The Union Territory of Delhi has an areas of 1483 square kilometre out of which 891 square kilometre is rural. The territory faced severe drought in 1987, which was second drought in succession. During the monsoon period, 1st June to 30th September, the territory received rainfall of 349 millimetre in 1986 and 237 millimetre in 1987 as against the normal rainfall of 586 millimetre as shown in Table 74.

Table 74: Rainfall in Delhi during Monsoon Period from 1st June to 30th September, 1983-87.

(mm)

S.No.	Year	Normal Rainfall	Actual Rainfall	Percentage of Departure from normal
1.	1983	585.5	683.4	(+)16.7
2.	1984	585.5	657.3	(+) 10.9
3.	1985	585.5	728.0	(+) 24.3
4.	1986	585.5	348.6	(−) 40 3
5.	1987	585.5	237.4	(−) 59.5

1.2 As a result of serious drought in 1987, as many as 229 out of 231 villages were affected in the Union Territory of Delhi. The drought affected a rural population of 4.81 lakh, and crops in an area of 75,694 hectare. 14,026 hectare of crops suffered more than 50 per cent crop loss. The estimated crop loss was Rs. 20 crore.

Organisational Response

2. Lt. Governor of Delhi and Chief Executive Councillor, Delhi regularly reviewed the drought situation. Chief Secretary, Delhi Administration also reviewed the drought situation every week.

Development Commissioner, Delhi co-ordinated the relief measures, assisted by Deputy Commissioner who is also Additional Development Commissioner and Relief Commissioner. The agencies involved in relief operations included Water Supply and Sewage Disposal Undertaking, Irrigation and Flood Control Department, Agriculture Department, Animal Husbandry Department, Food and Civil Supplies Department and Delhi State Civil Supply Corporation. At the field level, Block Development Officers were responsible for relief administration. The high level meetings held under the Chairmanship of Lt. Governor of Delhi laid down the policy guidelines for facing the drought situation. Concerned agencies were assigned time-bound targets for administering relief. Frequent field visits were undertaken by senior officers to assess the situation, review the progress and secure people's participation in the efforts of the Administration.

Employment Generation

3. Conditions in Delhi are different than the ones prevailing in other States. The job opportunities available in urban area of the capital in general, do not necessitate special employment generation schemes to be undertaken by the Government. A closer study of the situation by District Rural Development Agency (DRDA) led to the identification of 3,800 persons who needed employment, most of whom could be provided with the gainfull employment at daily wage rates prescribed by the Government under DRDA's normal schemems.

Cattle Care

4.1 Delhi needs about 2.70 lakh quintal of wheat *bhusa* per month. Out of this, about 2 lakh quintal comes from adjoining States. It was observed that the farmers were experiencing difficulty in the purchase of *bhusa* for their cattle. Market trends indicated that the availability of *bhusa* from the adjoining States had not gone down but the prices did indicate increasing trend. The prices went up further as the drought conditions persisted.

4.2 Delhi Administration undertook a relief scheme under which small and marginal farmers and agricultural labourers were provided fodder at the subsidized rate of Rs. 60 per quintal. They were given 4.5 kilogram of *bhusa* per cattle (2.25 kilogram per small cattle) per day so as to contain the element of subsidy within Rs. 3 per cattle per day as prescribed by the GOI.

4.3 A subsidy of Rs. 1.50 for small farmers per day and Rs. 3 for other farmers per day on the purchase of fodder was granted to the cattle owners both in rural area as well as in the dairy colonies. An amount of Rs. 48 04 lakh was spent on providing subsidy on purchase of fodder by the cattle owners in Delhi.

Water Supply

5.1 Due to drought the sub-soil water also went down considerably thus making it very difficult to obtain the drinking water from the handpumps and wells in some of the areas. Under this programme Rs one crore was provided to Delhi Municipal Corporation for installation of 400 special deep hand pumps.

5.2 As a result of drought the village ponds also dried up. This posed serious problem for the cattle. Government of Haryana was requested to release canal water for filling village ponds in some of the villages. The Government of Haryana very kindly acceded to the request as a result of which the cattle population benefitted. It is noteworthy that some migrant cattle, especially from Rajasthan, also landed in rural Delhi when the drought was in its most acute phase.

