THE DROUGHT OF 1987
Response and Management

Volume 1
National Efforts

THE DROUGHT OF 1987

THE DROUGHT OF 1987

RESPONSE AND MANAGEMENT

Volume 1
National Efforts

Edited by
D. C. MISRA
Additional Relief Commissioner and Joint Secretary (Scarcity Relief)

Department of Agriculture and Co-operation, Ministry of Agriculture

Government of India, New Delhi

January 1990 (Magha 1911)

Composed by Government of India Press, Photolitho Unit, Minto Road, New Delhi and printed at Government of India Photolitho Press, Faridabad, Editor: D.C. Misra, Additional Relief Commissioner and Joint Secretary (Scarcity Relief), Ministry of Agriculture, Department of Agriculture and Co-operation, Government of India, New Delhi-110001.

मंत्रिमण्डल सचिव
CABINET SECRETARY
NEW DELHI

FOREWORD

The Indian Experience in managing the drought of 1987, regarded as one of the worst the country faced in the century, evoked appreciation both in India and abroad. The management of Drought 1987 highlighted the resilience Indian agriculture had come to acquire over the last two decades: it also bore eloquent testimony to the responsiveness and capability of the Indian administrative set up in times of crisis.

2 Early in the *kharif* 1987 agricultural season, when following the failure of the South-West monsoon the dimensions of the impending disaster emerged, the Government of India took the initiative and set up a Cabinet Committee on Drought (CCD) under the chairmanship of the Prime Minister. Till normalcy was restored after the setting in of the monsoon in June-July 1988, the CCD met frequently to review the drought situation, the adequacy and effectiveness of the relief measures and the new policy initiatives needed to tackle the unprecedented drought.

3. The CCD, which was serviced by the Department of Agriculture and Cooperation, was assisted by a special Committee of Secretaries (COS) on Drought Relief. The COS met at regular intervals to work out the policy options for decisions by the CCD and to ensure that timely assistance was extended to the States, and that concern for the preservation of the quality of life was built into the relief measures.

4. These special administrative arrangements which facilitated the full and continued monitoring by the highest functionaries in the political, executive and administrative hierarchy of the relief operations were of special significance in ensuring that the management of drought 1987 was characterised by imagination, performance and effectiveness.

5. This effort to document the valuable experience gained in the management of drought 1987 is indeed commendable. The participant Ministries/Departments of the Government of India and the State Governments have shared their experience in the preparation of the document. I am sure this will prove as the starting point for systematic documentation of efforts in dealing with natural calamities in future.

6. I must compliment Shri C. Srinivasa Sastry, Agriculture Secretary and his colleagues for bringing out this detailed and comprehensive document on the Management of Drought 1987.

New Delhi,
March 25, 1989

(B.G. DESHMUKH)
Cabinet Secretary

कृषि और सहकारिता विभाग
कृषि मंत्रालय
कृषि भवन, नई दिल्ली-110001

Department of Agriculture & Cooperation
Ministry of Agriculture
Krishi Bhavan, New Delhi-110001

सचिव, भारत सरकार
SECRETARY
Government of India

PREFACE

The relief efforts to tackle natural calamities in India are seldom well documented. This is largely attributable to the fact that relief administration in the Centre and the States has minimal regular and continuing staff. When a crisis or a calamity occurs, staff from the line departments get drafted for relief operations. As long as the crisis lasts, attention is understandably concentrated on the speedy implementation of rescue operations and relief measures. As soon as normalcy is restored and the feverish activity associated with the implementation of relief measures abates, the relief operations get wound up and the staff disbanded. The special staff drawn from the line departments revert to their regular duties in their respective departments.

2. While Relief Manuals/Handbooks lay down in detail the drill to be followed to anticipate and handle different natural calamities like droughts and floods, the experiences in implementation are not adequately documented, much less assessed and evaluated. The line departments have neither the inclination nor the staff and time to document the details of the relief measures taken up by them. Consequently, there is little institutional memory to recall in detail the nature of the relief measures taken up in any particular major natural calamity, the manner of their execution, the strengths and weaknesses and the local response. Every time a calamity occurs, by and large, it is a question of starting all over again.

3. The drought 1987 was qualitatively different from the earlier experiences. The efforts mounted to manage this disaster were not only comprehensive but also innovative. More importantly, the timeliness of the Central initiatives, the concern for the preservation of the quality of life in the drought hit areas instead of merely providing relief to those affected by the disaster, special measures devised for the severely drought affected areas and the coordination and reporting mechanisms worked out for monitoring drought relief measures were all too valuable to be lost sight of. Therefore, after the South West monsoon set in June 1988 and normalcy was restored, a systematic attempt has been made in the Department of Agriculture and Cooperation to capture the salient features of the various relief measures undertaken and the several administrative and policy initiatives evolved during 1987-88. This document is the result of such an effort.

4. It is our expectation that the consolidation of the experiences in the management of Drought 1987 embodied in this work would be of wider interest. Besides, this would be of help to the administration, should such calamities recur in the future.

5. The documentation is in two volumes — Volume I giving the over all perspective and the various initiatives which are common to the country as a whole. The sectoral chapters in this volume cover such vital aspects like contigency planning for crops, water and energy resources, food security, employment generation, provision of drinking water, health and nutritional care to the affected population and the elaborate measures taken for cattle conservation. The role of voluntary agencies in drought management and the importance of Science and Technology inputs also find a prominent place. The long term imperative of preserving the environment and planning for drought mitigation have also been dealt with. The sectoral chapters are largely based on the material furnished by the respective Ministeries/Departments of the government of India. The subject matter being so vast, it has not been possible to cover in this volume all the issues relating to relief administration in all the sectors. It is hoped that the Ministries/Departments and other agencies associated with the management of Drought 1987 will bring out their experiences in greater detail through separate publications.

6. Volume-II puts together the experience of major Sates affected by the drought of 1987—Gujarat, Madhya Pradesh, Rajasthan, Tamil Nadu and Uttar Pradesh as documented by the officers of the States concerned. The other States are also in the process of documenting their experiences and these could be added as and when they become available.

7. It is hoped that this document would prove useful to the relief administrators, planners, policy makers and others interested in management of natural calamities. It is our expectation that the publication of this material will generate a debate on several policy and implementation issues relating to drought management and would provide a better data base to build the arguments than it has been possible hitherto.

8. During this crucial period, I had the privilege of working as the Secretary in the Department of Agriculture and Cooperation, the nodal department of Government of India for relief operations for natural calamities when, by general reckoning, India measured up to the challenge of managing Drought 1987. In addition to the usual responsibilities for the processing of the drought memoranda received from the States by deputing Central Teams and obtaining the recommendations of the High Level Committee on Relief and decisions of the Government of India on the nature of the relief measures and the quantum of Central assistance, during this crucial period, the DAC also serviced the Cabinet Committee on Drought (CCD) headed by the Prime Minister. The CCD frequently reviewed the drought relief operations and gave expeditious clearance to many new policies and innovative projects which characterised the management of Drought 1987. The DAC also serviced the special Committee of Secretaries (COS) on Drought which, under the chairmanship of the Cabinet Secretary, regularly reviewed the adequacy and effectiveness of the drought relief measures. The DAC also coordinated the implementation of the decisions taken by the CCD and the COS on Drought.

9. At the official level the COS under the guidance and supervision of Shri B.G. Deshmukh Cabinet Secretary was of great help in ensuring that the prompt decisions were taken and the various Government Departments involved in the relief operations functioned in a smooth and coordinated manner as a well oiled machine. His leadership and coordination skills transmitted the requisite urgency to the initiatives and imparted a high degree of meticulousness in the planning and implementation of the relief operations.

10. This documentation exercise, which required persistent and strenuous efforts to gather material from the operational and field level agencies and put them together, involved a lot of work by the officers and staff in DAC handling scarcity relief operations. Shri S.V. Giri, Relief Commissioner and Additional Secretary, DAC Since August 1987, who was in charge of this documentation exercise, has done a commendable job in directing this effort and in editing the material. Shri R.C.A. Jain, Addl. Relief Commissioner and Joint Secretary (Scarcity Relief), DAC since September 1988, put in special efforts to prepare much of the material and put it it in shape and in place. Shri A.R. Subbiah, Under Secretary in the Scarcity Relief Division since 1986 was intimately associated with the preparation of

this document and had put in strenuous efforts in the compilation of the data and in editing. Shri B. Narasimhan who was Joint Secretary (Scarcity Relief) during 1987-88 made valuable contributions in this documentation effort, particularly in terms of the broader framework and perspectives. The nodal officers of the Ministries/Departments of the Government of India had also prepared individual segments outlining their perspective experiences.

11. Suggestions for improvement in the presentation are welcome.

(C. Srinivasa Sastry)
Secretary to Govt. of India
Department of Agriculture and Cooperation
Ministry of Agriculture

Krishi Bhavan, New Delhi
March 25, 1989

ACKNOWLEDGEMENTS

The compilation of a document of this nature requires cooperation from all the concerned officers of not only various Ministries/Departments of the Government of India but also other Central Government Organisations and the State Governments. The cooperation extended by them in providing the requisite material for this documentation is gratefully acknowledged

2. The document on the Drought of 1987 was placed before the National Workshop on Drought Management held on 4-5 July 1989 in New Delhi. In the light of the comments received from the participants and additional information received from the State Governments the document was revised Shri D.C. Misra, Addl. Relief Commissioner and Joint Secretary (SR) has revised and edited this document in its present form.

3. The services rendered by Shri Deen Dayal, Deputy Secretary and Sarvashri A R Subbiah, K.S. Jain, Under Secretaries; Sukumar, Section Officer and V.P Pasricha, Research Investigator of the Scarcity Relief Division and Shri Subodh Kumar of Directorate of Extension in the preparation of the manuscript, proof-reading and coordinating the printing work deserve special mention.

4 Sarvashri V M.L. Saxena, C. Kapoor and S.R. Biswas of Directorate of Economics and Statistics and Shri A.K. Sharma of National Informatics Centre made substantial contribution to the graphics

CONTENTS

LIST OF ANNEXURES

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

ABBREVIATIONS

AIR	All India Radio
APA	Advance Plan Assistance
ARWSP	Accelerated Rural Water Supply Programme
CAPART	Council for Advancement of People's Action and Rural Technology
CCD	Cabinet Committee on Drought
CFTRI	Central Food Technological Research Institute
CGWB	Central Ground Water Board
COS	Committee of Secretaries on Drought
DAC	Department of Agriculture and Cooperation
DCC	District Consultative Committee
DCP	Department of Chemicals and Petroleum
DCS	Department of Civil Supplies
DD	Doordarshan
DPAP	Drought Prone Area Programme
DRAC	District Relief Advisory Committee
DST	Department of Science and Technology
FCI	Food Corporation of India
GOI	Government of India
HLCR	High Level Committee on Relief
ICAR	Indian Council of Agricultural Research
ICDS	Integrated Child Development Scheme
ICMR	Indian Council of Medical Research
IMD	India Meteorological Department
IMG	Inter-Ministerial Group
MHFW	Ministry of Health and Family Welfare
MIB	Ministry of Information and Broadcasting
MNP	Minimum Needs Programme
MOF	Ministry of Finance
NABARD	National Bank for Agriculture and Rural Development
NDDB	National Dairy Development Board
NSC	National Seeds Corporation
NREP	National Rural Employment Programme
NWDB	National Wasteland Development Board
PDS	Public Distrubution System
PMO	Prime Minister's Office
RBI	Reserve Bank of India
RLEGP	Rural Landless Employment Guarantee Programme
RRB	Regional Rural Bank
SCB	State Cooperative Bank
SDAAs	Serverely Drought Affeeted Arers

GLOSSARY

albedo	fraction of incident radiation reflected by a surface (from L. albus, white)
anganwadi	literally a courtyard area, a place where pre-school children and nursing and expectant mothers are gathered for nutrition, pre-school education and health services under Integrated Child Development Services (ICDS) Scheme.
arhar	pigeon-pea or red gram, *cajanus cajan* (L.) Millsp
bagasse	residue after extraction of juice from sugar-cane
bajra	pearl millet, *Pennisetum typhoideum* L.
balwadi	literally an area for children, an *anganwadi* (q.v.) with limited services and not related to Integrated Child Development Services (ICDS) Scheme.
ber	jujube, *Zizyphus jujuba* L; *Zizyphus mauritania* Lam
bhusa	wheat straw used as fodder.
crore	unit of counting equivalent to ten million or one hundred *lakh* (q v.)
dandupat	a principle of indigenous banking in which interest should not exceed the principal amount of loan.
diggis	ditches for drinking water, notably in Rajasthan.
Doordarshan	literally distant view, the name of Indian television.
gaushala	literally a house for cows, a place where destitute cattle are tended.
gowar	a fodder crop, *cyamopsis tetragonoloba*
gruel kitchen	a kitchen where gruel, a liquid food of rice and pulses, etc., known an *khichri*, is prepared.
jowar	great millet or sorghum, *Andropogon Sorghum* Brot., *Sorghum Vulgare* Pers.
Karkoon	A clerk in Gujarat administration.
kendra(s)	centre(s)
khadin	water impounding structure, notably in Rajasthan.
kharif	the south-westerly monsoon cropping season, notably in northern India, from July to October. The *kharif* crops include rice, sorghum (*kharif*), *bajra*, maize, *ragi*, groundnut and cotton.
khejri	a fodder tree, *Prosopsis cineraria*
khul(s)	minor irrigation structure(s), notably in Rajasthan.
kisan(s)	farmer(s)
Krishi Darshan	literally view of agriculture, the television programme on *Doordarshan* (q.v.), devoted to agriculture.
kurwai	cropping season in Tamil Nadu from May to October.
kuttis	small pieces of fodder
lakh	unit of counting equivalent to a hundred thousand; one hundred *lakh* make one *crore* (q.v.)
maldhari	cowherd in Gujarat
mistri	artisan or mechanic
mung	green gram, *Phascolus aureus* Roxb.
nala(s)	drain(s)
nirman	construction
panchayat	literally an assembly of five persons, the elected village council.
patta	deed
pinjarapole	a shed for destitute cattle
pradhan	(village) chief
pucca	permanent or solidly built.
rabi	the post-monsoon cropping season, notably in northern India, from October to March. The *rabi* crops include wheat, sorghum (*rabi*) and gram.
ragi	finger millet, *Eleusine coracana* (L.) Gaertn.
Rathi	an indigenous breed of cattle in Rajasthan.
samba	cropping season in Tamil Nadu from August to December.
samiti(s)	committee(s)
sarpanch	chief of the *panchayat* (q.v.)
sirki	dry reeds used for temporary roofing and partition.
sukha	drought
sukhadi	ready-to-eat dry food, notably in Gujarat and Maharashtra, consisting of wheat floor, jaggery and some oil.
tahsildar	a revenue official in-charge of *tehsil*, a revenue circle.
taluk	a revenue circle.
terai	literally moist, the belt of marshy land between Himalayan foothills and plains.
tree *patta*	an usufruct lease deed for raising tree crops on community land.
urd	black gram, *Phoseolus mungo* Roxb.

