

ADAPTIVE RESPONSES TO DROUGHT IN GUJARAT

Srinivas Mudrakartha
VIKSAT Ahmedabad

SOCIO-ECONOMIC SCENARIO

BHILODA

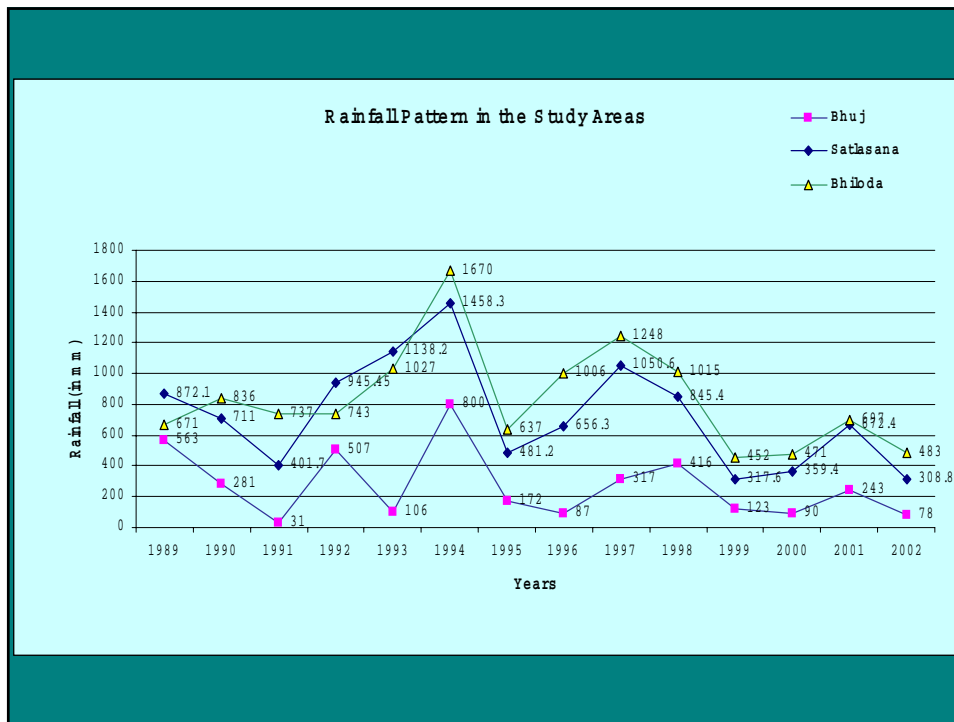
- **Tribal** dominated area
- **Livelihoods** based on forest and agriculture
- Semi-arid zone
- Policy of reservation and access to government jobs for tribals
- *Purdah* system
- Women do not speak up in front of men and elders

SATLASANA

- **Heterogeneous community**
- **Livelihoods** based on agriculture and animal husbandry
- Drought-prone area
- Women from Darbar community are not allowed to go out for work
- *Purdah (Iaaj)* system
- Women do not speak up in front of men and elders

BHUJ

- **Heterogeneous** community (Rabari, Bharvad and Darbar dominant communities)
- Livelihoods based on animal husbandry, handicrafts and agriculture in some areas
- Drought-prone area
- Natural calamities such as earthquake, cyclone and repeated occurrence of drought
- *Purdah (Iaaj)* system



PEOPLE'S PERCEPTION ON DROUGHT

- Consecutive failure of monsoon in the last 4-5 years and reduction in natural recharge of groundwater led to drought conditions.
- Erratic rainfall leading to use of ground water even during Kharif in recent years.
- Increase in land under cultivation and consequent demand for irrigation.
- Cost effective and efficient technologies (WEM) for groundwater withdrawal enabled farmers to tap water from deeper aquifers.
- Inefficient water use practices (e.g. flooding, field channels, seepage losses) in irrigation.
- Local irrigation water market leading to increased withdrawal.
- Lack of any government regulations regarding the use of groundwater.

IMPACTS OF DROUGHT

SOCIAL IMPACTS

- Decline in sex ratio of children below 5 and 14 years
- School dropout and child labour
- Changes in marriage age of girls
- Neglect of the aged
- Reduced social visits and intra-family tensions
- Drudgery of women (in collecting fodder and firewood)
- Reduction in consumption and nutritional levels
- Distress migration
- Contract (bonded) labour
- Conflicts over drinking water collection
- Feeling of helplessness and depression

IMPACTS OF DROUGHT...