Contingency Crop Planning

6.1 In order to make good the loss of agricultural production suffered in *kharif* 1987, a special

campaign was launched for *rabi* 1987-88 so that all the available resources could be fully utilised and maximum area was brought under cultivation both under foodgrains as well as vegetables. On account of some belated rains in September and October, full advantage was taken of the moisture availability by bringing maximum area under short duration vegetable crops and *toria*. The Training and Visit (T&V) system of Agricultural Extension played a very signifcant role in this special campaign. As a result of this the total loss suffered during 1987-88 was only to the extent of 5000 tonnes of foodgrains.

6.2 The loss suffered during *kharif* 1987 due to drought was compensated to some extent during *rabi* by the concerted efforts put by the extension staff and monitoring at the level of the Development Commissioner and Chief Secretary in arranging timely inputs, utilisation of all available irrigation resources, and providing timely training to farmers as well as extension staff.

6 3 For providing various agricultural inputs to the small and marginal farmers, a ceiling of Rs. 2.80 crore was sanctioned by the GOI. The inputs were provided to the small and marginal farmers at the rate of Rs. 700 per acre. Out of this ceiling, an amount of Rs. 1 68 crore was spent by providing various inputs like seeds, pesticides and fertilisers to 28,215 small and marginal farmers.

6.4 In addition the following measures were also taken:

(i) Printed literature containing package on various crops having less irrigation requirements were distributed amongst the farmers; (ii) Arrangements for supply of seeds like those *toria*, mustard, gram, wheat and vegetables were made; (iii) Farmers' camps were organised where latest packages of practices for taking cultivation of various crops under drought conditions were explained; (iv) 250 demonstration plots were laid to popularise pulse's cultivation under drought conditions.

6.5 The existing canal irrigation system in Delhi is mostly fed from Haryana. Being at the tailend, Delhi in general, does not get enough water to meet its requirements. Further, due to drought conditions, the position of water supply further worsened as a result of which Delhi could not get its due share of water. The only practical way left to the administration for helping the farmers in irrigation was through the State tubewells. Besides ensuring that all the existing 198 State tubewells are in operaiton, the Administration installed 50 new tubewells under a crash programme which benefitted 1000 hectare. This involved an extra cost of Rs. 19.88 lakh The Administration also undertook upstream pumping of Najafarh drain water, which otherwise is discharged in River Yamuna, into Mangeshpur drain for use by the farmers for cultivation.

6.6 In order to have regular uninterrupted supply of electricity the Delhi Electric Supply Undertaking (DESU) was directed to supply round-the-clock electricity for agricultural purposes for tubewells regularly without any interruption so that maximum area was brought under irrigation for saving the already sown crops as well as timely sowing of the *rabi* crops.

6.7 As a result of these steps the crop loss was not only contained but compensated to some extent in *rabi* 1987-88. A comparative statement of area under different crops from 1985-86 to 1987-88 may be seen in Table 75. The agricultural production for the corresponding years may be seen in Table 76.

6.8 Since the farmers in Delhi suffered a heavy loss due to failure of crops on account of drought, they were provided crop loans from the co-operative banks at subsidised rate of interest against the normal rate of 12.5 per cent. The farmers were provided crop loans at the rate of 6.25 per cent only. The interest subsidy to the banks was paid by the Administration. In addition, the recovery of shorter as well as longer term loans obtained by the farmers from different sources was also postponed.

6.9 With a view to mitigate the sufferings of the farmers, the land revenue for *kharif* 1987 was remitted and collection of *taccavi* loans suspended for six months. As a part of the scheme for ensuring better *rabi* crops, it was decided to provide financial assistance in the purchase of agricultural inputs by small and marginal farmers. The GOI permitted Delhi Administration to provide subsidy at the rate of Rs. 700 per hectare that is, Rs. 500 over and above the Central norm by diversion of plan funds within the sanctioned budget provision.

Public Distribution System(PDS)

7.1 Delhi gets foodgrains mostly from outside. With a view to prevent any temporary shortage due to

Table 75: Area Under Different Crops in Delhi, 1985-86 to 1987-88.

(hectare)

S.No.	Name of Crop	1985-86	1986-87	1987-88
1.	Wheat	45,010	45,578	44,185
2.	Paddy	4,896	3,603	1,980
3.	*Bajra*	5,726	6,570	1,060
4.	Maize	517	320	318
5.	Pulses	4,311	2,946	2,077
6.	Vegetables	1,10,834	1,17,314	85,743

Table 76: Production Under Different Crops in Delhi, 1985-86 to 1987-88.