1 OVERVIEW

The drought of 1987, caused by the failure of the south-west monsoon over large parts of India, was one of the worst in this century. The Prime Minister, in his address to the Chief Ministers of drought affected States on the 3rd September, 1987 described the drought of 1987 as a national challenge. He called upon all sections of the society, irrespective of their economic, political and social hues, to work in unison in extending relief to the suffering millions in the drought affected parts of the country.

1.2 The drought situation, as it unfolded, caused serious concern in India and abroad. The Government of India (GOI) launched a series of innovative measures to provide relief to the drought affected areas. These initiatives added a new dimension to drought management in the country. The States, some of whom were facing drought for the third or fourth year in succession, also broke new grounds in meeting the complex needs of the situation. Several voluntary agencies also stepped in to lend a helping hand in the drought relief measures undertaken by Central and State Governments, particularly in the field of cattle conservation and provision of drinking water.

1.3. While no external financial aid was solicited by the the GOI, the concern of the international community was adequately reflected in the assistance received from a few countries and international organisations like the World Bank and the European Economic Community.

2.1 During the south-West monsoon of 1987, only 14 out of the 35 meteorological sub-divisions in the country received normal or excess rainfall; 18 sub-divisions received deficient rainfall and 3 sub-divisions scanty rainfall. Only about 43 per cent of the meteorological districts of the country, accounting for 37 per cent of the geographical area, received normal or excess rainfall.

2.2 The overall deficiency in rainfall during this monsoon period in the country was (–)19 per cent. This order of deficiency in rainfall was recorded only in two earlier years of this century, namely, 1918 [(–)26 per cent] and 1972 [(–)25 per cent]. The drought of 1987 is the third in this century in severity in terms of rainfall.

2.3 The rainfall during the north-east monsoon after the 1st October, 1987 was quite favourable. For the country as a whole, for the period from 1st October 1987 to 31st December 1987, 16 out of 35 meteorological subdivisions received excess rainfall and 8 meteorological subdivisions normal rainfall. The effect of this rainfall on *rabi* production, fodder and drinking water availability in most parts of the country was quite beneficial.

3.1 Nearly 70 per cent of the 141 million hectare of cropped area in the country is dependent on monsoon rainfall. The south-west monsoon from June to September contributes nearly 80 per cent to the total precipitation in the country. The delayed onset of the monsoon in certain parts and the prolonged dry spells in most parts of the country severely affected agricultural operations in 43 percent (58.6 million heetare) of cropped area in 263 districts in 15 States and 6 Union Territories. About half of the area was not sown at all. The two worst affected States were Rajasthan and Gujarat where the years's precipitation was less than 50 per cent of the normal. In these and a few other States, the drought of 1987 was the third or fourth in succession accentuating the distress to unprecedented level. Even States like Punjab and Haryana having substantial areas under irrigation were adversely affected.

3.2 Successive droughts in Rajasthan, Gujarat and some other parts of the country led to severe drinking water shortages also both in urban and rural areas. Nearly 54,000 villages faced acute drinking water problem. Another serious dimension of the drought of 1987 was the severe fodder shortage experienced in large parts of the country particularly in Rajasthan and Gujarat.

3.3 The macro level deficiency of (–)19 per cent in the country in the precipitation during the south-west monsoon, however, does not fully reflect the magnitude of the drought situation that prevailed in the affected area, especially in the western and northen States. The all-India deficiency percentage was considerably offset by the excess rainfall of the order of 124 per cent of the normal received during the sourth-west monsoon in the eastern sub-Himalalyan region which, however, led to unprecedented floods in the States of Assam, Arunachal Pradesh, Bihar, Sikkim, and West Bengal.

3.4 Prospects for rabi 1988 were, once again, threatened by the deficient winter rains in the north-western India. During this season (1st January to 29th February, 1988) as many as 83 per cent of the districts in this region received deficient, scanty or no rainfall. This necessitated launching of emergency measures for minimising crop losses during the rabi season.

National Approach to Drought Management

4.1 As early as in mid-July, 1987 when it was observed that the developing drought situation was likely to have a serious impact on the Indian agriculture, the GOI responded to the emerging situation by assuming a positive role, giving up its traditional approach of responding on receipt of the States' requests for assistance. The Prime Minister, appreciating the calamitous dimensions of the creeping disaster, set up a Cabinet Committee on Drought (CCD) under his leadership, with the objective of ensuring timely and prompt measures for mitigating the impact of drought. The CCD was serviced by the Department of Agriculture and Co-operation (DAC).

4.2 The Prime Minister designated Central Ministers for a sustained inter-action with the States with a view to helping them in undertaking effective relief measues. A Committee of Secretaries on Drought (COS) was set up under the chairmanship of the Cabinet Secretary to coordinate and monitor the activities of the Central Ministries/Departments and the State Governments in regard to drought relief. The COS was serviced by the DAC.

4.3 The CCD formulated an Action Plan and set about the task of closely monitoring its implementation. The Action Plan encompassed definite measures to be initiated by various departments in different sectors. It, *inter alia*, included:

(i) Preparation of water budgets to optimise the use of water available in the reservoris and utilisation of groundwater resources;

(ii) Undertaking appropriate contingency measures and supply of adequate power in the agricultural sector so as to minimise crop losses;

(iii) Effective steps to provide drinking water to the drought affected population;

(iv) Strengthening of the Public Distribution System (PDS);

(v) Public health measures and providing supplementary nutrition for the young and needy children in the drought affected area, and

(vi) Measures to provide adequate fodder and nutrients for the health and preservation of cattle.

4.4 Even though drought conditions severely affected the kharif crops, the loss in production could be minimised by preparing an effective agricultural contingency plan incorporating optimum use of water resources. On the basis of detailed discussions with the State Governments and formulation of specific measures at the field level a plan for production of 76 million tonne of foodgrains and 7.7 million tonne of oilseeds during rabi was evolved. The strategy for rabi production was based on: (i) ensuring timely inputs for rabi cultivation, (ii) arranging 4 lakh quintals of wheat seed for Bihar, and Jammu and Kashmir for rabi 1987-88, (iii) improving flow of credit in drought affected area by relaxation of credit norms by National Bank for Agriculture and Rural Development (NABARD), (iv) arranging uniterrupted supply of power for a minimum of 8-10 hours on priority to agricultural sector, (v) improving the generation of power from the existing power plants, (vi) facilitating adequate supply of petroleum products to drought affected area, and (vii) distributing 1.37 lakh minikits in drought affected area at an outlay of Rs. 2.06 crore for enhancing the availability of vegetables. The reduction in foodgrain production due to drought during the crop year 1987-88 as compared to the previous year could by these measure be pegged down to only 3.5 per cent.

4.5 The GOI idnetified the following major thrust areas for priority attention in providing relief to drought affected area:- (i) Employment generation, (ii) Provision of drinking water, (iii) Fodder availability, (iv) Supply of essential commodities, and (v) Drought proofing. Besides, a series of measures were also undertaken to improve the infrastructure for power generation and distribution, irrigation, public distribution system and the status of health and nutrition of the population in the drought affected area.

4.6 Nearly 93 million out of the 285 million people affected by the drought of 1987 in different States and Union Territories, belonged to vulnerable sections of the society consisting of small and marginal famers, agricultural labourers, etc. The immediate impact of drought was on the rural incomes, especially the means of livelihood of the vulnerable sections of society. As a measures of relief, it was necessary to provide employment opportunities to these affected people on a priority basis. Appreciating this imperative 57 per cent of the total ceilings of expenditure approved by the GOI in 1987-88 for drought relief for the various States, was for execution of employment generation work.

4.7 In order to ensure that employment generation work results in drought proofing and creating durable and productive assets, the GOI laid down the following order of priority for selection of works: (i) tubewells: (ii) ponds; (iii) field channels; (iv) soil conservation and water harvesting works; and (v) laying of roads where road links did not exist. Considerable emphasis was laid on proper use of the available water resources for insulating agriculture from the vagaries of monsoon. For increasing the irrigation potential, the GOI identified 94 major and medium irrigation projects and 19 minor irrigation projects in 14 drought affected States and sanctioned an additional outlay of Rs. 236 crore for accelerating their pace of execution and to complete them in two years creating an additional irrigation potential of 1.64 lakh hectare.

4.8 The Rural Electrification Corporation (REC) launched a special drive during August—November 1987 for energisation of 1.50 lakh new pumpsets and restoration of 1.30 lakh pumpsets rendered inoperative due to burnt out transformers. Under an Action Plan implemented by the REC, 2.27 lakh pumpsets were energised in 12 drought affected States in this short period of 4 months, exceeding the target of 1.50 lakh pumpsets by 51 per cent. Simultaneously 2.8 lakh inoperative pumpsets were made operational by replacement of burnt out transformers, exceeding the target of

1.30 lakh pumpsets by 115 per cent. With 2.27 lakh pumpsets having been energised/extended connections and 2.80 lakh inactive pumpsets having been made operational irrigation facilities of the order of 5.07 lakh pumpsets were made available in these States in just 4 months which were more than the irrigation facilities ever added in any single year through energisation of pumpsets.

4.9 In order to ensure that the nutritional requirements of the labourers on relief works were suitably met, the GOI announced a policy of allocation of foodgrains as payment for a part of the wages in kind at the rate of (i) 3 kgs. per manday in the severely drought affected areas (SDAAS), and (ii) 2 kgs. per manday in all other drought affected area.

4.10 The GOI took early steps to intensify the efforts under Accelerated Rural Water Supply Programme (ARWSP), and Technology Mission on Drinking Water. Significant among the measures taken was the release of assistance to States for augmenting the fleet of rigs available for drilling tubewells for providing drinking water. Steps were taken to closely monitor the deployment and utilisation of 825 rigs available with State Governments in the drought affected area. The Central Ground Water Board (CGWB) was provided with additional funds for procurement of 17 high powered rigs for deployment in difficult terrains. A medium term programme to cater to 48 towns with a population of 20,000 to 10 lakh, having chronic shortage of drinking water, was also drawn up. Major towns like Rajkot, Jamnagar and Ajmer in drought affected area were provided with additional funds for completing reliable water supply schemes. States were advised to adopt strict water budgets for reservoirs so as to cater to the drinking water needs on priority.

4.11 The multi-pronged strategy of the GOI to tackle the problem of drinking water included (i) use of scientific methods for identifying water sources, (ii) construction of a large number of water harvesting structures, (iii) steps to prevent overdrawal of groundwater around urban agglomerations, and (iv) conservation of surface water by the use of cetyle alcohol.

4.12 With a view to maintain the status of health and quality of life, the following measures were initiated (i) stepping up public health measures for preventing outbreak of diseases, and (ii) improving the nutrition level by extension of the benefits of supplementary nutrition to all drought affected area on the scale of the integrated Child Development Scheme (ICDS).

4.13 The GOI took steps to improve the availability of foodgrains in the Public Distribution system (PDS). During the drought period ending July 1988, over 10 lakh tonne each of rice and wheat was allocated to the States. Special allocation of foodgrains to the extent of 4.44 lakh tonne was made for the drought affected area for relief measures. The GOI took steps for the import of 2 lakh tonne of pulses, 30,000 tonne of butter oil and 30,000 tonne of skimmed milk powder under various programmes. The PDS was strengthened and nearly 7,740 additional fair price shops were opened in the drought affected area since August, 1987. Additional mobile vans for supplying essential commodities in remote and inaccessible dought affected area were also commissioned.