ECONOMIC IMPACTS

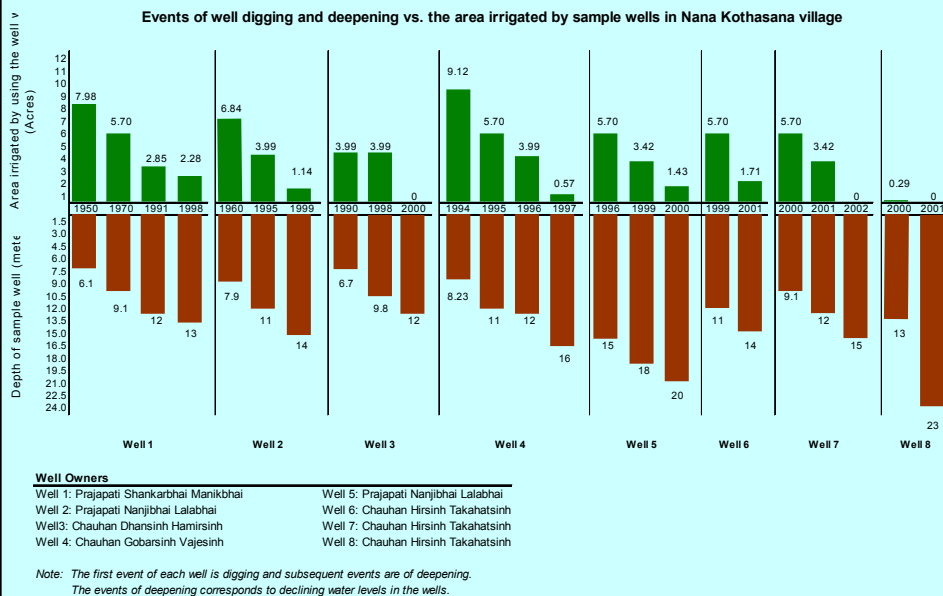
- Crop failure, loss of livelihoods in agriculture, declining income levels
- Food insecurity: decline in home production of food grains
- Fodder shortage, cattle death
- Excess dependency on drought relief and increased vulnerability
- Increased indebtedness
- Increased vulnerability due to sale of assets

IMPACTS OF DROUGHT...

ENVIRONMENTAL IMPACTS

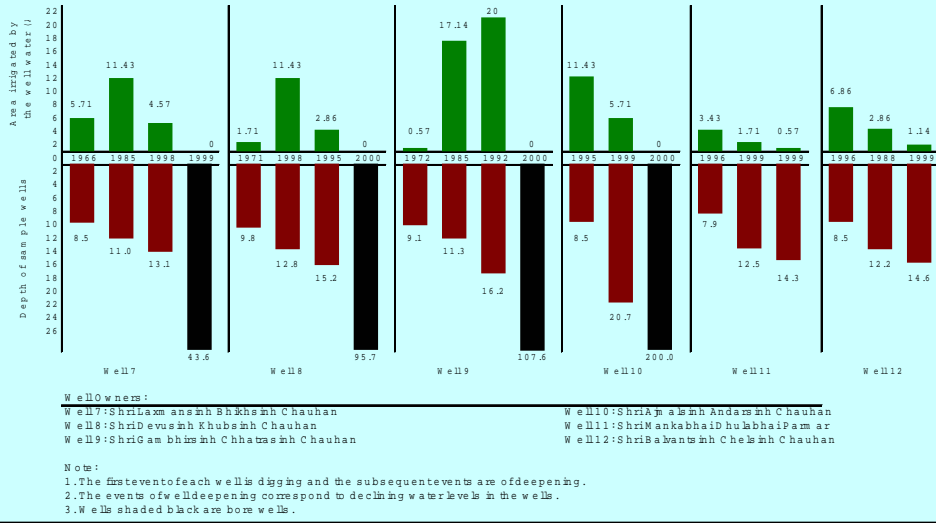
- Decline in natural recharge
- Depletion of groundwater due to over-extraction and increase in salinity
- Loss of agro bio-diversity
- Destruction of wild specie bio-diversity due to overgrazing and degeneration of forests
- Degradation of common pool resources such as *gauchars* and forests