(tonne)

S.No.	Crop	1985-86	1986-87	1987-88
1.	Wheat	1,26,843	1,32,176	1,27,000
2.	*Bajra*	3,436	3,942	4,300
3.	Paddy	10,771	7,926	6,600
4.	Maize	206	160	210
5.	Pulses	3,017	1,844	3,447
6.	Vegetables	6,16,820	6,01,945	2,87,640

transport lag or otherwise, the Administration was in constant touch with the GOI to tie up with the Food Corporation of India (FCI) to always maintain 3 months requirements of foodgrains for Delhi as a reserve stock. In order to see that vegetables and other eatables were available to the consumers at reasonable rates, the Delhi State Civil Supplies Corporation put into operation 25 vegetable specials and 75 other *Bazar on Wheels* as against 10 and 40 vehicles respectively plying in July 1987.

7.2 Timely and adequate supply of diesel oil for pump sets and tractors owned by the farmers were also made by issuing a directive to all the petrol/diesel dealers through the Civil Supplies Department.

15 A SUMMING UP OF STATE EXPERIENCES

The management of drought of 1987 in 13 States and one Union Territory documented in the present volume shows that the drought management strategy differed from State to State in its approach and emphasis though sharing the common feature of sound management policy covering, among other things employment generation, water conservation and augmentation, energy supply, contingency crop planning, public distribution of essential commodities and special nutrition programmes particularly for vulnerable groups of society. The distinguishable response of States is due to natural endowments of a particular State, the behaviour of the erratic monsoon over its geographical area, its immediate past history of moisture stress and the administrative capability to cope with the crisis.

1.2 Gujarat faced three consecutive droughts with the drought of 1987-88 being the worst in the century. In its drought management approach, the State Government laid special emphasis on the target group of stack-holders, that is, people in distress, the small and marginal farmers, cattle breeders, infirm and destitutes, pregnant and nursing mothers and children. In employment generation the special care taken of women workers is noteworthy. So also is the differentiated wage rate in soil conservation works for different kinds of soil. In water conservation the effort of the State Government to conserve available water in reservoirs for sustaining water supply for a longer period by spreading water evaporation retardant chemicals is an innovative step. Similarly, its recourse to

compartmentation for reducing evaporation losses of water is a novel experiment. In fodder supply the State preferred growing fodder in area where water was available instead of transporting it from neighbouring States.This also made green fodder available to the cattle The State Government also used the crisis posed by drought for accelerating the pace of development in the State notably in creating durable and productive assets which triggered over-all development.

1.3 In Haryana the State Government's efforts to assure availability of inputs to farmers for *rabi* crops are noteworthy. Similarly, distribution of mini fodder seed kits is a novel feature for encouraging local fodder production. In cattle care, the State Government's efforts to fill the ponds with canal water for providing drinking water for cattle are also noteworthy.

1.4 In contingency crop Planning, Himachal Pradesh, for example, adopted innovative approach of advising farmers in lower and medium hills to sow *toria* in vacant fields till middle of September 1987. Similarly, the strategy adopted by the State Government in advising the farmers in medium and high hill areas to sow *arkal* peas is noteworthy. Provision of essential commodities at highly subsidised rates to the affected people was yet another distinguishing feature of the public distribution system (PDS) in Himachal Pradesh. The State Government's attempts to construct new micro-watersheds and distribution of agricultural implements are also some of the other noteworthy features.

1.5 In Karnataka creation of physical assets by accelerating and pooling various employment oriented programmes like the National Rural Employment Programme (NREP), the Rural Landless Employment Guarantee Programme (RLEGP) and the Drought Prone Area Programme (DPAP) are noteworthy features of its drought management. Similarly, the State Government's efforts for completion of water supply schemes by undertaking and reviving piped water supply schemes and digging up of open wells are other noteworthy features of State Government's efforts for augmenting water supply for the affected population. The State, however, benefitted enormously by timely north-east monsoon in November-December, 1987.