4.14 Fodder was a source of serious concern since the begining of drought conditions in July 1987 throughout the country. Rains in late August-September slightly eased the problem in some States but Gujarat and Rajasthan continued to experience severe fodder shortage. They formulated a scheme for increasing fodder production in the drought affected area by extending subsidy to small and marginal farmers. An area of about 2.30 lakh hectare was covered under the scheme with an outlay of Rs. 8.02 crore. The State Governments were advised to provide free irrigation facilities for increasing the area under fodder cultivation. Steps were initiated for identification of forest areas, where grass production could be augmented, for meeting the fodder requirements within and outside the States. The activities of State Forest Departments and Animal Husbandry Departments were closely coordinated to achieve this objective. Gujarat had set district-wise targets for growing fodder in 4 lakh hectare to the extent of 80 lakh tonne by June, 1988. Rajasthan took steps to grow fodder in 1.5 lakh hectare by providing free inputs and irrigation.

4.15 Under the scheme of central assistance, the GOI provided subsidy to the extent of 75 per cent of the transport cost in the case of inter-State transport of fodder and 50 per cent in the case of intra-State transport. Paddy straw was moved from Punjab to Gujarat and Rajasthan in substantial quantities under this scheme. The GOI earmarked 10 per cent of the molasses production for the manufacture of cattlefeed. In all 1.5 lakh tonne of molasses was provided for this purpose. Arrangements were made for the use of about 31,000 tonne of damaged wheat available with the

Food Corporation of India (FCI) for manufacture of cattle feed. Voluntary organisations rendered yeomen service in procurement and distribution of fodder, and maintenance of cattle camp especially in Gujarat and Rajasthan. Assistance was provided for the maintenance of cattle camps run by voluntary agencies. At the peak of the drought, nearly 2,500 cattle camps, *pinjrapoles* and *gaushalas* were run by the Government and voluntary agencies, maintaining nearly 18 lakh cattle in the States of Gujarat and Rajasthan.

4.16 A massive information campaign was mounted by the All India Radio (AIR), *Doordarshan*, (DD), Press Information Bureau (PIB), Directorate of Audio-Visual Publicity (DAVP), and Directorate of Field Publicity (DFP), of the Ministry of Information and Broadcasting (MIB) in different parts of the country to create public awareness about the drought and the various relief measures undertaken by the GOI, State Governments and voluntary agencies. Apart from their programmes directed at general audience aimed at creating awareness and building morale, special audience programmes concerning agriculture, supply of essential commodities, employment generation, drinking water, public health schemes, etc. were also launched to focus on popular participation and support to the Government policies and programmes directed at tackling the drought situation.

Central Assistance

5.1 The GOI was very keen that the relief assistance should be extended to the States in time, and to this end, the memoranda of the States must be processded with utmost expedition. For taking a final decision on the States' memoranda, the GOI set for itself a time limit of 30 days from the confirmation of the date for the visit of the Central team by the State Government.

5.2 Appreciating the special needs of certain parts of the country, which have repeatedly faced drought in the last 3 to 4 years, the GOI, in relaxation of the current norms for central assistance, approved liberal measures for relief in SDAAs. The package of special relief measures for the SDAAs provided for: (i) a higher quantum of foodgrains to labourers on relief works, (ii) enhanced subsidy for maintenance of cattle, (iii) provision of shelter for cattle camps, (iv) additional coverage under the programme of gratuitious relief, and (v) provision for supplementary nutrition through extension of ICDS coverage.

5.3 During the 1987 drought period, 15 States and 4 UTs submitted memoranda seeking Central assistance of Rs. 10,298 crore for drought relief. All these memoranda were promptly considered and ceilings of expenditure approved for an aggregate amount of Rs. 1,472.10 crore upto July, 1988. In addition, as indicated earlier, the GOI sanctioned an assistance of Rs. 236 crore for completion of specified irrigation projects in different States by 1989-90 as part of its drought proofing efforts. An assistance of Rs. 8.02 crore for fodder cultivation and Rs. 2.06 crore for cultivation of vegetables was also sanctioned for the drought affected States.

6. The effeciency of relief operations depends as much on the formulation of sound policies and programmes as on their proper and timely implementation. The GOI therefore continuously emphasised regular monitoring of the relief operations. The State Governments were advised to streamline their relief machinery for providing effective and timely relief to the drought affected population through efficient implementation of the relief measures and monitoring their activities on regular basis.

7.1 The effectiveness of the drought management strategies and measures adopted by the GOI and the State Governments has been summed up by a dispassionate observer from an international organisation having wide experience in the management of natural disasters in different countries who, after visiting the drought affected area of Gujarat and Rajasthan during the drought of 1987, made the following comments:

> "What I believe may well be one of the most effective drought responsesystems in existence. It is the most forceful example I have ever seen of the fact that drought need not result in food scarcity at the village level, increased malnutrition and death among victims, lack of income generating opportunities for self-sufficiency, large scale migrations of people in search of food and employment, death or sale of cattle, bankruptcy and significant depletion of farmers' assets. The disaster response seen by the States of Gujarat and Rajasthan, supported and lead by the

Central Government, confirms the universal truth that whether or not such negative consequences exist is almost entirely dependent upon the effectiveness of the disaster response system. What I saw in India was a system that successfully ensured that food was available at the village level; that those in need had opportunity to maintain (perhaps even increase) their monthly earnings thereby ensuring the family well being; that the mass works projects were developmental in nature in that community assets were being built and that vulnerability to the devastations of future water shortages was being reduced by the emphasis on "drought-proofing"; and that the cattle and other assets of the farmers were protected making recovery at the family level much easier. Of course, there were many other critical efforts initiated as well; those mentioned are only a sample of the more obvious.

My praise of the drought response efforts are unqualified, and this is said in recognition of the fact that in a programme effort that attempts to reach tens of thousands of villages and millions of people. There may have been the occasional time of community in which problems was encountered. However, what I came to appreciate through my visit was the concerted effort and determination of people at every administrative level, from seniormost civil servants at Central Government level to local community leaders, to overcome any such problems and ensure that effective and benevolent services were available to all.

Another important conclusion I drew from the visit was that while the formidable emergency response could only have been implemented through the personal commitment and long hours of work month after month by the excellent quality staff involved, still that alone would not have produced the results evident in every village had it not been for the establishment and continued refinement of the disaster system that is in place. I believe strongly that India can be proud of this system and that people in other countries searching for better ways to meet the needs of people affected by drought could benefit by understanding the fundamentals of this system."

7.2 The management of the drought of 1987 underlines the fact that by appropriate institutional support and proper co-ordination of efforts crises could be met confidently and the policies could be translated into practice most expeditiously. This experience also embodied the reorientation in the approach to drought management and marked a major departure in terms of caring for the quality of life and not merely confining to providing sustenance to mitigate hardship. That the drought of 1987 was one of the severest in terms of inadequacy in precipitation and its uneven spread, and extensive damage to productive agricultural area is well documented. The ensuing chapters spell out the way the administration responded to face this challenge and measure up to it.

EVOLUTION OF DROUGHT MANAGEMENT POLICY

The present policy of the Government on drought relief has evolved over a period from the various measures adopted for amelioration of the distress caused by famines and scarcities from time to time. For an appreciation of the policy it is worthwhile to recount some of the important stages in its evolution.

1.2 The famine policy of the earlier rulers in India evolved through a process conditioned by the resources of the State, the philanthropy and munificence of the rich and the political and economic philosophies of the times. The relief policy of these times was, broadly speaking *ad hoc* and not based on any definite principles. This was due to the stage of political development, lack of resources and communications and the inadequate appreciation of the vulnerability and the needs of the affected population.

1.3 In the era preceding the British rule, the village communities were mostly self-sufficient and the means of communications were virtually non-existent. Consequently trade and movement of foodgrains even in times of plenty were limited. The emperors are said to have maintained stores of foodgrains in their capitals as war chests and richer landlords also kept surplus from the years of bounties as insurance against years of scarcities. Depending upon the benevolence of the rulers and the severity of the famines the grains were either sold or distributed free.

1.4 The Gujarat relief manual recounts at length the history of Indian famines as noted by A. Loveday in his *History and Economics of Indian Famines* (1914) and has on record that Mohammed-Bin-Tughlaq was the first ruler to take vigorous measures to alleviate the effect of the drought that occurred in AD 1343 during his regime. In addition to the distribution of 6 months' supply of foodgrains to the inhabitants of Delhi, advances were made from the treasury not only for the cultivation of land but also for digging of wells. In AD 1630, Shah Jehan is said to have distributed Rs. 5,000 every Monday to the deserving poor, and Rs. 50,000 in Ahmedabad during the famine. The same principle of doles of food was also adopted and land revenue was subsequently remitted to the extent of Rs. 30 lakh. A departure was, however, made in that the relief was not confined to the

capital of Delhi but it was extended to Burhanpur, Ahmedabad and the country around Surat, where some kitchens and alms-houses were established. In AD 1596, some relief works were established and the strength of the army was increased to support the poor.

1.5 During the famine of AD 1577 in Kutch and that of AD 1746 in the district around Bombay, relief was afforded by direct distribution of cooked food. But generally, nothing substantial was done outside the limits of the capital. The poor left the countryside for the towns and pestilence followed. Shah Jehan and Aurangzeb demonstrated perhaps the greatest powers of organisation.

1.6 The subsequent history shows that the first impulse of the people when food was scarce was to migrate to the neighbouring area. The migratory habits of the people in famines, the stores of grains which emperors of the past maintained, and the principle of mutual assistance and family support for the aged and the weak, were the bulwarks against the perils of destitution and the ravages of starvation. In terms of public works, irrigation works like tanks, canals and wells were usually taken up for providing employment in times of distress.

1.7 According to Loveday, the important famines between AD 297 and AD 1907 tended to recur in cycles of 5 years and the greater ones in cycles of 50 years. Roughly speaking, it was towards the middle and the end of each century that the most disastrous calamities occured in India. The famines of AD 1343-45, AD 1540, AD 1630, AD 1747 and AD 1837 were all intense in certain districts though comparatively limited in area and short in duration. Those of AD 1396, AD 1596, AD 1660-61, AD 1803-04, AD 1896 and 1900 were the most disastrous and the most extensive famines.

1.8 During the time of the East India Company from AD 1765 to AD 1858, the country experienced 12 famines and four severe scarcities as against only 14 recorded during the seven centuries from Eleventh to the Seventeenth. The horrors of the post-1858 period have been described by Romesh Dutt as follows: "The poverty of the Indian population at the present day is unparalleled in any civilised country, the famines which have desolated India within the last quarter of the ninenteenth century are unexampled in their extent and intensity in the history of ancient or modern times. By a moderate calculation, the famines of 1877 and 1878, of 1889 and 1892, of 1897 and 1900 have carried off 15 million people."

1.9 Inspite of the fact that such a large number of famines occured in India during the 19th century, the relief policy of Government was torn between the conflicting goals of saving life and of securing the maximum possible economy in relief expenditure. Even during the terrible famine of AD 1877 the British government warned the special officer, Sir Richard Temple that "the task of saving life irrespective of the cost is one which is beyond their power to undertake."

Famine Commissions

2.1 Three successive Famine Commissions were appointed during the period from 1878 to 1900 to investigate the nature and causes of recurring famines, to assess the relief measures adopted and to suggest guidelines for the future. The first of these Commissions, presided over by Sir John Strachey, submitted its report in 1880. The commission recommended that the employment of the affected persons on large works of permanent utility should be the principal form of famine relief, but those who were unable to work should be given cooked food in poor houses. The Commission expressed the view that the improvement of internal communications and the removal of all obstructions to the free course of trade accompanied by the extension of irrigation in suitable localities and improved agriculture, offered permanent solution for recurrent famines. The Commission also suggested the establishment of a separate fund, later known as famine insurance fund, to meet the expenditure on famine relief. The Commission circulated a famine code to provincial Governments embodying the principles and procedures of administrative relief. In the light of this model code, several provincial Governments framed their own codes which helped the local administration to undertake systematic measuers for tackling famines.

2.2 The Second Famine Commission (1898) under the Chairmanship of Sir James Lyall, recommended that district small as well as large works should be kept ready. Works might be taken up at a distance from the villages if they were more useful than the nearer works but not merely for effecting economy in expenditure. The Commission favoured the payment of wages by results, subject

to a minimum and a maximum daily wage. The Commission also recommended a more positive policy regarding suspension and remission of land revenue.