Events of well deepening and area irrigated by sample wells: Nana Kothasana

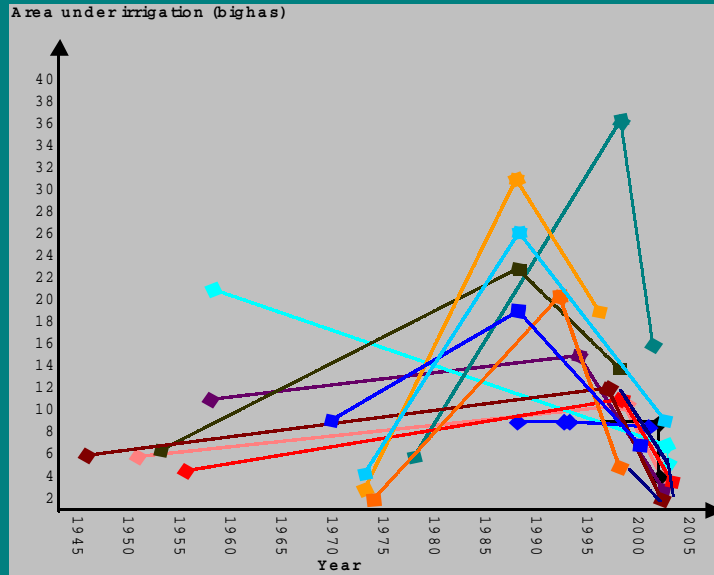


Events of well deepening and area irrigated by sample wells: Bhanavas

Events of well digging and deepening vs. the area irrigated by sample wells in Bhanavas village



Changes in irrigated area as a result of well deepening and changes in extraction technology



WATER MARKET

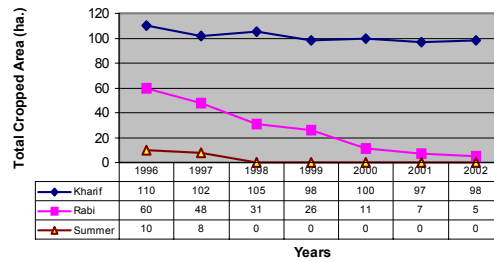
Selling Water: A Source of Livelihood?

This is the case of a farmer in Bhanavas who owned 2 *bighas* of land (little over 1 acre) and had a well with plenty of water. He used to sell water to his neighbours to irrigate 33 *bigha* (13.20 acres). The returns that he used to get from selling water **only for winter crops** are as given in the following table:

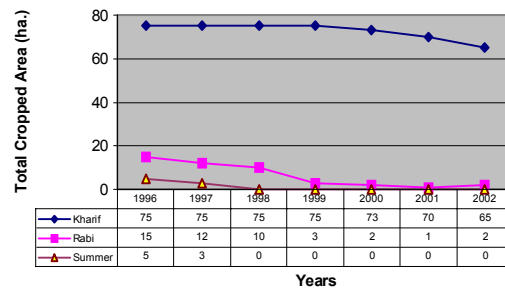
Crops irrigated	Area (acre) under the crops	Productivity (quintal /acre)	Total produce (quintal)	Money value of produce (Rs.)	Water charges @ 1/3 of total produce
Wheat	7.52	9.49	71.36	42,816	14,272
Mustard	4.35	5.45	23.70	28,440	9,480
Castor	1.33	7.80	10.30	15,450	5,150
Total	13.20			86,706	28,902

CHANGES IN CROPPED AREA

Changes in cropped area in Nana Kothasana village since 1996



Changes in cropped area in Bhanavas village since 1996



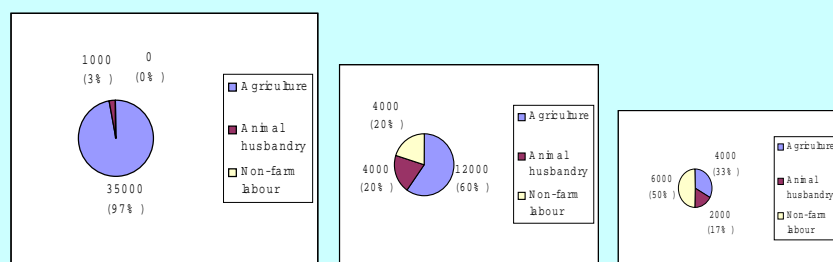
DECLINE IN CROP PRODUCTION

Crops	Year 1998 Base	1999	2000	2001	2002
Kharif Crops					
Groundnut	100%	50%	Did not cultivate	Did not cultivate	Crop failed
Cluster beans	100%	30%	Did not cultivate	Did not cultivate	Crop failed
Maize	100%	50%	Did not cultivate	Did not cultivate	Crop failed
Bajra	100%	70%	50%	25%	Crop failed
Rabi Crops					
Wheat	100%	50%	25%	10%	5%
Mustard	100%	50%	Did not cultivate	Did not cultivate	Did not cultivate
Tobacco	100%	10%	Did not cultivate	Did not cultivate	Did not cultivate

