-	-	-	-
Overall	1.68	1.32	0.41	0.16	3.57
Nagaur					
Marginal	0.55	0.70	0.54	1.50	3.29
Small	0.52	0.88	0.41	0.46	2.27
Semi-medium	0.55	1.25	1.43	0.14	3.36
Medium	0.08	1.48	0.54	1.13	4.22
Large	7.75	3.50	0.90	2.70	14.85
Overall	0.88	1.19	0.73	0.77	3.57

*Note:* Standard cattle units (SCUs) are defined as sheep and goat = 0.20, cow = 1.00, buffalo = 1.00, camel = 1.50, calf buffalo = 0.50.

Table 2 shows that 52.5 per cent of the households in Rajsamand and 40 per cent in Nagaur sold animals due to drought. The households also adopted a strategy to sell larger quantities of milk and milk products to meet their cash requirements. None of the households migrated with animals in the three sample villages. It was observed that the better-off households took advantage of the situation and purchased assets sold by poor households under distress. Small ruminants become very convenient in sale/purchase as the value is within the affordable limit.

TABLE 2. NUMBER OF HOUSEHOLDS ADOPTING ALTERNATIVE STRATEGIES

Strategies (1)	Jaipur (2)	Rajsamand (3)	Nagaur (4)
Sale of animal	3 (7.5)	21 (52.5)	16 (40.0)
Sale of animal products	2 (5.0)	16 (40.0)	27 (67.5)
Purchase of animals	-	-	-
Migration with livestock	-	-	-
Total sample households	40 (100.0)	40 (100.0)	40 (100.0)

*Note:* Figures in parentheses are percentages of total sample in each village.

### *Cropping Pattern*

As drought is a recurring phenomenon, people have developed mechanisms over the years to counter droughts of different intensities by varying agricultural practices. Agriculture is a high-risk activity. The farmers adopt a mixed farming system to cope with risks. The crops grown are traditional crops such as millet, pulses, oilseed and fodder crops. Most of these crops are highly drought-resistant.

Agricultural activity is largely dependent on the size of the operational holdings. The per household size of operational holding is reported in Table 3 in respect of all three sample villages. The practice of leasing-out land is prevalent among all size-classes of holdings in Jaipur village, while in the remaining two villages leasing-in land is practiced by the marginal, small and semi-medium households.

TABLE 3. OPERATIONAL HOLDINGS BY OWNERSHIP SIZE CATEGORY OF HOLDING

Ownership size-class	Number of holdings	Owned area (ha.)	Leased-in area (ha.)	Leased-out area (ha.)	Operational holding (ha.) (6)	Per household operational holding (7)
(1)	(2)	(3)	(4)	(5)		
Jaipur						
Marginal	14	9.31	1	2.13	8.18	0.58
Small	11	16.75	-	3.00	13.75	1.25
Semi-medium	9	26.75	-	5.63	21.13	2.35
Medium	5	32.25	-	16.13	16.38	3.27
Large	1	50.00	-	42.50	7.50	7.50
Overall	40	135.06	1	69.39	66.93	1.67
Rajsamand						
Marginal	24	12.94	5.00	-	17.94	0.74
Small	12	15.69	2.25	-	17.94	1.49
Semi-medium	1	3.50	8.00	-	11.50	11.50
Medium	3	15.00	-	1.25	13.75	4.58
Large	-	-	-	-	-	-
Overall	40	47.13	15.25	1.25	61.13	1.53
Nagaur						
Marginal	5	3.00	10.00	-	13.00	2.60
Small	12	20.38	3.50	-	23.88	1.99
Semi-medium	10	28.00	-	-	28.00	2.80
Medium	12	67.00	-	0.75	66.25	5.52
Large	1	13.75	-	-	13.75	13.75
Overall	40	132.13	13.50	0.75	144.88	3.62

Table 4 shows the cropping pattern according to categories of households. Two features of the cropping pattern that can be observed in Table 4 are: (a) adjustment through area left fallow during *kharif* and *rabi*; and (ii) preference for mixed crop combinations in the more severely affected villages.

### *Fallow Land*

Table 5 indicates the percentage of area left fallow in the three villages. *Kharif* fallow area is 16 per cent of operational holding in Jaipur, 35 per cent in Rajsamand

and 46 per cent in Nagaur. *Rabi* cultivation is negligible in Rajsamand. Jaipur and Nagaur villages manage to cultivate more than 80 per cent of the area available for cultivation as a result of groundwater availability. However, the amount of water that farmers are able to provide is less than recommended because of shortage of water as well as of power. The coping strategy was to cultivate a larger area under mustard as the crop is less water intensive. In Nagaur, on the other hand, the strategy was to grow higher value wheat or gram if water was available.