2.3 The report of the Third Famine Commission (1901) headed by Lord MacDonnell was remarkable in that it warned the Government against the dangers of being caught napping. It emphasised that a complete and authoritative plan for relief should be laid out from the beginning. This plan should include a properly thought out programme of public and village works, the provision of a reserve of adequate tools and implements and the grant of liberal advances to agriculturists in the earliest stages of distress. The Commission recommended that test relief works should be commenced as soon as indications of famine were visible and these test works should later on be converted into regular works as soon as it appeared that they were necessary for the people who sought work. Another special feature in the report of this Commission was that it advocated a system of payment strictly by results, with a maximum limit on daily earning but without any minimum limit. While it recommended the grant of gratuitous relief to those who were not in a position to work, it suggested that the number of persons receiving gratuitous relief should not be more than a third of the affected population during the dry months and not more than 42 per cent throughout the entire period. Deserted children should be looked after by the State for a reasonable period after the closure of the famine works. For the preservation of cattle, the Commission recommended cultivation of fodder crops, grant of loans for purchase of fodder and opening of cattle camps. Finally, the Commission advocated a 'moral strategy' to tackle famines by getting non-official support for administering relief.

2.4 The famine codes framed from time to time in the light of recommendations of the successive Famine Commissions provided for taking measures when danger of large scale human mortality was apprehended and aimed at preventing deaths on accounts of calamities.

Famine To Drought

3.1 In the evolution there was a noticeable change in approaches of the drought management policy to the famines of the pre-independence days and to droughts which were experienced since then. Famine is a forbidding spectre; it conjures up harrowing memories of men and women dying in thousands, of cattle and animals facing privation of the worst sort, of misery abounding, and of a general unsettlement in the political and social fabric.

3.2 These are mercifully now things of the past. Nature's course however continues to be tortuous and her tortures are still sometimes manifest. Man has not been able to succeed in either taming or training Nature and he is still subject to the caprice of errant elements. Indian agriculture continues to be subject to the vagaries of monsoon, particularly in large parts of the country where only a limited cultivated area is under irrigation. The redeeming feature is the change in the approach of the administration to drought. The Government no longer remains either a passive witness or an unmoved spectator to the miseries of its citizens. When the monsoon flounders and the drought manifests, the entire administrative machinery is geared to meet the challenge and several measures are taken with a view to provide prompt relief to the affected population

3.3 It was not a play of words that induced the Government of the erstwhile Bombay State to replace the word 'famine' by the word 'scarcity' in all its rules, manuals, and enactments. It was the expression of what Government considered as an article of faith and a sincere and genuine attempt to instil confidence in the minds of the rural population with a long memory of hardship and suffering. It was also a reminder to the administration that it must move swiftly and effectively to relieve the situation at the very onset of the distress.

3.4 The Famine Relief Codes of the erstwhile provinces were replaced in the fifties by the Scarcity Relief Manuals of various States which describe 'scarcity' as a marked deterioration of the agricultural season due to the failure of rains or floods or damage to crops from insects resulting in severe unemployment and consequent distress among agricultural labour and small cultivators. In assessing the state of a season for the purpose of determining whether scarcity is to be declared or not, factors such as the *annewari* of crops in the current and in the previous two years, the availability and prices of foodgrains and fodder, the state of employment and trends in wages, unusual movements of labour from rural areas, the state of crime and other factors indicating signs of distress such as malnutrition among children, are taken into consideration.

3.5 Scarcity manuals lay down measures to provide reasonable purchasing power to the affected people as well as ensure availability of goods and services. The more recent drought manuals also lay down measures not only towards alleviating distress of the affected population but also to bring out alternative arrangements in maintaining crop production through contingency planning and better water management and developmental efforts by creating assets through employment generation works to the extent necessary.

New Drought Codes

4.1 Every major drought contributed in bringing about qualitative improvements in drought managment policy. Drought of 1965-66 contributed to building up of a reliable PDS to take care of the food emergencies. The privations suffered during this drought also spurred the country into embarking on certain fundamental changes in the agricultural strategy which ultimately ushered in a Green Revolution making the country self-sufficient in foodgrains production. The drought 1972 focussed on the need for evolving massive employment generation programmes for enhancing, the purchasing power of the people rather than running free kitchens, while the drought of 1979 underlined the need for creating durable and productive assets for enabling the people of the affected area to withstand future droughts with greater resilience.

4.2 The GOI issued guidelines in 1989 for preparing relief manuals in the light of changes in approaches for incorporating them in drought management. The State Government of Andhra Pradesh brought out a Drought Handbook and the Governments of Gujarat and Maharashtra prepared Draft Relief Manuals. The other State Governments are in the process of drafting their relief manuals in the light of guidelines issued by the GOI.

4.3 The drought of 1987 focussed not only on the need for providing access to food to the affected people but also on maintaining their quality of life. It is no more a question of saving life from the threat of widespread starvation during such a natural calamity. The central theme of relief today is to meet the food and nutritional needs of all sections of the people keeping in view their normal energy requirements, supply of drinking water, providing adequate health care and fodder for the cattle.

4.4 The drought management policy presently under implementation seeks to provide for the social and economic goals of the welfare state and the egalitarian objectives of the Government as embodied in the Constitution of India. The objective is not only that no one should die of starvation but more importantly to prevent physical deterioration and destitution of the people and to enable them to resume normal pursuit of life at the earliest. It also aims to encouraging community effort by sharing a common concern and to fashion or shape events and social infrastructure so that the recurrence of scarcities and other calamities are minimised. The approach of the present drought management policy, therefore, is more towards drought mitigation and is preventive in nature rather than merely curative. The relief measures are therefore, not to be conceived in isolation but integrated with the development ethos and programmes under implementation under various Five Year Plans in India.

3 NATURE AND EXTENT OF DROUGHT

Summer monsoon, more precisely the south-west monsoon, occupies an important place in Indian agriculture. The country's agriculture and food production substantially depend on these monsoon rains. These rains also contribute to power generation and industrial production in the country.

1.2 During the summer monsoon season (June-September) of 1987, India experienced one of its severest droughts. For an appreciation of the severity and the magnitude of the drought, the failure of 1987 monsoon has to be viewed in the context of the successive monsoon failures prior to 1987. The drought of 1987 followed two and in some areas even three consecutive low rainfall monsoon periods. Consequently, the drought of 1987 became severe in the areas which received deficient rainfall during the successive years preceding the deficient rainfall of the 1987 monsoon period.

1.3 One way of viewing the rainfall situation over the country is by way of looking into the percentage departure of rainfall from the long-term normal. The rainfall is considered normal, if the seasonal departure is within (±)10 per cent of the normal rainfall. However, when percentage departure is (−)11 per cent or more, it is considered deficient monsoon year, or a drought year. The rainfall is excess if the departure is (+)11 per cent or more.

1.4 Indian monsoon rainfall has its interannual variability and in the past years of excess rains and years of droughts occurred without any discernable pattern. The period 1985-87 was unique in the history of monsoon rainfall as it witnessed successively higher deficits in all-India rainfall. The percentage departure of rainfall from the normal for 1985, 1986 and 1987 was (−)7 per cent, (−)13 per cent and (−)19 per cent respectively.

1.5 Even though the south-west monsoon during 1984 was normal in most parts of the country, rainfall deficiencies were significant in the sub-divisions of Vidarbha, Marathwada, and Telengana as shown in Table 1.

Table 1 : Seasonal Deficiency in Rainfall, 1984

S.No.	Meteorological Sub-Division	Percentage Departure of Rainfall from Normal
1.	Vidarbha	(−) 40
2.	Marathwada	(−) 28
3.	Telengana	(−) 24

Table 2 : Seasonal Deficiency in Rainfall, 1985

S. No.	Meteorological Sub-Division	Percentage Departure of Rainfall from Normal
1.	Saurashtra and Kutch	(−) 49
2.	West Rajasthan	(−) 44
3.	East Rajasthan	(−) 37
4.	Gujarat Region, Daman, Dadra and Nagar Haveli	(−) 28
5.	Vidarbha	(−) 26
6.	Marathwada	(−) 25
7.	Telengana	(−) 24

1.6 The monsoon set in Kerala on 28th May, 1985, that is, 3 days before the normal date. Progress of monsoon upto Bombay was nearly along the normal dates. However, it got delayed thereafter. Progress of monsoon was stagnant between 15th to 25th June and then from 28th June to 8th July, 1985. It covered entire country by the 14th July, 1985.

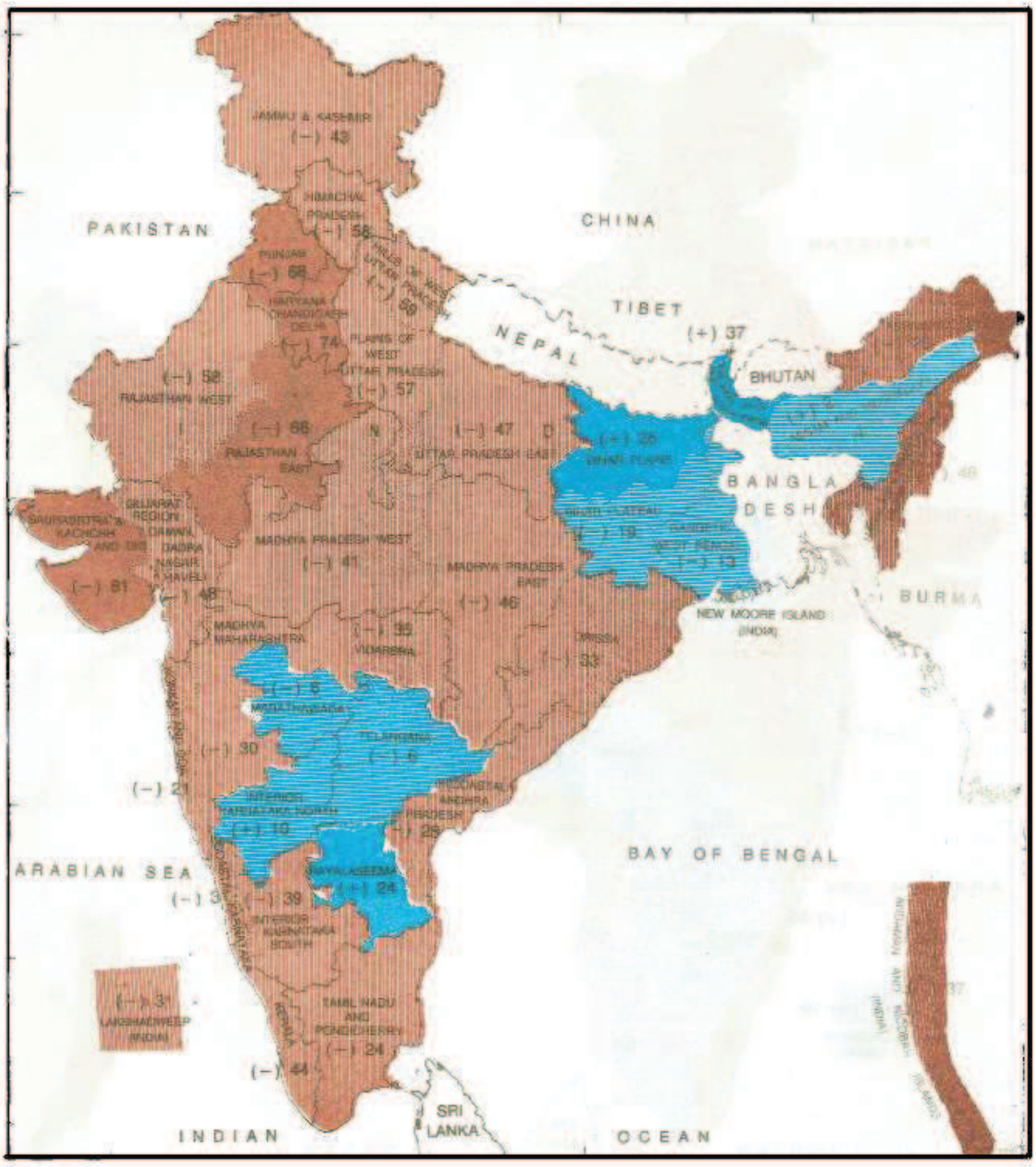
1.7 The overall rainfall distribution during 1985 was satisfactory except in Rajasthan, Gujarat, interior Maharashtra, parts of Karnataka and Andhra Pradesh. The rainfall was excess in two meteorologial sub-divisions, normal in 24 meteorological sub-divisions and deficient in 9 meteorological sub-divisions. The meteorological sub-divisions with significant seasonal deficiency in 1985 are shown in Table 2.

During 1985 south-west monsoon, 65 per cent of the meteorological districts received either normal or excess rainfall and 35 per cent deficient or scanty rainall. A list of significant dry spells of duration of 4 weeks or more during the monsoon season of 1985 may be seen at Annexure I.

1.8 The onset of monsoon in 1986 was delayed by 3 to 4 days over south peninsula, 6 to 7 days over parts of central India and 10 to 15 days over eastern India. Even in north-west India the onset was delayed in west Rajasthan by 8 days. However, over some parts of north-west India, the monsoon set in a little ahead of time. For example, it set over Delhi on 27th June, that is two days earlier than its normal date. Seasonal rainfall was normal in 21 meteorological sub-divisions and deficient in 14 meteorological sub-divisions out of total 35 meteorological sub-divisions in the country. It is noteworthy that no meteorological sub-division received either excess or scanty rainfall in 1986. The details of deficiencies are shown in Table 3.