Note: Summer crops were confined to very small patches of fodder

Source: VIKSAT Primary Survey, Focus Group Discussions, 2003

LIVELIHOOD CHANGES

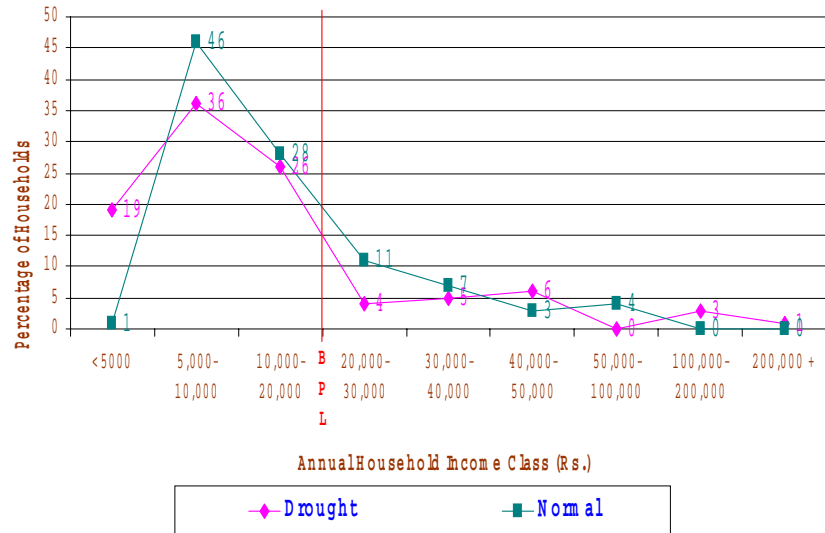


1998

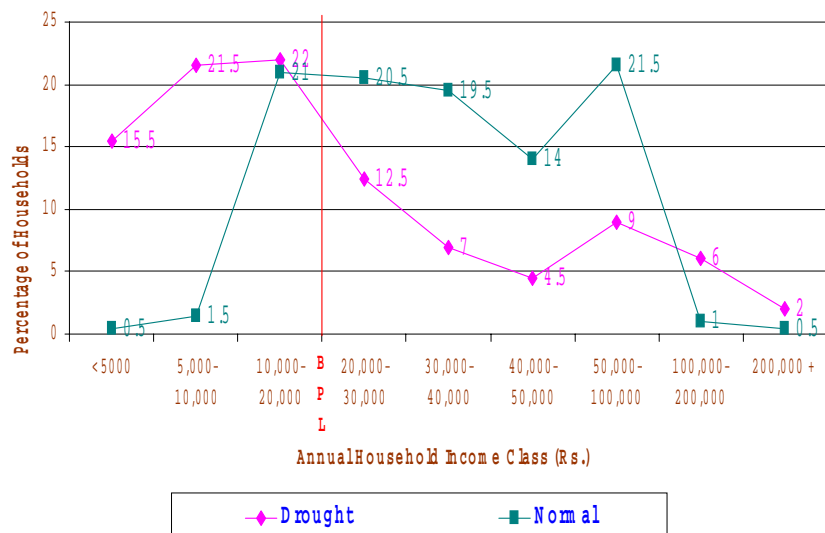
2000

2002

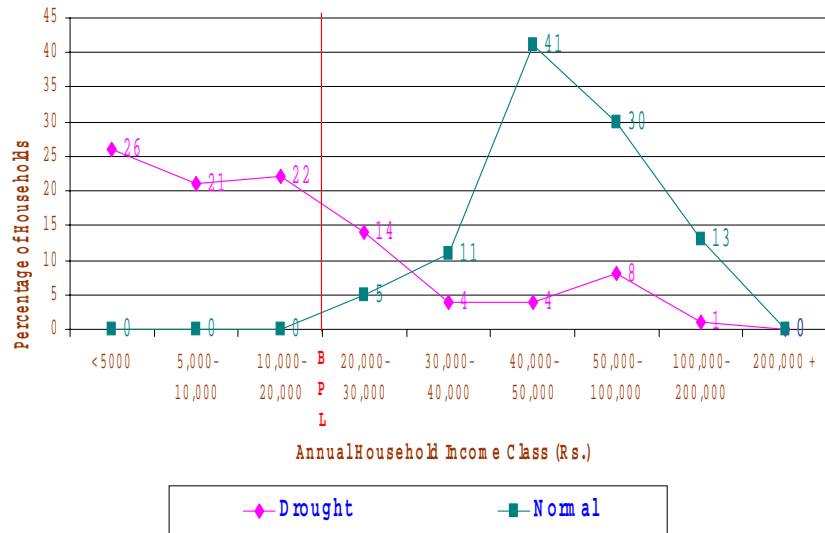
Income Distribution of Sample Households in Drought and Normal Years in Bhibda Area