TABLE 4. CROPPING PATTERN BY SIZE-CLASS OF HOLDING IN SAMPLE VILLAGES  
(per ha)

Crops	Size of holdings					Overall
	Marginal	Small	Semi-medium	Medium	Large	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Jaipur						
<i>Kharif</i>						
Cereals	0.58	0.52	0.42	0.5	1	0.48
Pulses	0.28	0.24	0.37	0.42	-	0.36
Mixed crops	-	-	-	-	-	-
Total <i>kharif</i>	0.86	0.76	0.79	0.92	-	0.84
<i>Kharif</i> fallow	0.14	0.24	0.21	0.08	1	0.16
<i>Rabi</i>						
Cereals	0.08	0.10	0.13	0.15	-	0.11
Mustard	0.80	0.78	0.53	0.70	1	0.71
Others	-	-	-	-	-	-
Total <i>rabi</i>	0.88	0.88	0.66	0.85	1	0.82
<i>Rabi</i> fallow	0.12	0.12	0.34	0.15	-	0.18
Rajsamand						
<i>Kharif</i>						
Cereals	0.64	0.5	0.65	0.48	-	0.56
Pulses	-	-	-	-	-	-
Mixed crops	0.03	0.03	0.26	0.09	-	0.09
Total <i>kharif</i>	1	1	1	1	-	1.00
<i>Kharif</i> fallow	0.33	0.47	0.09	0.43	-	0.35
<i>Rabi</i>						
Cereals	-	-	-	0.05	-	0.01
Mustard	-	-	-	-	-	-
Others	-	-	-	0.07	-	0.02
Total <i>rabi</i>	0	0	0	0.12	-	0.03
<i>Rabi</i> fallow	1	1	1	0.88	-	0.97
Nagaur						
<i>Kharif</i>						
Cereals	0.14	0.18	0.12	0.12	0.18	0.14
Pulses	-	0.24	0.11	0.06	0.22	0.1
Mixed crops	0.02	0.31	0.33	0.33	-	0.3
Total <i>kharif</i>	0.16	0.73	0.51	0.51	0.4	0.54
<i>Kharif</i> fallow	0.84	0.27	0.49	0.49	0.6	0.46
<i>Rabi</i>						
Cereals	0.92	0.11	0.09	0.11	0.09	0.18
Mustard	-	-	-	0.02	-	0.02
Others	-	0.01	-	-	0.01	-
Total <i>rabi</i>	0.92	0.11	0.09	0.13	0.1	0.19
<i>Rabi</i> fallow	0.08	0.88	0.91	0.87	0.9	0.81

TABLE 5. PERCENTAGE OF AREA UNDER CURRENT FALLOW LAND

(1)	Jaipur (2)	Rajsamand (3)	Nagaur (4)
<i>Kharif</i> fallow	16	35	46
<i>Rabi</i> fallow	18	97	81

### *Crop-Mix/Cropping Pattern*

Farmers, in general, prefer to maintain diversified crop portfolios. Typically, few crops that are a mix of staple and cash crops dominate. Other considerations also enter into the choice of mixed crop. Where market transaction costs are prohibitive, as in the case of western Rajasthan, farmers prefer to maintain food crops in their crop portfolios. Diversity in crop mix also allows farmers to follow a flexible production schedule in terms of their responses to varying rainfall patterns. Typically, farmers in the West shift from millet to other crops (for example, sesame and watermelon) when early rains appear to be inadequate or when rains are concentrated in the latter part of the wet season (late July and August).

In addition, farmers adopt a variety of loss avoidance or loss minimisation measures. They shift their planting/sowing date on/before the onset of the first rains to obtain maximum moisture from a short but intense rainfall. Because of local variability of rains, it is common to sow each crop in several different locations of different fields. Crops are also sown in larger areas, if land is available to ensure that some area is harvested at the end. Adoption of quick maturing seed varieties is also on the rise due to the recurrence of drought.

A more detailed cropping pattern of the three villages is given in Table 6. The variation in cropping pattern across farm size is shown in Table 4. The difference in cropping pattern across three sample villages is indicative of the difference in resource endowment of the households, the agro-climatic conditions and the strategies followed to cope with drought. As groundwater is available in Jaipur more than in the other two villages, households depend more on *rabi* crops than *kharif* rainfed crops. However, there is a significant difference in their cropping intensity. On the other hand, households in Rajsamand single crop is grown while in Nagaur mixed crops are more important in the cropping pattern. It is interesting to observe that a large number of crops and their combinations are used to take care of climatic risk. At least 13 combinations were reported in this village. Growing mixed crops is an age-old practice in western Rajasthan to cope with the climatic risk (Jodha, 1978) and the practice continues to be followed. The crop combinations are of foodgrains, mainly bajra and different types of pulses and oilseeds or cluster beans.

Table 4 shows that there is a difference in the cropping pattern followed by marginal and large farmers. Smaller farmers grow a large number of crops and crop combinations while larger holdings show a preference for sole/single cropping. Along with the sole and mixed cropping practices farmers also keep land fallow to

maintain the productivity of land, and adjust with the household resource endowments.