Table 3 : Seasonal Deficiency in Rainfall, 1986

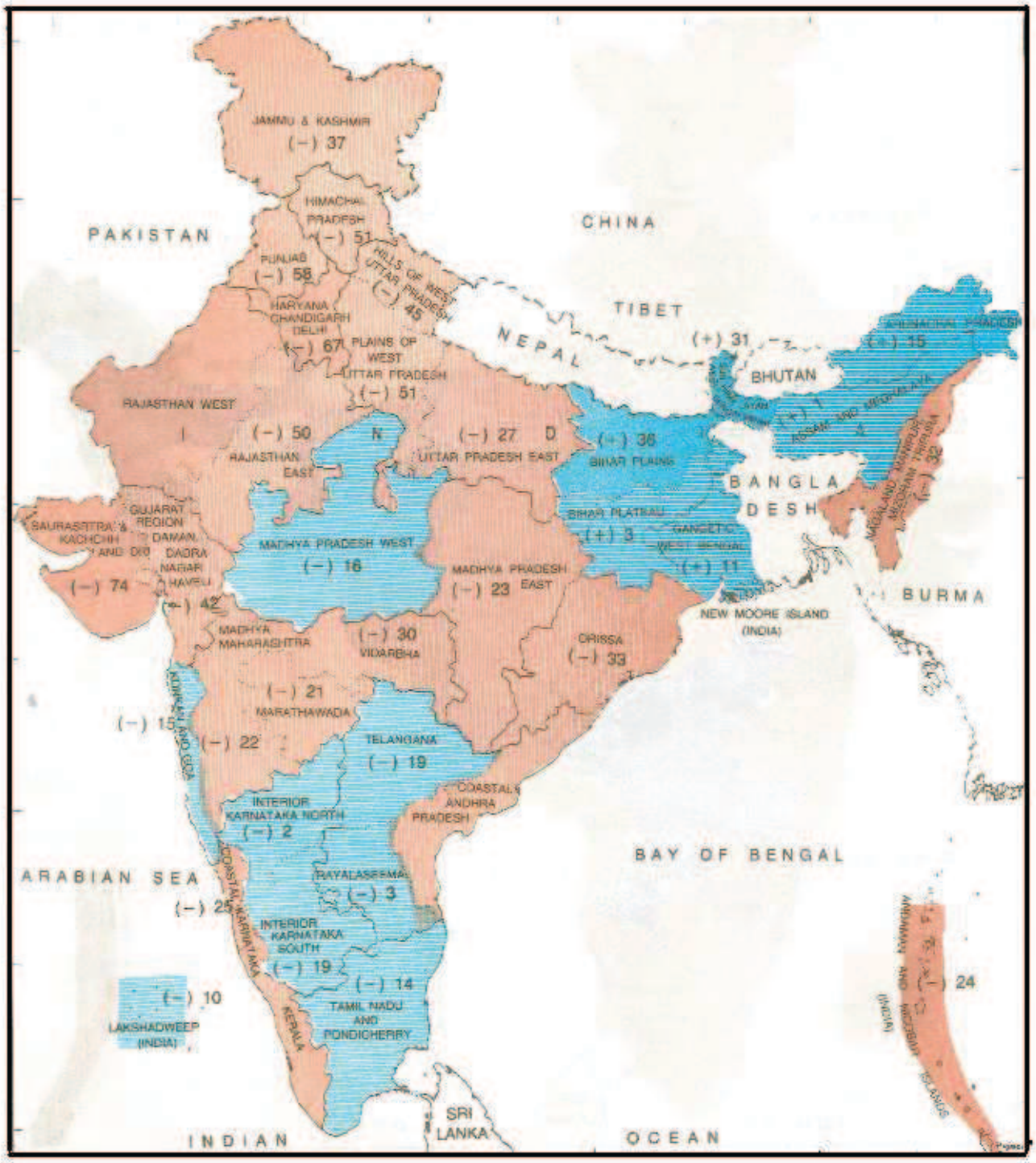
S. No.	Meteorological Sub-Division	Percentage Departure of Rainfall from Normal
1.	West Rajasthan	(−) 43
2.	Saurashtra, Kutch and Diu	(−) 40
3.	Bihar Plateau	(−) 34
4.	Assam and Meghalaya	(−) 33
5.	Gujarat Region	(−) 31
6.	Konkan and Goa	(−) 31
7.	Marathwada	(−) 31
8.	Arunachal Pradesh	(−) 27
9.	Bihar Plains	(−) 26
10.	Nagaland, Manipur, Mizoram and Tripura	(−) 25
11.	Andaman and Nicobar Islands	(−) 23
12.	Plains of West Uttar Pradesh	(−) 22
13.	Haryana, Chandigarh and Delhi	(−) 22
14.	Kerala	(−) 21



EGEND

- Excess + 20% or more
- Normal + 19% to − 19%
- Deficient − 20% to − 59%
- Scanty − 60% to − 99%
- No Rain − 100%

Map 1: Percentage Departure of Normal Rainfall for the Period from June 1 to August 12, 1987



LEGEND

- **Excess** + 20% or more
- **Normal** + 19% to − 19%
- **Deficient** − 20% to − 59%
- **Scanty** − 60% to − 99%
- **No Rain** −100%

Map 2 : Percentage Departure of Normal Rainfall for the Period from June 1 to September 30, 1987

It may be seen that the deficiency in rainfall was significant over 9 meteorological sub-divisions out of which 3 were in high rainfall areas (Assam and Meghalaya, Konkan and Goa, and Arunachal Pradesh). Periods of dry spells of 4 weeks or more may be seen at Annexure II.

Drought of 1987

2.1 The south-west monsoon of 1987 set in Kerala in time, that is, 2nd June, 1987. Its further northward progress was satisfactory upto middle of June. It was, however, inordinately delayed in parts of north-west India and Gujarat and it covered the entire country only by 27th July, 1987. Rainfall that year had been erratic and inadequate and there were long dry spells. By middle of August 1987, as many as 25 out of 35 meteorological sub-divisions received deficient/ scanty rainfall while only 10 meteorological sub-divisions received normal/excess rainfall as shown in Map 1. At the end of monsoon season, by 30th September 1987, as many as 21 meteorological sub-divisions received deficient/scanty rainfall, while only 14 meteorological sub-divisions received normal/excess rainfall as shown in Map 2.

2.2 The important features of the rainfall anomalies in south-west monsoon period of 1987 were as follows:

(i) *Excess* (20 per cent or more of normal) in 2 meteorological sub-divisions viz., Sub-Himalayan West Bengal and Sikkim; and Bihar Plains.

(ii) *Normal* (within 19 per cent of normal) in 12 meteorological sub-divisions, viz., Arunachal Pradesh; Assam and Meghalaya; Gangetic West Bengal; Bihar Plateau; West Madhya Pradesh; Konkan and Goa; Telengana; Rayalseema; Tamil Nadu and Pondicherrry; North Interior Karnataka; South Interior Karnataka; and Lakshadweep. Among these only 4 meteorological sub-divisions showed positive departure.

(iii) *Deficient* (-20 per cent to -59 per cent of normal) in 18 meteorological sub-divisions, viz., Andaman and Nicobar Islands; Nagaland, Manipur, Mizoram and Tripura; Orissa; East Madhya Pradesh; East Uttar Pradesh; Plains of West Uttar Pradesh; Hills of West Uttar Pradesh; Punjab; Himachal Pradesh; Jammu and Kashmir; East Rajasthan; Gujarat Region, Daman, Dadra and Nagar Haveli; Vidarbha; Madhya Maharashtra; Marathwada; Coastal Karnataka; Kerala; and Coastal Andhra Pradesh.

(iv) *Scanty* (-60 per cent to -99 per cent of normal) in 3 meteorological sub-divisions, viz., Saurashtra, Kutch and Diu; West Rajasthan; and Haryana, Chandigarh and Delhi.

2.3 *Excess* to *normal* rainfall covered 37 per cent and *deficient* to *scanty* rainfall covered 63 per cent area of the country. Major deficiency in rainfall was observed over north-west India and Gujarat region where seasonal deficits were more than 50 per cent of normal in many places. The overall deficit of rainfall on all-India basis for the monsoon of 1987 was (-)19 per cent and was nearly twice the standard deviation. The monsoon rainfall deficiency in 1987 was thus not only substantial in magnitude but also covered substantial area of the country.

2.4 It may be instructive to note the rainfall deficiencies in magnitude and the extent of area in earlier years also. It may be seen from Figure 1 that after 1965, the rainfall deficiency in terms of area coverage was worst in 1987 (63 per cent), followed by 1972 (57 per cent), 1974 (55 per cent) and 1979 (52 per eent). Similarly, meteorological sub-division-wise, 1987 was the most deficient (21), followed by 1972 (20), 1965 (19) and 1979 (19) as shown in Figure 2. (Figures in parenthesis denote the number of meteorological sub-divisions receiving deficient/scanty rainfall.)

2.5 For an appreciation of rainfall distribution over the country, district-wise distribution of rainfall may be taken into account. India has been divided into 384 meteorological districts. The percentage of these districts with excess, normal, deficient and scanty cumulative rainfall as on September 30, 1987 with comparative figures of rainfall from 1982 to 1987 are given in Table 4. During the monsoon of 1987, 43 per cent of the districts received excess/normal rainfall and 57 per cent of the districts received deficient/scanty rainfall. The districtwise deficiency of rainfall stands out clearly in 1987.

2.6 The week-by-week progress of rainfall distribution over the country as a whole in terms of percentage departure from the normal of the weekly rainfall can be analysed. This is shown in Figure 3. For monsoon of 1987, it may be seen that prolonged dry spells occurred from the middle of June to

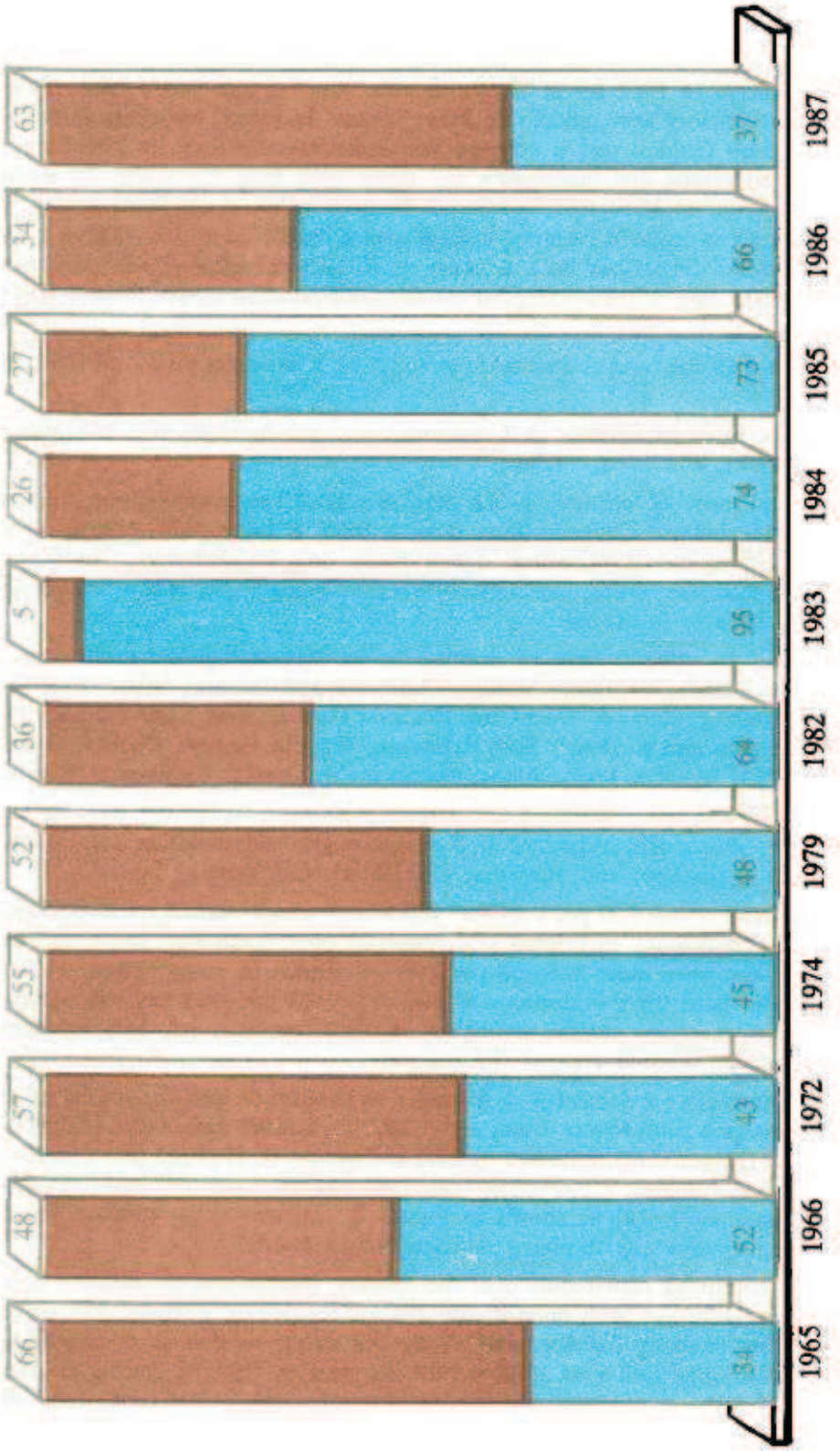


Figure 1: **Percentage of Area with Excess/Normal and Deficient/Scanty Rainfall from June 1 to September 30 for Selected Year, 1965-87.**

Table 4 : Districtwise Percentage Distribution of Rainfall 1982-87.