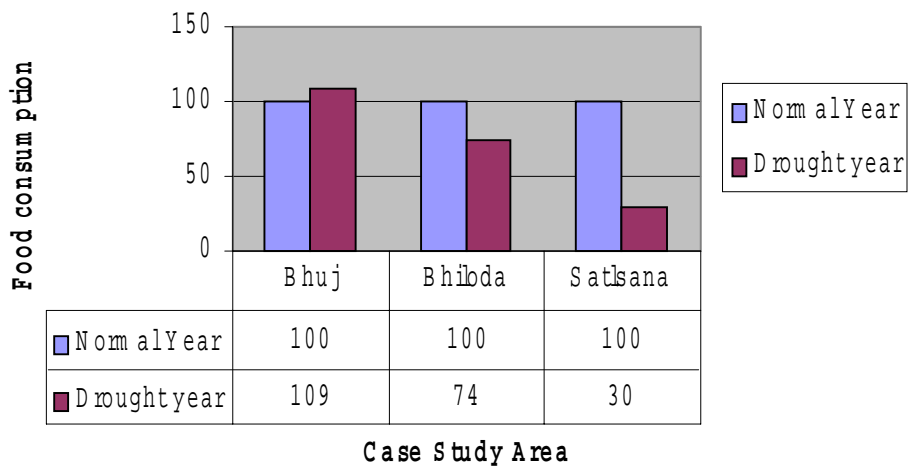
Income Distribution of Sample Households in Drought and Normal Years in Bhuj Area



Income Distribution of Sample Households in Drought and Normal Years in Satlsana Area



Food consumption during Normal year vs drought year





Sex Ratio

- Sex ratios according to primary survey: Bhiloda: 928/1000; Bhuj: 965/1000; Satlasana: 920/1000. (920/1000)
- **< 5 years**: Bhiloda: **717/1000**; Bhuj: 855/1000; Satlasana: **756/1000**
- **Satlasana, 6-14 years is 662/1000**, which is alarming.
- **Overall sex ratio** of children **up to 5 years** of age in the study areas is **789/1000**, which is a matter of serious concern.
- Sex ratio in Bhiloda and Satlasana are highly unfavourable to girl children.

COPING RESPONSES AND MECHANISMS...

EFFORTS TO SUSTAIN AGRI-BASED LIVELIHOODS

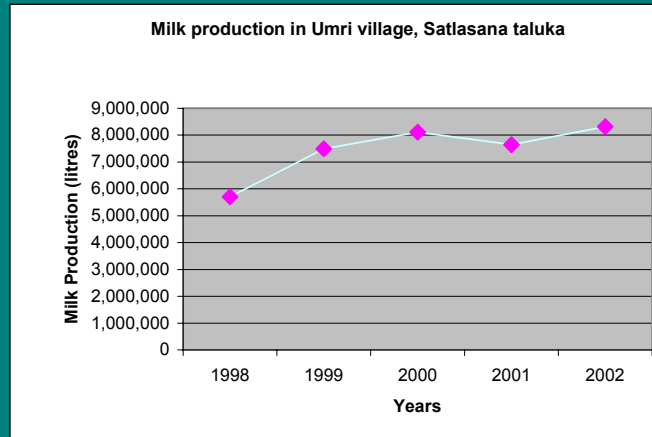
- Use of past savings and borrowing for drilling boreholes
- Adopting water efficient irrigation technologies such as sprinklers (available with govt. subsidy)
- Changes in cropping pattern in favour of fodder and food crops
- Reduction in area under irrigation
- Employment of own labour

COPING RESPONSES AND MECHANISMS...