TABLE 6. CROPPING PATTERN OF SAMPLE HOUSEHOLDS  
(per ha)

Crops (1)	Sample villages		
	Jaipur (2)	Rajsamand (3)	Nagaur (4)
<i>Kharif</i>			
Bajra	0.31	-	0.14
Jowar	0.13	-	-
Maize	0.04	0.56	-
Moong	0.29	-	0.02
Moth	0.00	-	0.02
Chavla	-	-	0.05
Til	0.04	0.01	-
Guar	0.03	0.06	0.01
Mixed	-	-	0.04
Bajra+moth	-	-	0.01
Bajra+moong+moth	-	-	0.02
Bajra+moth+chavla	-	-	0.01
Bajra+moth+moong+chavla	-	-	0.03
Bajra+moth+moong+guar	-	-	0.01
Chavla+guar	-	-	0.01
Chavla+moong+bajra	-	-	0.03
Guar+moong	-	-	0.02
Bajra+moong+guar	-	-	0.01
Bajra+moong	-	-	0.05
Moth+chavla	-	-	0.02
Bajra+chavla	-	-	0.02
Moth+moong+guar	-	-	0.02
Green fodder	-	0.02	-
Total <i>kharif</i>	0.84	0.65	0.54
<i>Kharif</i> fallow	0.16	0.35	0.46
<i>Rabi</i>			
Wheat	0.09	0.01	0.18
Barley	0.02	-	-
Mustard	0.61	-	0.01
Tarameera	0.10	-	-
Sugarcane	-	0.01	0.00
Green fodder	-	0.01	-
Total <i>rabi</i>	0.82	0.03	0.19
<i>Rabi</i> fallow	0.18	0.97	0.81
Gross cropped area (ha)	111.17	41.37	102.09
Net sown area (ha)	56.59	39.75	88.64
Cropping intensity	196	104	115

### *Agro-Forestry -Tree Management*

Indigenous agro-forestry systems and practices play an important part in ensuring production and stability of biomass in arid environments.

Traditionally, farmers maintained trees partly as a form of insurance for use in times of severe droughts, prolonged sickness, and other periods of critical scarcity (Chambers, 1989). With improved access to urban markets, trees have increasingly



been cut for sale as fuelwood and timber. Following large scale felling, rather than lopping of trees during recurrent severe droughts of the mid-1960s, and reduced protection and re-growth of trees in subsequent years, the number of trees declined significantly in several villages. Tree cutting was also the outcome of land reforms that entailed transfer of land titles. Titles to trees were more ambiguous and in many places, trees were cut as rights on them were not clear.

Farmers manage trees as an integral part of their farming system, within a given ecological and social setting. Protection, upkeep and usage of trees and bushes depend on the importance of trees or tree based biomass in the functioning of the system. The role of trees within it can alter over time, as people's perceptions, needs and decisions change. The evolution of local practices and strategies, which occur through a process of informal interactions and experimentation, is also likely to be influenced by a variety of public interventions. The health and sustained productivity of natural resource component of the land use system depends upon formal public policies being compatible with people's informal strategies for resource management.

The role of trees is likely to be particularly important in the farming system in environments characterised by high risk and low production. In these areas nature's regenerative process is slow and farming is best confined to extensive land uses based on natural vegetation. Trees and shrubs play an important role in people's production and usage strategies in this environment, both as common property resources (CPRs) and as a component of the farming system itself, which is based on the production of grain in association with nitrogen-fixing trees, and on livestock management.

In the indigenous agro-forestry system, a number of trees and shrubs are maintained within the fields, especially *khejri* (*Prosopis cineraria*) and ber (*Zizyphus nummularia*) bush colonies, as shelterbelts of field boundaries. These constitute another important source of fodder, fuel and other material, while keeping part of the crop land under natural vegetation. *Khejri* trees are lopped for fodder and fuel every year after the harvest of rainy season crops (Mann and Saxena, 1980). Ber bushes are cut back to ground level before planting the field crops. Natural coppicing, i.e., re-growth from stumps sprouts is interspersed with the crop but the two are harvested at different points of time-ber is harvested before the crop is grown and harvested. Trees, bushes and shrubs grown as shelterbelts are not harvested, but camels and goats browse on them.

During drought years, tree and shrub fodder fetches as high a price as foodgrains. An equally important feature of the leguminous trees and bushes retained in fields is the beneficial impact it has on crops. During good rain years the crop yields around *khejri* trees and ber bush colonies are often higher than in other parts of the same plots.

Ber bushes are of value to the farmer as a more stable source of biomass. During years with poor rainfall *khejri* and ber top feeds play an important compensatory role in the overall supplies of fodder. This is partly because they are less sensitive to fluctuations in rainfall and partly due to greater efforts by the farmer to harness them

during poor rainfall years. During poor rainfall years there is also greater emphasis on collecting fuel, fencing and thatching materials from perennials, on common land as well as farmland, for own use as well as for sale. With little coming from crops, the perennials bear the brunt of providing supplies during drought periods.