S.No.	Category	1982	1983	1984	1985	1986	1987
1	Excess	9	38	18	16	8	10
2	Normal	39	47	46	49	44	33
3	Deficient	47	15	35	32	45	42
4	Scanty	5	0	1	3	3	15

middle of August, 1987 over majority of metereological sub-divisions comprising north-west India. It is observed that cumulative below normal rainfall persisted in all weeks throughout the monsoon of 1987. It is also revealed that the rainfall was minimum during the period from 20th June to middle of August, which is normally the rainiest period in the country. This had adverse impact on cumulative seasonal rainfall figures.

2.7 On most of the days in 1987, daily all-India monsoon rainfall remained below the normal except for a few spells. Also daily rainfall distribution of the monsoon of 1987 was broadly similar to that of 1972 season except that pronounced spells of above normal rainfall occurred from the 20th June to 10th July, 1972.

2.8 In 1987 percentage departure of monsoon rainfall from the normal for the country as a whole was (-) 19 per cent. In the past there were only four years for which the percentage departure of monsoon rainfall was less than that of monsoon of 1987. These were 1877 (-31 per cent), 1899 (-29 per cent), 1918 (-26 per cent) and 1972 (-25 per cent). Thus the drought of 1987 is the fifth severemost since 1876 and the third severemost in the century. Rainfall departure in 1987 was similar to that of 1979 (-) 19 per cent and 1951 (-19 per cent) and very close to 1965 (-18 per cent). However, over north-west India the percentage departure of rainfall in monsoon of 1987 was (-) 46 per cent. In this respect, it was the second worst during the century. It was only in 1918 that the percentage departure of rainfall over north-west India exceeded this figure when it was (-) 56 per cent of the normal. Over peninsular India the percentage departure of rainfall in monsoon of 1987 was (-) 27 per cent, and it was the third severemost drought in this century. This comparison demonstrates that the rainfall performance in monsoon of 1987 was exceptionally below normal. The impact of such an extreme deficiency would be much more pronounced to-day as our dependence on the monsoon rains has become crucial for not only agricultural production but also for power generation, industrial production and several other economic activities.

2.9 Over a small area, when the percentage departure of rainfall is between (-) 26 per cent and (-) 50 per cent of normal, the area is considered under moderate drought. Severe drought prevails over an area when the percentage departure of rainfall over the area is (-) 51 per cent or more of the normal. During monsoon of 1987, as many as 6 meteorological sub-divisions were hit by severe drought. These constitute about 17 per cent area of the country. The percentage area of the country affected by moderate to severe drought since 1875 is shown in Figure 4. It may be seen that 1918 was the worst year in this century when 70 per cent area of the country was affected by drought. In terms of total area affected by drought, the monsoon season of 1987 ranks fourth since 1875 and second since 1901. This again establishes the severity of water stress resulting from the poor performance of monsoon of 1987. It is of particular interest to note that the normal foodgrains production accounted for by the affected area is 53.6 per cent while this percentage was much less in all the previous years except 1965. This would go to show that most of the productive area got affected by the drought of 1987.

2.10 The details of damage due to drought reported by State Governments on account of rainfall deficiency during the monsoon season of 1984 to 1987 are shown in Table 5. It may be seen that damage due to drought increased progressively and attained a peak level in 1987. No other drought on previous occasions followed a series of moderate to severe droughts as the drought of 1987. Drought of 1965-66 had a good monsoon during the preceding year 1964-65. In 1972, except State of Maharashtra, all the other States received satisfactory rainfall during 1971 monsoon period. Drought of 1979 was preceded by very good monsoon of 1978. Statewise impact of drought on human and cattle population and the cropped area may be seen in Annexure III.

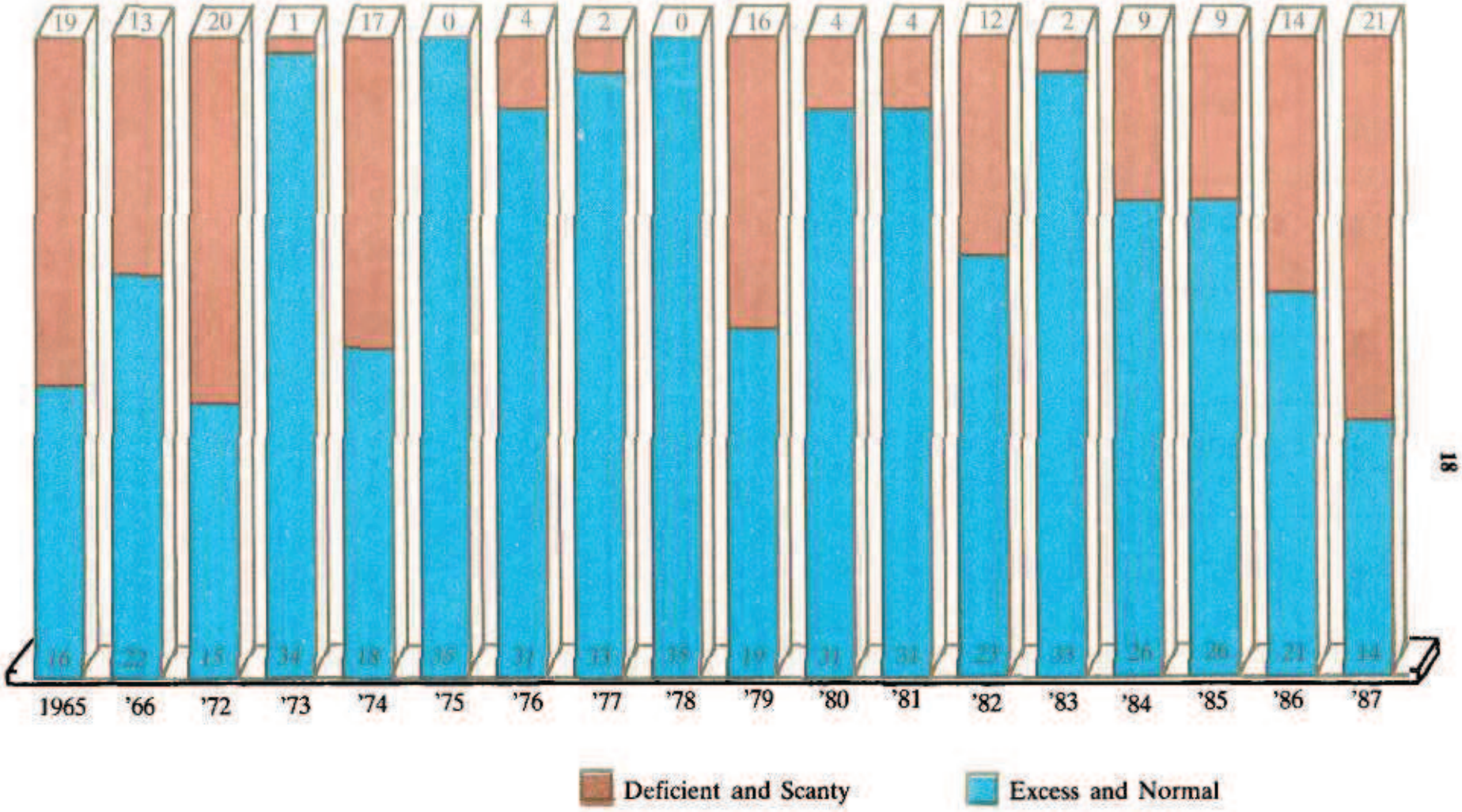


Figure 2: **Number of Sub-Division with Excess/Normal and Deficient/Scanty Rainfall for the Period June 1 to September 30 for Selected Years, 1965-87.**

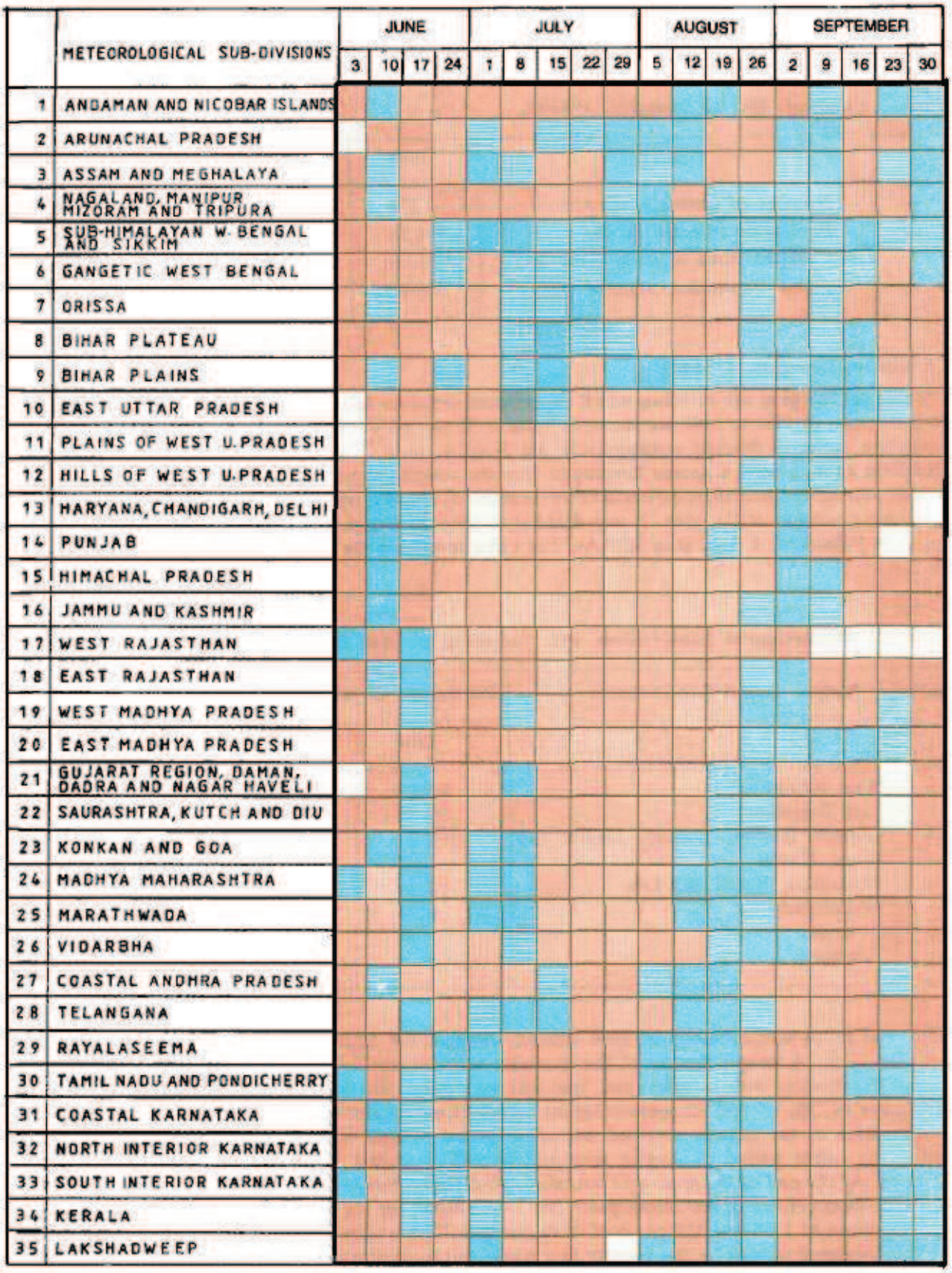


Figure 3: Week by Week Progress of the Monsoon from June 3 to September 30, 1987.