1.6 In Kerala the State Government's attempt to benefit coir workers by employment generation measures is noteworthy. The State adopted innovative approach in tackling water scarcity by transporting water by tankers and *valloms* (small boats) as well as construct ground level water tanks in places facing acute water shortage The State Government also purchased water storage tanks for mitigating the hardships of the affected people. A noteworthy feature of the steps taken by the State Government in easing the water supply situation in tribal habitations is implementation of special schemes for tapping water streams by constructing small storage tanks near the springs and laying/ using strong PVC pipes for carrying water to the tribal habitations. The State Government's efforts to save the plantation crops in the State is also noteworthy. The State Government supplied fertilizer mixture to coconut, pepper and arecanut cultivators. Similarly, its efforts to supply seedlings of clove and nutmeg to farmers is noteworhty.

1.7 In Madhya Pradesh the maintenance of 1.71 lakh handpumps throughout summer for safe drinking water supply to 65,000 villages is noteworthy. Similarly, the State Government's efforts to mobilise departmental and private rigs for boring tubewells in the State is yet another distinguishing feature. The State Government's efforts in implementing special nutrition programme in 105 drought affected blocks covering 3.48 lakh beneficiaries every day is salutary. Every beneficiary was given 60 gram ready-to eat food which contained 8 gram protein and 200 calories. Another novel feature is the distribution of wheat to weaker sections of society by *janpads/panchayats.*

1.8 In Maharashtra the Employment Guarantee Scheme (EGS) is already in existence for providing gainful and productive employment. Under this scheme, the guarantee of work is restricted to unskilled manual work. A unique feature of this scheme is that in times of crisis like drought the scheme can be expanded to take care of enhanced employment generation for the affected population During the drought of 1987, some new types of works like renovation of *ex-malguzari* tanks and repairs of paddy *bunds* were allowed by the State Government during the drought period. Due to these relaxations, additional works could be started to cope with increased labour demand. Similarly, the State Government's effort for augmenting fodder supply in the affected area is noteworthy, for example, grass at forest land was reserved for distribution to needy agriculturists, movement of fodder for drought affected districts was banned and district authorities were instructed to open cattle camps, wherever necessary. Another innovative feature is the contingency seed stocking at district headquarters.

1.9 In Nagaland the State Government did not give any cash relief to the afected people Instead the State Government supplied inputs free of cost for raising special crops which included wheat, mustard, linseed and summer potato.The State Government undertook a special *rabi* campaingn to offset the loss suffered in *kharif* 1987

1.10 In Orissa the State Government set up a very broad-based block level committee for securing active participation of the representatives of the people and non-officials. A noteworthy feature in the State is the priority accorded to block minor irrigation projects, *gram panchayat* tanks and water harvesting structures under the employment generation programmes. The State Government's efforts to distribute substantial quantity of seeds to small, marginal and other farmers at subsidised rates is also worthy of note. Similarly, the State Government's efforts for a cash programme for augmenting irrigation for agriculture through water harvesting structures and recommissioning of lift irrigation projects is innovative. The State Government's efforts for meeting the nutritional requirements of vulnerable sections of the society is also a distinguishing feature, particularly in districts of Kalahandi and Koraput where practically the entire vulnerable groups were covered.

1.11 Punjab, which is less vulnerable to drought than some other States, also experienced the severity of drought of 1987. Despite its relative prosperity, the State also experienced the need for undertaking employment generation programme and the willingness of the people to participate in them. Extension of canal distributory system and excavation of village link drains were some of the highlights of its employment generation schemes. The State's experience in diverting electrical energy from urban industrial sector and its adverse impact on the industrial sector which made a large number of industrial workers redundant, requires to be noted The State also required more diesel oil for running agricultural pumpsets. The State Government received 1 12 lakh kilolitre of diesel oil in July, 1987 as compare to 80,000 letres in July 1986. During August, 1987 the offtake of diesel oil for pumpsets wes 75 per cent higher. The extension services were utilised to provide requisite know-how to the affected farmers in the wake of drought.