During years with good rainfall crop by-products contribute the larger share of total biomass production, and biomass from agro-forestry components is not fully harnessed. Tree and bush top feeds remain unharvested and in many cases bajra stalks are also left unharvested partly due to labour shortages and partly due to lesser need for fodder. Dry land farmers, in general, give higher priority to the protection of trees and shrubs on their croplands.

However, as pressures on the resource base have grown, several of these arrangements have weakened and in the process have adversely affected farmers' tree management systems. In Nagaur village, greater felling of trees and bushes was observed.

### *Migration*

One of the important coping strategies followed by droughts/famine affected people throughout the world is migration. Human migration is associated with livestock migration in many cases. The state of Rajasthan is not an exception to it. Even in a normal year migration takes place on certain fixed route. Migration of both cattle and small ruminants is almost a regular feature in arid and semi-arid regions of Rajasthan. It is traditionally followed as a means to struggle with fodder and water scarcity in order to save the livestock from starvation and death.

Migration can be broadly of three types: (i) seasonal, (ii) long-term and (iii) permanent. All these are still prevalent in Rajasthan. The purpose and the places from where migration takes place vary across different class and caste background of the population.

Seasonal migration, by definition, is a movement for seeking employment for a short period, not exceeding one year. It is one of the main adaptations during drought years. It involves neither change of place of residence nor permanent movement away from place of birth but only a temporary change of place for the purpose of work. The period of migration may vary from 15 days to 10 months in a year depending upon the nature of work and the need for income. The basic reason for migration is non-availability of adequate work in one's own place of residence. In years of reasonable rainfall, there may hardly be any migration in search of work outside the village. Seasonal migrants are found to be mostly landless labourers, marginal and small farmers, who are economically and socially deprived. The pattern of seasonal migration is more at the intra-district and inter-state level rather than at the inter-district level. With the development of urban centres having most of the basic amenities and facilities seasonal migrants also prefer to work in urban areas, despite several hurdles in getting work and shelter.

Long-term and permanent migration is an age-old practice in many parts of Rajasthan. It is corroborated by the fact that most of the big industrialists in different parts of the country belong to Rajasthan. They were migrants, who had left the state in search of livelihood in their hard days. Long-term and permanent migrants are mostly better off section of the population and are also from upper castes. In the last two decades a new trend in the long-term migration has emerged. It is observed that most rural artisans have either shifted to the urban areas or migrated outside the state.

The variation in migration responses indicates the important influence of proximity to urban areas, ecological variation (for example, presence of vegetation as a source of direct food and cash income) and distance to water sources. Distress migration was high in areas where the agricultural resource base was limited, alternative income sources were absent, and food was not easily affordable and accessible. Also, where the social support network was discriminatory (as was the case for recent residents in some villages), the disadvantaged were forced to migrate. In addition, there are household-specific factors that contribute to migration. These may be summarised as: (i) The odds are higher for migration of families headed by males than for those headed by females. (ii) Ownership of land, livestock and other assets reduces the probability of migration. It is the poor who are prone to migrate. (iii) Families with large number of dependants are most likely to migrate, indicating distress migration. And (iv) The chances of migrating are higher where there is no access to a water source within the village.

Table 7 shows the nature and purpose of migration of the sample households. About 11.4 per cent households in Jaipur, 14 per cent in Rajsamand and 5 per cent in Nagaur adopted migration, as a strategy to cope with the drought situation. Household heads were 83 per cent of migrants in Jaipur, 53 per cent in Rajsamand and 43 per cent in Nagaur. The purpose of migration was mostly to look for employment opportunities. It is mostly the marginal and small farmers in all sample villages who look for jobs in the casual labour market. In other words, around 80 to 85 per cent of the migrated population migrated for wage earning.

Table 8 shows location-wise (whether inside or outside of the villages) share in the total wage earning. Households of sample villages earned more than 85 per cent of the total wages from outside their respective villages. This is particularly the case for the small and marginal households. Relief work contributed marginally, i.e., about 10.5 per cent in Jaipur village and 3.3 per cent in Rajsamand village. No relief work was carried out in the Nagaur village. Wage earning within the village accounts for 4.2 per cent of total wage earning in Jaipur, 8.2 per cent in Rajsamand and 14.9 per cent in Nagaur. Women are generally left behind in the village when male members of the household migrate. Women report for work on drought relief works. Even if men are idle but available in the village, more women than men are found working on relief works. There are two reasons for this: first, relief work is relatively low-paid and work norms are lighter; and second, widespread corruption in distribution of wages takes the form of manipulation of attendance muster rolls. Women are more

acceptable as they are mostly illiterate and do not question the record of work and attendance. Recent legislation - Minimum Wage Act and Right to Information Act - have reduced such malpractices.