Table 5 : **Damage Due to Droughts, 1984-87.**

S.No.	Damage	1984	1985	1986	1987
1	Number of Districts affected	151	109	280	263
2	Population affected (lakh)	704.58	785.91	1919.42	2854.19
3	Cropped Area affected (lakh ha)	153.69	282.10	400.13	586.00
4	Cattle Population affected (lakh)	475.06	654.30	1119.89	1681.11

Consecutive **Droughts, 1984-87**

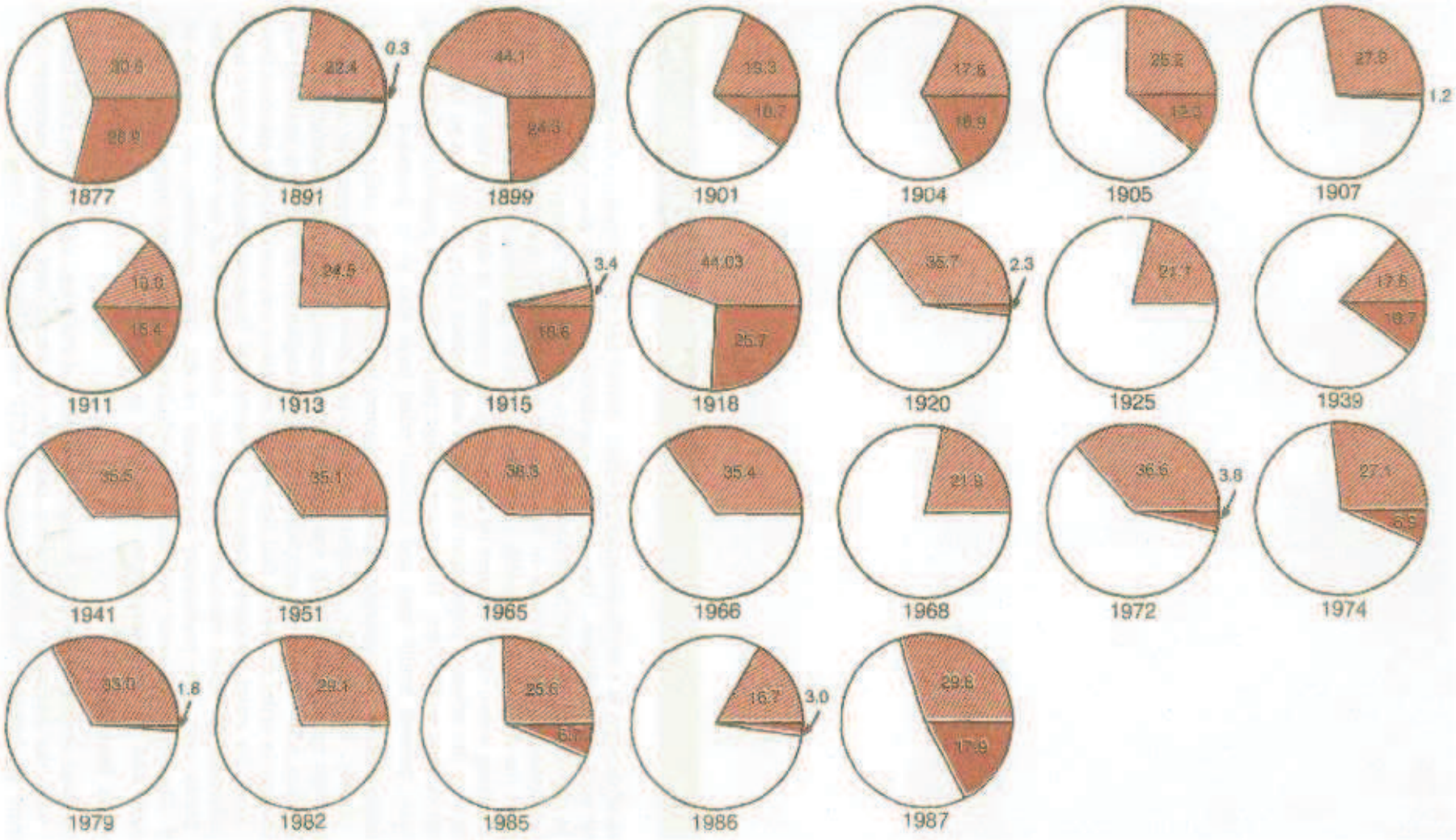
3.1 Meteorological sub-divisions which experienced deficient rainfall consecutively during the south-west monsoon of 1984 to 1987 are shown in Table 6. It may be observed that most parts of Gujarat and Rajasthan suffered drought consecutively for 3 to 4 years. This prompted the Govenrment to formulate an innovative response keeping in view the severity as reflected by deficiency in the rainfall of 1987, the severe hardships experienced on account of consecutive years of drought, and the general economic condition of the area. It was decided to treat 37 blocks of 6 districts in Rajasthan and 36 blocks in 5 districts of Gujarat as SDAAs. The order specifying the SDAAs may be seen at Annexure IV.

Table 6 : **Meteorological Sub-Divisions with Successive Rainfall Deficiency, 1984-87.**

S.No.	Meteorological Sub-Divisions	Percentage Departure of Rainfall from Normal			
		1984	1985	1986	1987
1.	West Rajasthan	(-) 20	(-) 44	(-) 43	(-) 67
2.	East Rajasthan	(-) 15	(-) 37	(-) 18	(-) 50
3	Gujarat Region, Daman, Dadra and Nagar Haveli.	(-) 1	(-) 28	(-) 31	(-) 42
4.	Saurashtra, Kutch and Diu	(-) 14	(-) 49	(-) 40	(-) 74
5	Marathwada	(-) 28	(-) 25	(-) 31	(-) 21
6	Vidarbha	(-) 40	(-) 26	(-) 3	(-) 30
7.	Telangana	(-) 24	(-) 24	(-) 6	(-) 19

3.2 The south-west monsoon of 1988 radically changed the situation almost all over India due to continual rains. A unique feature of the monsoon season (June to September) of 1988 was that the rainfall distribution both in space and time was very good. At the end of June, July, August and September,19, 35, 35 and 32 meteorological sub-divisions respectively out of the 35 meteorological sub-divisiions in the country received normal to excess rainfall. Cumulative rainfall for the season during the entire period of August remained normal or excess in all the 35 meteorological sub-divisions. At the end of the season 32 out of 35 sub-divisions fell in this category. This was among the best such distributions in the recent past. The total rainfall for the country as a whole during south-west monsoon of 1988 was 116 per cent of the normal. There were only 3 years in this century when the total seasonal rainfall for the country as a whole was more than that of 1988. They were 1917 (121 per cent of normal), 1933 (117 per cent of normal) and 1961 (121 per cent of normal).

3.3 As a result of good rains, the water availability in 47 major reservoirs at the end of monsoon of 1988 was about 80 per cent of their total live storage capacity. This was the highest live storage at the end of monsoon season since 1983. Due to the excellent rains throughout the country, ground water level also went up significantly over most parts of the country holding good prospect for drinking water and ground water irrigation. The drought of 1987 thus ended with the south-west monsoon of 1988.



Figure—4 **Area of the Country Affected by Moderate and Severe Drought in Deficient Rainfall Years**

4 ORGANISATIONAL RESPONSE

The management of drought is a multi-dimensional effort. Relief has to be organised for millions of people affected by scarcity conditions. The working population has to be given employment in productive works in the vicinity to avoid large scale migration. Consequently a large number of plans and estimates for decentralised works have to be prepared by technically qualified personnel in a short spell of time. At the work sites reasonable amenities have to be provided for the labourers. The acute shortage of drinking water has to be met by improving the sources of drinking water as well as by transporting water to the affected population in tankers and bullock carts. Cattle has to be taken care of by provision of feed and fodder. To prevent a large part of the rural population from being decimated by disease, prompt health care and medical relief have also to be provided.

1.2 The GOI responded to the emerging drought situation by assuming an active role when it observed as early as July, 1987 that the drought conditions may have serious impact on agriculture and, in turn, on the large rural population. It was realised that normal channels of administration and methods of coordination will have to be supplemented and strengthened at different levels of the administrative machinery in order to ensure that the drought situation was continuously assessed from time to time, the need for relief measure examined promptly and financial allocations made most expeditiously to undertake the relief measures well in time. Area Officers of the DAC visited the drought affected States and gave preliminary assessment of the crop conditions on account of inadequate rainfall. The reports showed that there was reduction in agricultural operations as large area was left unsown and the crop conditions were poor in the sown area.

Cabinet Committee on Drought

2.1 The Prime Minister described the 1987 drought as a national challenge and set up a CCD under his Chairmanship with the objective of ensuring initiation of timely and effective measures for mitigating the impact of drought. The composition of CCD was as follows:

1. Shri Rajiv Gandhi, Chairman
   Prime Minister.
2. Shri P. Shiv Shanker,
   Minister of Planning and Programme Implementation.
3. Shri Narayan Datt Tiwari,
   Minister of Finance and Commerce.
4. Shri Vasant Sathe,
   Minister of Energy and Communications.
5. Shri Bhajan Lal,
   Minister of Agriculture.
6. Shri Dinesh Singh,
   Minister of Water Resources.
7. Shri Brahm Dutt,
   Minister of State (Independent Charge), Ministry of Petroleum and Natural Gas
8. Shri Sukh Ram,
   Minister of State (Independent Charge), Ministry of Food and Civil Supplies.
9. Shri Z.R. Ansari,
   Minister of State (Independent Charge), Ministry of Environment and Forests.

2.2 The first meeting of CCD held on the 6th August 1987 laid down the conceptual framework and set the pace for working out the policy responses to tackle the developing drought situation. In its second meeting held on the 10th August 1987, the CCD approved the Action Plan which served as the blue-print for implementing the drought relief programmes. The Action Plan may be seen at Table 7. Thereafter the CCD gave policy directives from time to time and closely monitored the implementation of drought relief programmes by the Central Government Departments and the State Governments. The CCD met as many as 4 times in August, 1987 and regularly thereafter to monitor and review the implementation of drought relief measures till the conditions stabilised in the country after the onset of 1988 monsoon.

2.3 The CCD was wound up after its meeting held on the 13th July, 1988. A new Cabinet Committee on Natural Calamities (CCNC) has since been formed to deal with all aspects of management of natural calamities as and when they occur including the measures to be taken, both short-term and long-term, to reconstruct the economy of the affected area, and to examine the remedial measures that can be taken to avoid recurrence of such calamity or reduce its ill effects should it recur.

2.4 The Prime Minister designated Central Ministers for continuous inter-action with the State Governments and helping them in undertaking effective relief measures in the affected area and facilitating optimal use of central assistance, financial and otherwise. The list of Central Ministers assigned to different States is at Annexure- V. The Cabinet Secretary briefed the Central Ministers in September, 1987 about the drought conditions in various States and requested the Ministers to give their views on the drought conditions and the impact of drought relief programmes in alleviating the distress of the affected people in the States.

2.5 A COS was set up under the Chairmanship of the Cabinet Secretary to closely monitor and coordinate the drought relief programmes of Central Ministries/Departments and the State Governments. The composition of the Committee is shown at Annexure-VI. The COS met on the 8th August, 1987 for the first time and subsequently met 12 times till the end of the drought period. The proposals that were to be brought to the CCD were considered in advance by the COS. The presence of Secretaries and senior officers of the Central Ministries/Departments in the meetings of the COS ensured that once a proposal was approved by it, there was no need to refer the same proposal for further examination and that sanctions could issue without delay. The exigencies of the situation in the field and the need to provide relief without any delay prompted the Ministries/Departments to consider the proposals most expeditiously and consequently, it was possible to find quick solution to

Table 7: Action Plan Approved by Cabinet Committee on Drought

ACTION PLAN FOR DROUGHT RELIEF

ORGANISATION

(i) Setting up of a Cabinet Committee on Drought.

(ii) Setting up of a Committee of Secretaries headed by Cabinet Secretary to monitor the developing drought situation and to take corrective steps.

(iii) Set up Central Control Room in Krishi Bhavan. Set up similar Control Rooms at State/district levels to maintain effective liaison with the Central Control Room.

CONTINGENCY PLANS

Crops

(i) Drawing up contingency plans for alternative/short duration crops.

(ii) Ensure adequate supply of seeds.

(iii) Assess the requirements of seeds including fodder seeds crop wise.

(iv)Identify the sources for supply of seeds cropwise and district wise.

(v) Prepare district wise proformae of the requirements of seeds and their supply.

(vi) Draw upon the National Seeds Corporation (NSC)/ State Seed Corporations (SSCs) to procure seeds.

(vii) Determine priorities for the supply of seeds to districts.

(viii) Prepare an emergency plan for seed production in *rabi* 87-88 under irrigated conditions for use in 88-89 to make good the short falls by placing indents in advance to NSC/other SSCs.

(ix) Set up a task force to economise water use in major irrigation reservoirs in *kharif* 87 and maximise area under *rabi* 87-88.

(x) Arrange for credit to farmers for purchasing seeds.

(xi) Initiate action to convert short-term loans into medium-term loans in drought affected areas.

Fodder

(i) Assess fodder requirement by joint teams of Animal Husbandry and Forest Departments in drought-affected districts and locate areas where shortages are likely to occur and arrange for supplies from outside.

(ii) Monitor the prices of fodder in selected places/markets.

(iii) Arrange to procure fodder from surplus States.

(iv) State Forest Departments to arrange for the cutting and baling of grasses in the forests, whenever possible to meet the demand from fodder deficit districts.

(v) Fodder cultivation to be encouraged wherever feasible.

(vi) Ensure supply to molasses to cattle feed plants.

(vii) Obtain from National Dairy Development Board (NDDB) and other sources premixed feed and urea-molasses bricks to the extent necessary.

(ix) Organise through voluntary agencies cattle camps where necessary near sources of water.

Power

(i) Ensure at least 8-10 hours of power availiability to agricultural pumpsets.

(ii) Regulate the availability of power for drawal of water in areas where the ground water is inadequate to prevent overdrawal of water.

(iii) Where ground water is adequate, sanction and provide power connections for agricultural pumps on priority.

(iv) Regulate supply to power-intensive industries, if necessary.

(v) Monitor regularly the supply of power for agriculture.

Diesel

(i) Ensure adequate supply of diesel to farmers.

(ii) Liaise with the Indian Oil Corporation (IOC)/Petroleum Ministry.