1.12 Rajasthan, where the drought of 1987 was fourth consecutive year of scarcity, saw introduction of a number of innovative approaches to drought management. The State Government which undertook massive employment generation programmes, developed a strong administrative structure for supporting the programme. The State Government's effort to introduce identity cards for eligible workers under the employment generation programme is noteworthy. Similarly, its effort to set up flying squads for supervision over the employment generation work is innovative. An important feature of the employment generation programmes in Rajasthan was afforestation works which were in the nature of drought proofing. In water supply the spray of cetyl alcohol for reducing evaporation losses from surface water sources can be considered for replication in other states. Yet another innovative feature was a shift in emphasis from community to individual beneficiary works. Similarly, use of space imageries for finalisation of sites for bore wells was yet another attempt by the State Government to make use of available science and technology for combating the drought. The active role played by the voluntary agencies in running massive cattle camps in the State shows the useful role of the voluntary agencies in supplementing the efforts of the administration in times of crisis. The State Government also enhanced provision of nutrition to children and women from once a day to twice a day and opened 364 additional *anganvadi* centres.

1.13 In Tamil Nadu the drought management approach could be said to have been guided by four parameters of amount of rainfall, ground water level, reservoir level and crop conditions. The State Government systematically monitored 1800 observation wells. Similarly, it systematically monitored the reservoir levels of major reservoirs. The State Government adopted innovative approach of enabling the Departments to undertake all the employment-oriented schemes on their own without depending on contractors so as to ensure full benefit of relief works to the people. A unique feature of the works executed during the drought of 1987 was the formation of 19 ecological farms in all the drought affected districts. Likewise the creation of commercially useful plantations like *agave* which were raised in 100 hectare and provided raw material to the nearby tribal and poor people for making coir and other articles from the fibre was a salutory feature in its approach. In cattle care the State Government provided water tubs for the cattle by drilling bore wells near the tubs. An innovative feature of the contingency crop planning was the novel plan of "direct sowing" in Thanjavur district. The strategy was to raise the crop in the rains and then as and when Metture storage improved, and it