TABLE 7. MIGRATION OF SAMPLE HOUSEHOLDS

Size of holding (1)	Who migrates			Total number of household members (5)	Per cent households who report migration some of members (6)
	Head of households (2)	Other members (3)	Total (4)		
Jaipur					
Landless					
Marginal	9	2	11	75	14.7
Small	6	2	8	67	11.9
Semi-medium	6	-	6	63	9.5
Medium	2	1	3	37	8.1
Large	1	-	1	12	8.3
Overall	24	5	29	254	11.4
Rajsamand					
Landless					16.8
Marginal	14	8	22	131	14.7
Small	3	7	10	68	-
Semi-medium	-	-	-	7	6.7
Medium	1	1	2	30	-
Large	-	-	-	-	14.4
Overall	18	16	34	236	
Nagaur					
Landless					
Marginal	2	2	4	28	14.3
Small	1	1	2	61	3.3
Semi-medium	1	2	3	65	4.6
Medium	2	2	4	86	4.7
Large	-	1	1	18	5.6
Overall	6	8	14	258	5.4

TABLE 8. WAGE EARNING PER ANNUM BY LOCATION AND SIZE OF HOLDING

Size of holding (1)	Wages earned (Rs.)			
	Within village (2)	Outside village (3)	Drought relief work (4)	Total (5)
Jaipur				
Small	600 (4.4)	11,336 (82.8)	1,747 (12.8)	13,683 (100.0)
Marginal	243 (1.7)	15,333 (92.0)	1,057 (6.3)	16,633 (100.0)
Semi-medium	56 (0.4)	14,678 (91.1)	1,373 (8.5)	16,107 (100.0)
Medium	2,160 (63.4)	-	1,248 (36.6)	3,408 (100.0)
Large	-	-	1,800 (100.0)	1,800 (100.0)
Overall	568 (4.2)	11,487 (85.3)	1,412 (10.5)	13,467 (100.0)

(Contd.)

TABLE 8. (Concl.)

Size of holding (1)	Wages earned			Total (5)
	Within village (2)	Outside village (3)	Drought relief work (4)	
		Rajsamand		
Small	805 (5.1)	14,690 (92.4)	401 (2.5)	15,896 (100.0)
Marginal	2,447 (14.2)	13,904 (80.9)	836 (4.9)	17,187 (100.0)
Semi-medium	-	-	-	-
Medium	-	2,500 (100.0)	-	2,500 (100.0)
Large	-	-	-	-
Overall	1,217 (8.2)	13,173 (88.5)	491 (3.3)	14,881 (100.)
		Nagaur		
Small	1,800 (10.3)	15,680 (89.7)	-	17,480 (100.0)
Marginal	3,892 (25.6)	11,300 (74.4)	-	15,192 (100.0)
Semi-medium	3,550 (15.7)	19,080 (84.3)	-	22,630 (100.0)
Medium	1,275 (8.1)	14,508 (91.9)	-	15,783 (100.0)
Large	-	30,000 (100.0)	-	30,000 (100.0)
Overall	2,663 (14.9)	15,223 (85.1)	-	17,886 (100.0)

Figures in parentheses are percentages to the total.

### *Managing Assets and Credit*

Building of assets and their depletion are continuous processes embedded in the lives of people in the drought-prone areas. People devise strategies to adjust their assets according to the intensity of drought (Table 9). Assets can be classified as permanent assets, such as, land, building and well; and movable assets, such as, tractors and livestock. As reported earlier, sale and purchase of livestock is quite common. Sale of permanent assets such as land is resorted to only under distressed conditions. This may happen when there is consecutive drought of high intensity. People generally try to avoid land transactions as far as possible. One can say that sale of land is the last resort when all other strategies to mitigate drought fail. Only two land transactions were reported in the three villages. None of the two can be described as distress sale but are the result of individual decisions of the households.

The softer option to reduce the impact of drought is to manage credit. Several sources of formal and informal credit exist in rural areas. Generally, loans are taken for the following purposes: day-to-day consumption needs, social expenditures like marriages, festivals and rituals, working capital for agriculture to buy seeds, fertilisers etc., and expenditure on fixed capital such as construction of well, for example digging of well, purchase of bullocks or agricultural implements and machinery, etc.