RELATIVE SIGNIFICANCE TO ANIMAL HUSBANDRY

- Animal husbandry which was secondary source of income before drought became the main source of livelihood
- Selling jewellery to purchase fodder
- Women travelling long distances to fetch fodder
- Keeping cattle at relatives' place in nearby districts
- Keeping cattle at *gaushalas*
- Letting loose cattle into forests to avoid death in house premises

MILK PRODUCTION DURING DROUGHT PERIOD



COPING RESPONSES AND MECHANISMS...

MEETING CONTINGENCIES

- Sale of land
- Sale of soil to brick kilns
- Sale of cattle
- Sale of trees
- Bonded / contract labour

COPING RESPONSES AND MECHANISMS...

ALTERNATIVE SOURCES OF LIVELIHOODS

- Migration for non-farm employment
 - Diamond polishing units in Satlasana, Visnagar, Ahmedabad, Surat and Bombay
 - Construction sites in nearby areas
 - Wage labour in market yards, stone quarries, relief sites
- Migration for sharecropping in Banaskantha, Sabarkantha and Patan districts

COPING RESPONSES AND MECHANISMS...

EXCESS DEPENDENCE ON CPRS

- Dependence on forests
- Dependence on *gauchars* (common grazing lands)
- Over-extraction of groundwater even to irrigate monsoon crops due to failure of rainfall
- Chasing ground water to retain crop production

COPING RESPONSES AND MECHANISMS...

SOCIAL EFFECTS

- Reduction in consumption expenditure
- Cultural change – **Darbar men and women working as labourers**
- **Effects on Children** – school dropout and child labour
- **Effect on marriage age of girls** – increase and decrease
- Reducing social visits
- Neglect of the aged by the migrants

ADAPTIVE STRATEGIES...

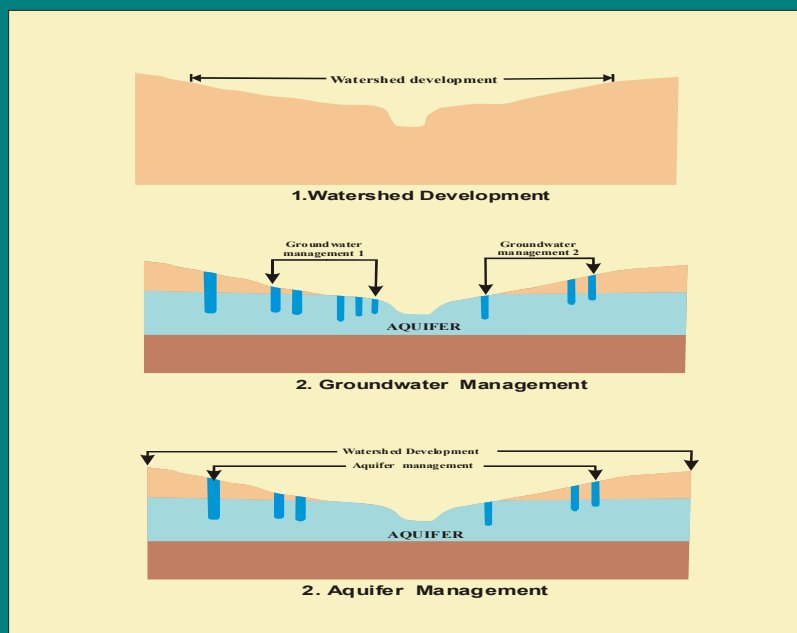
LEARNINGS...

- **Many of the coping strategies** to drought practiced by people are **not sustainable**.
- Unfavourable terms of trade increases **vulnerability**.
- **Diversification** : People who succeed in finding alternative occupations are less affected.
- **Wells near check dams had water** and crop cultivation sustained
- **Institutional support helpful** to sustain livelihoods (dairy co-operatives)
- Households with diversified livelihoods less affected
- **Information networks** to find labour helpful
- Earnings from natural resources are useful additions
- **Regeneration of forest resources** (NTFP) helped
- Drought relief and drought proofing works helped the asset-less people to survive

... LEARNINGS

- Demand side management of water helps sustain livelihoods
- Improved agricultural practices and drought resistant variety have potentials for livelihood security
- Livelihood finance strategies needed
- Diverse livelihood skills are necessary for the people to adapt
- Could not amend their social practices and cross social barriers were hit hard
- Traditional knowledge systems
- **Time favourable for participatory management of groundwater**
- **“Landless asset-less” are not necessarily the ones worst affected**
- Appropriate poverty reduction initiatives responding to diverse priorities of the people needed

GROUNDWATER MANAGEMENT OR AQUIFER MANAGEMENT



THANK YOU