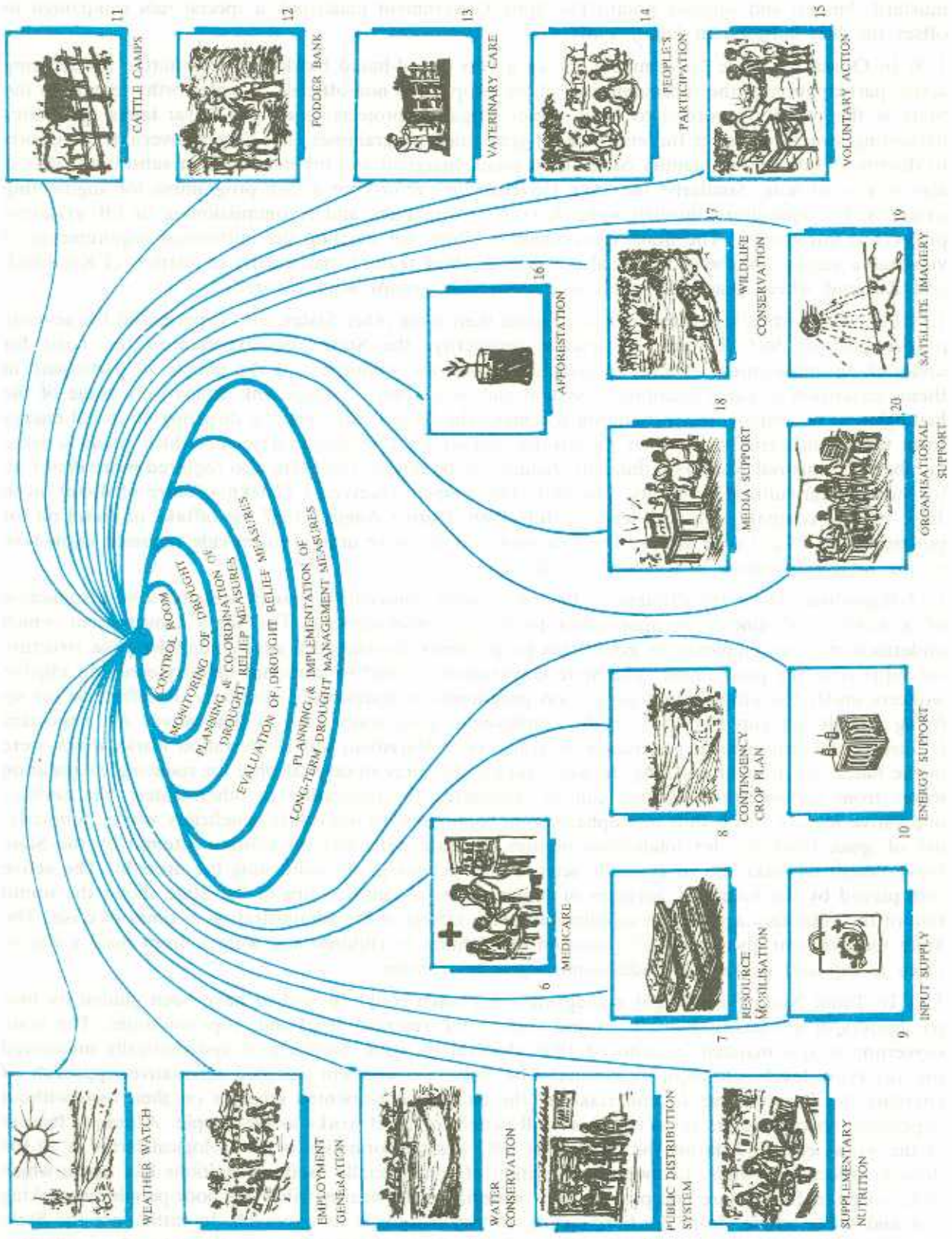

Figure 35 : A Conceptual Model of Drought Management

became possible to release water, it could be utilised to supplement the rainfall. A noon meal project is already under implementation in the State. During the drought of 1987, the project was expanded to cover as many as 3.51 lakh children and 2.51 lakh nursing mothers.

1.14 In Uttar Pradesh the drought management strategy centred around, in addition to employment generation works and other traditional measures, a massive programme of tubewells, energy supply and contingency crop planning. The State Government with the assistance of the GOI covered scarcity villages by providing piped water supply and installation of handpumps in a planned manner and by 1986-87, 54,668 villages, that is, 21 per cent of the villages in the State, were provided at least with one source of safe water. In cattle care, the State Government allowed cutting of grass and its transportation from reserve forest area in the hills for feeding livestock. In contingency crop planning the State Government adopted the innovative approach of encouraging the farmers for taking up the sowing of potato as an early crop in an area of 40,000 hectare to compensate the loss of farmers in *kharif* 1987 and also to provide food to the people. The State Government provided 16,670 free borings to small and marginal farmers. It enhanced the power supply to the farm sector from 5 hours a day to 10 to 12 hours per day. The heavy drawal of power in rural area led to damage to number of transformers. The State Government undertook a systematic programme of replacement of these transformers as well as of damaged underground cables at the sub-stations In its efforts the State Government also sanctioned 2000 tubewells to be bored through Uttar Pradesh Drought Relief Committee which is a voluntary organisation working since 1966.

1.15 In the Union Territory of Delhi, involvement of extension services not only in contingency crop planning but also in monitoring the drought situation was a characteristic feature. The administrations' efforts to regularly monitor the price distribution system, implementation of a crash programme of vegetable production and filling up of village ponds by canal water released from Haryana are some of the other distinguishing features of its drought management.

1.16 The experience of the States in the management of drought of 1987 shows that the best time to fight a drought in the Indian sub-continent is when it is not there. The tendency to take anti-drought measures only on its occurrence is required to be replaced by a systematic study of monosoon behaviour and availability of water resources The administrations which tend to think in terms of straitjacket solutions to drought-induced problems are required not only to coordinae the works of different departments and agencies but to become innovative in their approaches which result not only in speedier delivery of relief but also aim at resource conservation and environmental upgradation, making best use of available science and technology.

1.17 The States gave an exemplary account of themselves in prompt response, efficient management and innovativeness in tackling the drought of 1987, which was one of the worst in the century in India. Time has now come to evolve long-term strategies which take into account not only the primary consequences of a drought like fall in food production, but also secondary consequences like adverse impact on the quality of the life of the people. The relief administrations may therefore like to view anti-drought measures in a longer time-frame and broader horizon making best use of our enhanced understanding of the phenomenon of drought and its management leading to greater cost-effectivenes, efficiency and mitigation of hardships to the people. If the present documentation of drought of 1987, which is first of its kind, stimulates further thinking on the phenomenon of drought and its management, demystifies it, candidly establishes the vital linkages between different aspects of drought and its management, and finally leads to proper preparedness for facing the droughts in future, the pains taken by the compilers in undertaking this exacting exercise of documentation would be amply awarded. A Conceptual model of drought management is shown in Figure 35