TABLE 9. STRATEGIES ADOPTED BY THE SAMPLE HOUSEHOLDS TO COPE WITH DROUGHT

Category	Loan	Past saving	Sale of assets	Low consumption	Livestock		Live lihood strategies	Relative	Others		EBSN
					Sale of Live-stock	Sale of livestock products			Migrate	Sale of labour	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Jaipur											
Marginal	50.0	25.6	-	57.1	7.1	-	21.4	-	7.1	71.4	-
Small	71.4	14.3	-	28.6	-	7.14	14.3	7.14	28.6	35.7	-
Semi-medium	77.8	-	-	22.2	11.1	11.1	22.2	-	33.3	44.4	-
Medium	60.0	60.0	-	20.0	20.0	-	20.0	-	20.0	40.0	-
Large	-	100.0	-	100.0	-	-	-	-	100.0	-	-
Total	67.5	25.0	-	42.5	7.5	5.0	20.0	2.5	25.0	52.5	-
Rajsamand											
Marginal	54.2	20.8	-	95.8	50.0	29.2	50.0	4.2	16.7	16.7	-
Small	58.3	16.7	-	100.0	66.7	50.0	75.0	-	25.0	16.7	-
Semi-medium	-	100.0	-	-	100.0	100.0	-	-	-	-	-
Medium	-	100.0	-	33.3	-	66.7	-	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-	-
Total	50.0	27.5	-	90.0	52.5	40.0	52.5	2.5	17.5	15.0	-
Nagaur											
Marginal	100.0	20.0	-	20.0	20.0	20.0	-	-	80.0	20.0	-
Small	66.7	-	-	33.3	33.3	50.0	-	-	50.0	50.0	-
Semi-medium	20.0	10.0	20.0	30.0	40.4	80.0	-	-	40.0	70.0	-
Medium	33.3	-	-	41.7	50.0	97.7	-	-	16.7	33.3	-
Large	100.0	-	-	-	100.0	100.0	-	-	100.0	100.0	-
Total	50.0	5.0	5.0	32.5	40.0	67.5	-	-	42.5	47.5	-

Note: Figures are per cent of households in each category adopting the specified strategy.

The formal agencies that provide working capital are Grameen Banks, co-operative banks and commercial banks while for social and day-to-day expenses credit is obtained mostly from moneylenders/traders or relatives. In a normal year people try to pay back their loans and build up assets, while in a drought year they sell their assets and borrow. This is practiced commonly by almost all in drought-prone areas. Another adjustment takes the form of postponing expenditure on socially obligatory functions. Buying new clothes, inviting relatives for social visits, going on pilgrimages and fairs, giving gifts to sons-in law are some of the deferred expenditures. Sometimes even marriages are postponed. Expenditure during festivals is an indicator of good or bad year of agricultural production.

The borrowing per household increases with the size of land owned as the repaying capacity is higher and institutional borrowing is generally land based. This reduces the brunt of drought (Rathore, 2000). As the borrowings are mostly taken from friends and relatives for consumption needs, the strategy can work well depending upon the nature of social networking of the household. In Nagaur village, loans from the banks are used for productive purposes mainly for tractors and diesel

engine to cultivate their own land in time and thus generate additional income. These strategies of enhancing off-season employment, income and utilising the soil moisture conditions efficiently are very effective to reduce the impact of drought.

#### *Social Strategies and Patron-Client Relationships*

Mutual social and economic inter-dependence takes the form of patron-client relationships that have existed for many generations. Patron-client relationships have existed over several generations between cultivators and labourers, landowners and tenants, service class and other class, moneylenders and borrowers. The *jati system* is a form of such relationships. Such relationships provide certain amount of security to both the parties. During drought, such relationships become more important, as they act as buffer support to some extent. Although land lease, borrowing and purchase on credit are economic transactions, but they are also social interactions between patron and client. Such transactions may not be possible without the social 'bond' between the two parties. Landless labourers rarely have a social bond like relationship with the employers. Their minimum subsistence is always at stake and whenever a crisis situation arises, they have to resort to harder options like migration. The apparent freedom of casual labourers has a cost in the form of a less secure subsistence in times of crisis.

#### *Other Coping Strategies*

There are several other coping strategies adopted by the households. Table 10 summarises the results of the survey in this regard. Sixty-eight, and 50 per cent of households in three sample villages respectively used borrowing as an instrument to cope with drought. Past savings contributed up to 25 per cent. Households in Rajsamand village adjusted their consumption level as 90 per cent of them reported this as their choice. Change in assets, such as sale of livestock or livestock products, was more emphasised by households in Nagaur and Rajsamand villages, whereas migration and change in occupation is preferred by households in Rajsamand and Jaipur villages. Social networking does not seem to play an important role. Participation in the labour market was reported by 53 per cent households in Jaipur, 15 per cent in Rajsamand and 47 per cent in Nagaur. Table 9 above shows the further breakdown of household strategies by size-class of farms. In Jaipur and in Nagaur, borrowing was reported by all size-classes of households, while past savings were more useful for the medium and large size categories of households in Jaipur and for semi-medium and medium households in Rajsamand. The impact of drought on household consumption level is evident from the fact that households in all the three sample villages reported reduced consumption. Reducing the stock of animals and sale of animal products were adopted by all size-classes but it increases with the increase in size-class of holdings. It is less popular among Jaipur households. Migration in search of jobs and offering labour services in casual labour market are

more common among marginal and small size households though households of all size categories use it as a strategy to mitigate the impact of drought.

TABLE 10. STRATEGIES ADOPTED BY SAMPLE HOUSEHOLDS TO MITIGATE DROUGHT

	<i>(per cent)</i>		
	Jaipur	Rajsamand	Nagaur
(1)	(2)	(3)	(4)
Loan	68	50	50
Past saving	25	28	5
Sale of assets	-	-	5
Low consumption	43	90	32
Livestock			
Sale of livestock	8	53	40
Sale of livestock products	5	40	67
Changing livelihood strategies	20	52	-
Others			
Depend on relative	3	2	-
Migrate	25	17	42
Sale of labour	53	15	47

*Note:* Figures in parentheses indicate per cent of total sample households.

### *Changing Consumption Pattern*

Adjusting consumption, particularly food intake, is an important adaptation during the drought years. It can be in the form of reducing number of meals, quantity and quality of food, or switching from superior grains to coarse grains. In extreme conditions of famine, people have been compelled to resort to eating wild flora and fauna, i.e., forest leaves, tree barks, hunting birds and animals, etc. Literature on droughts and famines has often referred to such food and fodder which people consumed as 'famine food', 'non-conventional foods', etc. It has been argued that falling back on such famine foods is a simple strategy during the agriculturally bad years. In the present context when food is easily transported to the villages such extreme situations are rare. Reduction in expenditure becomes necessary but relatively easy and better credit facilities enable households to maintain their status with reductions or postponement of non-essential consumption.

The impact of drought on total expenditure is given in Table 11. The results clearly indicate that the total expenditure in the drought year is less than in a normal year in most of the items. Wherever there is change between the two it is because of higher prices paid for the items during drought years. Most of the social expenditures are postponed in a drought year. The impact also differs in different categories of households. The small and marginal farm size households are more affected than the large farm size households. In fact, large size households are not much hit except for the curtailment in social expenditures, as they try to maintain their status by using their savings or borrowings. The total expenditure in a drought year is higher because of the higher prices they pay for few agricultural commodities purchased from the market. For that matter even the expenditure of marginal households on food items is higher in the drought year. It was reported during the detailed



TABLE 11. CONSUMPTION EXPENDITURE PER HOUSEHOLD

*(Rs. per year)*

(1)	Size of holding					
	Marginal (2)	Small (3)	Semi-medium (4)	Medium (5)	Large (6)	Overall (7)
Jaipur						
Cereals						
Normal year	510	704	686	762	1,425	708
Drought year	551	586	683	766	1,425	986
Per cent change	+8.0	-20.1	-0.4	-0.5	No change	+39.1
Pulses						
Normal year	37	44	37	36	60	63
Drought year	27	30	22	40	60	29
Per cent change	-27.0	-31.8	-40.5	+11.1	No change	-53.9
Edible oil						
Normal year	53	75	72	65	90	66
Drought year	44	54	57	48	120	52
Per cent change	-16.9	-28.0	-28.8	-26.1	+33.3	-21.2
Fuel						
Normal year	318	379	394	432	660	379
Drought year	288	357	393	383	660	354
Per cent change	-9.4	-5.8	-0.2	-11.3	No change	-6.6
Health, education, etc.						
Normal year	227	534	361	388	300	382
Drought year	252	487	295	254	300	346
Per cent change	+11.0	-8.8	-18.3	-34.5	No change	-9.4
Other food items						
Normal year	204	336	252	269	300	261
Drought year	155	258	180	201	300	198
Per cent change	-24.0	-23.2	-28.6	-25.3	No change	-24.1
Entertainment						
Normal year	161	49	123	200	300	151
Drought year	111	34	40	200	200	107
Per cent change	-31.0	-30.6	-67.5	No change	-33.3	-29.1
Others						
Normal year	289	32.0	377	340	560	330
Drought year	146	190	236	190	440	191
Per cent change	-49.5	-40.6	-37.4	-44.1	-21.4	-42.1
Total expenditure						
Normal year	1,799	2,441	2,302	2,492	3,695	2,340
Drought year	1,574	1,996	1,906	2,082	3,505	2,263
Per cent change	-12.5	-18.2	-17.2	-16.4	-5.1	-3.3
Rajsamand						
Cereals						
Normal year	486	666	540	950	-	577
Drought year	592	732	720	1,252	-	689
Per cent change	+21.8	+9.9	+33.3	+31.8	-	+19.4
Pulses						
Normal year	31	54	90	66	-	43
Drought year	26	40	90	70	-	39
Per cent change	-16.1	-25.9	No change	+6.1	-	-9.3
Edible oil						
Normal year	65	75	200	80	-	72
Drought year	54	69	200	78	-	64
Per cent change	-16.9	-8.0	No change	-2.5	-	-11.1

*(Contd.)*

TABLE 11. (Contd.)

(1)	Size of holding					Overall (7)
	Marginal (2)	Small (3)	Semi-medium (4)	Medium (5)	Large (6)	
Fuel						
Normal year	427	513	215	497	-	536
Drought year	473	586	245	518	-	509
Per cent change	+10.8	+14.2	+13.9	+4.2	-	-5.0
Health, education, etc.						
Normal year	100	102	-	167	-	105
Drought year	88	96	-	167	-	95
Per cent change	-12.0	-5.9	-	No change	-	-9.5
Other food items						
Normal year	191	200	450	403	-	221
Drought year	181	187	600	500	-	227
Per cent change	-5.2	-6.5	+33.3	+24.1	-	+2.7
Entertainment						
Normal year	330	432	150	390	-	369
Drought year	312	384	150	390	-	344
Per cent change	-5.4	-11.11	No change	No change	-	-6.8
Others						
Normal year	168	223	650	404	-	214
Drought year	127	156	650	404	-	176
Per cent change	-24.4	-30.0	No change	No change	-	-17.7
Total expenditure						
Normal year	1,798	2,265	2,295	2,957	-	2,137
Drought year	1,853	2,250	2,655	3,379	-	2,143
Per cent change	+3.0	-0.7	+15.7	+14.3	-	+0.3
Nagaur						
Cereals						
Normal year	482	431	504	617	1,420	538
Drought year	494	426	501	621	1,385	536
Per cent change	+2.5	-1.2	-0.6	+0.6	-2.5	-0.4
Pulses						
Normal year	26	30	36	37	125	36
Drought year	23	28	32	36	125	33
Per cent change	-11.5	-6.7	-11.1	-2.7	No change	-8.3
Edible oil						
Normal year	35	44	54	63	140	54
Drought year	36	43	54	64	140	54
Per cent change	+2.8	-2.3	No change	+1.6	No change	No change
Fuel						
Normal year	194	232	268	330	380	281
Drought year	219	239	263	334	380	287
Per cent change	+12.9	+3.0	-1.9	+1.2	No change	+2.1
Health, education, etc.						
Normal year	140	167	144	246	300	186
Drought year	152	169	161	250	300	193
Per cent change	+8.6	+1.2	+11.8	+1.6	No change	+3.7
Other food items						
Normal year	248	221	258	293	700	269
Drought year	252	210	259	278	660	263
Per cent change	+1.6	-4.10	+3.4	-5.1	-5.7	-2.2

(Contd.)

TABLE 11. (Concl.)

(1)	Size of holding					Overall (7)
	Marginal (2)	Small (3)	Semi-medium (4)	Medium (5)	Large (6)	
Entertainment						
Normal year	138	149	233	228	360	233
Drought year	138	149	267	228	360	241
Per cent change	No change	No change	+14.6	No change	No change	+3.4
Others						
Normal year	350	125	122	201	400	178
Drought year	306	108	106	177	360	155
Per cent change	-12.6	-13.6	-13.1	-11.9	-10.0	-12.9
Total expenditure						
Normal year	1,613	1,399	1,619	2,015	3,825	1,775
Drought year	1,620	1,372	1,643	2,088	3,710	1,762
Per cent change	+0.4	-1.9	+1.5	+3.6	-3.0	-0.7

discussion with the sample households that every household attempts to maintain the attained status even if they have to migrate outside to earn more wages and feed the household members. The first and foremost impact during drought year is on expenditure of health, education, social (marriage etc.) and entertainment. This trend is more visible in case of marginal and small households.

## IV

## CONCLUSION

People living in the drought-prone areas are found to have developed their own strategies over centuries to cope with the adverse consequences of drought. It is true that they have been successful in their endeavour; but there exist a large section of population living below poverty line, including marginal and small farmers and the socially marginalised groups, who are more vulnerable to drought. Along the economic development, social institutions, which were considered to be a source of strength for these people earlier while coping with drought, are gradually weakening. Therefore, the need is to focus greater attention on people's own strategies and indigenous technologies to mitigate the severity of drought. Mixed farming and agro-forestry are two strategies that need to be focused on. The need is to ensure higher productivity of pulse and oilseed combinations adopted by the farmers.

It was observed in the sample villages that most of the small and marginal size-classes of households largely seek employment in the urban labour market. Also, the diversification of occupation is one of their strategy to cope with drought. Therefore, policies in the non-farm sector to generate employment and income should be given utmost importance. As far as possible, employment should be generated in rural areas through local resource base industries or by promotion of local crafts, etc.

More emphasis should be given to improve accessibility by way of investment in infrastructure such as roads and communication. People-centered approach to

develop capabilities through improved literacy, health care, particularly for women, be adopted.

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#### REFERENCES

- Chambers, R. (1989), "Editorial Introduction: Vulnerability, Coping and Policy", *IDS Bulletin*, Vol. 20, No. 2, pp. 1-7.
- Jodha, N.S. (1978), "Effectiveness of Farmers Adjustment to Risk", *Economic and Political Weekly*, Vol. 13, No. 25, pp. A38-A48.
- Mann, H.S. and S.K. Saxena (1980), *Khejri (Prosopis Cineraria) in Agro-Forestry*, Central Arid Zone Research Institute, Jodhpur (Rajasthan).
- Rathore, M.S. (2000), *Rajasthan Water Resource Consolidation Project - Baseline Survey of 20 Irrigation System*, Institute of Development Studies, Jaipur (mimeo.)