Essential Commodities

(i) Review the availability of PDS outlets and open fresh outlets, wherever necessary.

(ii) Ensure that essential commodities, e.g., edible oils, controlled cloth, salt, etc. are made available to the vulnerable sections of society.

(iii) Closely monitor foodgrains stocks with private trade in drought-affected areas.

(iv) Hire trucks, etc. for running of mobile outlets for sale of essential commodities.

issues which would otherwise have taken a much longer time. As the proposals approved by the COS had prior consultation with respective Departments and technical advisers, it was easy for the CCD also to give clear policy directions. The COS not only formulated proposals for short-term relief and rehabilitation but also considered the wider and long term issues for mitigating the effects of drought.

2.6 A Crisis Management Group (CMG) was constituted under the Chairmanship of the Central Relief Commissioner on the 5th August, 1987 to review the drought situation prevailing in the country and implementation of relief measures on a day-to-day basis. The composition of CMG is shown at Annexure-VII. The CMG met daily from 5th August, 1987 to consider problems such as identification of fodder sources, transport of fodder, petroleum products, price situation, drinking water problems, etc. The CMG met twice a week/weekly from 23rd August, 1987 to 24th November, 1987 and thereafter fortnightly. During these meetings the CMG discussed the specific problems faced in different parts of the country threadbare and its decision helped in easing specific operational constraints in implementing drought relief measures.

2.7 With the various Central Government Ministries/Departments represented at its meetings, it was possible for the CMG to monitor the implementation of the sectoral relief measures, identify problems of coordination and also initiate advance action to tackle the emerging situation. The CMG acted as a coordinating body at the operational level of the Central Government. In consultation with various Departments, CMG addressed to important tasks during the drought period as detailed below:

(i) Provision of agricultural inputs, viz., seeds, fertilisers, in accordance with the Contingency Agriculture Plans for *kharif* 1987, *rabi* 1987-88 and *kharif* 1988. Three lakh quintals of wheat seed to Bihar and 1 lakh quintal to Jammu and Kashmir were provided. CMG reviewed advance action for procuring 40,000 quintals of groundnut seeds from Andhra Pradesh and Tamil Nadu at the cost of Rs. 40 crore to enable the State Government of Gujarat to distribute them to farmers for *kharif* 1988 season;

(ii) Regular monitoring of the supply and distribution of High Speed Diesel (HSD) in the face of heavy demands from Punjab, Haryana, Uttar Pradesh and Rajasthan;

(iii) Monitoring the transportation of diesel, coal, and fodder to the drought affected areas through the railways;

(iv) Preparation of monthly fodder plans for Gujarat and Rajasthan showing the monthly requirements, availability, demand gap, and sources to bridge the gap;

(v) Monitoring the fodder prices in various centres of the affected areas;

(vi) Acting as clearing house of information in respect of fodder availability in the surplus areas and locating fodder sources in forest areas;

(vii) Monitoring the fodder production plan implemented by various drought affected States;

(viii) Monitoring of establishment of cattle camps and measures for cattle health and conservation;

(ix) Provision of drinking water in the drought affected areas;

(x) Monitoring of the prices of the essential commodities and its distribution through the PDS;

(xi) Monitoring of the employment situation; and

(xii) Health and nutrition programmes.

2.8 The meetings of the CMG alternated with the Crop Weather Watch Group in the DAC which reviewed rainfall and weather conditions. Both of them working in tandem initiated appropriate advance action to provide the necessary support for the implementation of the agriculture contingency plans.

2.9 In order to develop focal points of contact in various Ministries/Departments and for ensuring their accountability, nodal officers were got nominated in the respective Ministries/Departments concerned with the implementation of drought relief programmes. The list of the nodal officers is at Annexure-VIII. With the positioning of the nodal officers, the coordination became smoother and the information flow got streamlined. This in turn enabled the CCD and the COS to give prompt policy directives on getting timely information from the respective Departments.

2.10 A Control Room was set up in the DAC from the 6th August, 1987 which worked round the clock from August to December 1987 and thereafter from 9.00 AM to 10.00 PM. The Control Room was responsible to get daily reports from the State Governments with regard to certain crucial items like employment generation effort, number and spread of relief works, number of persons on relief works, cattle in the cattle camps etc. The approach was to detect early signals of any emerging distress and initiate timely action to avert any crisis. By getting daily and fortnightly reports from the State Governments, it was possible to get a fair picture about the emerging drought situation and the impact of drought relief programme in alleviating distress of the affected population. The Control Room also received reports from the respective Central Departments on the implementation of Action Plan and sent regular daily and weekly reports to the Prime Minister's Office (PMO) and the Cabinet Secretariat. This well co-ordinated information system became the hallmark in handling the drought of 1987. Proformae of these reports are given at Annexure-IX and Annexure-X.

2.11 The reports obtained from the various Central Departments on the Action Plan and from the State Governments included information on the implementation of relief measures, more particularly, on employment generation, drinking water availability, supply of fodder and availability of essential commodities. On this basis a weekly report was generated and sent to PMO and the Cabinet Secretariat. Performa of such a report may be seen at Annexure-XI. With the information flow from different quarters streamlined and converging at the Control Room, it was possible for the CMG to give appropriate and speedy response to the requirements of the State Governments. The role of the Control Room as an effective Secretariat back up for the CMG came to be acknowledged as an integral part of the innovative drought management approach.

Special Conference

3.1 A Conference of Chief Ministers of the affected States was held on the 3rd September, 1987 under the Chairmanship of the Prime Minister to review the policy responses and implementation of the drought relief measures. In this Conference the Action Plan formulated by CCD was endorsed. The following points were highlighted for immediate action:

(i) The States must utilise effectively the resources in their own plans and the allocations under National Rural Employment Programme (NREP)/Rural Landless Employment Guarantee Programme (RLEGP) and other Central programmes to provide maximum employment opportunities during the drought period;

(ii) Decisions on the drought memoranda of the States should be speeded up. After the Central teams visit, and report the High Level Committee on Relief should give its recommendations within 10 days and Government decision should be available within 3 days thereafter;

(iii) It should be ensured that adequate quantities of foodgrains were delivered in the areas where they were needed and to the vulnerable sections through the PDS. Alongwith foodgrains all other basic essential materials should also be delivered to the needy;

(iv) Money had been released already for drinking water and various other schemes. A sum of

Rs. 910 crore was available under ARWSP, Minimum Needs Programme (MNP), etc. for various drinking water programmes. The priorities of programmes should be redrawn and implementation speeded up;

(v) States should concentrate on the next *rabi* crop. Wherever feasible, including the flood affected areas, fodder should be grown as a catch crop. In *rabi,* production should be maximised through supply of adequate quantities of seeds and fertilisers;

(vi) Planning Commission should ensure that help was made available to States for rephasing their schemes so that there should be quick step up in production;

(vii) In the supply of essential commodities, some manufacturers had voluntarily agreed to keep prices down. The Chief Ministers were requested to hold similar discussions with manufacturers and traders to reduce the prices;

(viii) States were to explore the possibility of supplying power during day instead of night as irrigation in the night would lead to waste of water; and

(ix) Emphasis should be on viewing the problems in the larger context over a longer term. The problems of drought and flood should be effectively tackled and all available water harnessed.

3.2 In the *rabi* conference held on 6-7 October, 1987, the *rabi* production strategy was reviewed in the context of the drought situation and the likely decline in *kharif* production. Wide ranging discussions were held on several aspects for maximising agricultural production during *rabi* 1987-88. To compensate for the shortfall in production in *kharif* on account of drought and maximising production in *rabi* 1987-88, the *rabi* conference decided on the following strategy:

(i) Scientific management of water resources;

(ii) Ensuring judicious use of scarce water at critical stages of crop growth;

(iii) Optimal use of agricultural inputs;

(iv) Diversion of area from high water intensive crops like wheat to low water intensive crops like oilseeds and pulses through extension and media;

(v) Ensuring quick availability of credit and conversion of short-term loans into medium term loans in drought affected areas;

(vi) Quickening the pace of implementation for full utilisation of funds under Small and Marginal Farmers Programme, National Oilseeds Development Programme, National Watershed Development Programme, and Oilseeds Thrust Programme; and

(vii) The involvement of extension agents of fertiliser industry to promote use of fertilisers, their participation in farmers training programmes at the village level and their active association in disseminating messages for maximising agricultural production.

3.3 A special meeting of the Relief Commissioners was held under the Chairmanship of Secretary Department of Agriculture and Co-operation on 6th January, 1988 to review implementation of drought relief measures. This meeting was specially convened, (i) to take stock of the situation in the States; (ii) to review the progress of implementation of Action Plan and relief measures in the States; and (iii) to discuss various issues with a view to evolve a long-term strategy for drought management in the country. The Cabinet Secretary also attended the meeting and emphasised the need for taking advance action to tackle the drought situation which was likely to become critical in the following summer months.

Central Assistance

4.1 While mounting such massive relief effort, the financial assistance from the GOI had to be matched to the requirements of the States both in volume and its timeliness. Taking note of the situation, the Prime Minister in the Chief Ministers' Conference held on 3rd September, 1987 stated that the time schedule laid down by the HLCR for processing the States' memoranda should be strictly followed. According to this time schedule, the Central assistance was to be sanctioned within 30 days of confirmation of the date of the visit of the Central Team from the concerned State Government. In all, 15 States and 4 Union Territories submitted memoranda seeking Central assistance for drought relief in 1987. By and large, the time schedule was adhered to in processing the

memorada. The timely issue of sanctions indicating ceilings of expenditure for drought relief enabled the State Governments to plan their relief programmes well in time. This helped in adopting a planned approach, instead of *ad hoc* approach, in building productive and useful assets under the employment generation programmes and drinking water programmes.

4.2 A Group of Secretaries of Ministries/Departments of Agriculture and Co-operation, Rural Development, Women and Child Development, Planning, Water Resources, and Expenditure was constituted to explore the possibility of providing special assistance to the SDAAs. The Group of Secretaries visited the States of Gujarat and Rajasthan in October, 1987. They suggested 5 districts in Gujarat and 6 districts in Rajasthan to be identified as SDAA districts. The proposals formulated, based on the recommendations of the Group of Secretaries, were considered by the CCD on 18th November, 1987. On the basis of the decision of the CCD, the HLCR considered the recommendations of the two Central teams which visited Gujarat and Rajasthan. On this basis HLCR identified 36 blocks in 5 districts in Gujarat and 37 blocks in 6 districts in Rajasthan for being identified as SDAAs. After discussion with the representatives of State Governments, the lists of districts/blocks were finalised with some minor modification though the number of districts/blocks remained unaltered. A formal order specifying the districts and blocks was issued by the DAC on 10th March, 1988 which may be seen at Annexure-IV.

4.3 Special assistance was extended for SDAAs in Gujarat and Rajasthan as follows: (i) 3 kg. of foodgrains per manday to workers in relief works; (ii) subsidy of 40 paise per kg of foodgrains to be equally shared by Central and State Governments; (iii) Rs. 4 per cattle per day for the cattle in the cattle camps; (iv) special nutrition at the scale of Re. 1 per adult and 75 paise per child; and (v) provision of shelter for cattle camps. Out of a total ceiling of expenditure approved for the State Government of Rajasthan for drought relief, Rs. 128 crore was specifically earmarked for SDAAs for gratuitous relief (Rs. 10 crore), employment generation (Rs. 62 crore) and cattle conservation (Rs. 56 crore). Similarly for the State Government of Gujarat, out of a total ceiling of expenditure approved for drought relief, an amount of Rs. 99.25 crore was earmarked for SDAAs for gratuitous relief (Rs. 2.25 crore), employment generation (Rs. 62.00 crore) and cattle conservation (Rs. 35.00 crore).

4.4 As part of the GOI's concern for timely and adequate relief to the people, the information flow needed for appreciation of the relief measures undertaken by the State Governments was streamlined. The GOI prescribed daily and fortnightly proformae to get information from the States. This helped in efficient monitoring of relief measures. The timely flow of the information from the field level to State headquarters and then to the GOI is of essence in monitoring and management of relief operations. The information flow was not regular in early stages as the information system at the field level had to take time to gear to meet the new demand placed on it. This was, however, quickly overcome and from January 1988, the flow of information was regular and timely from most of the States. Moreover, regular and timely flow of information became important from financial point of view as well. The release of funds from the GOI against the approved ceilings of expenditure was also linked to the flow of information and the pace of expenditure. It was only when such information was received that the DAC recommended issue of necessary releases. The monitoring also enabled early detection of unfolding severity of the drought. As the drought persisted and intensified, its severity got pronounced in the arid zones of western India which had already suffered successive drought conditions in preceeding 2-3 years. This resulted in timely approval of special assistance programmes for relief to the people of SDAAs.

The State Level

5.1 Each State Government evolved its own organisational structure to deal with the situation arising out of drought. The general features of the organisational arrangements in various States are as follows:

(i) A State level Relief Advisory Committee presided over by the Chief Minister of the concerned State and comprising public representatives and Government officials functioned in almost all the States with significant drought conditions. This Committee met depending on the needs of the situation. Some of the State Governments like Gujarat and Rajasthan set up Sub-Committees of the Cabinet to direct and monitor the relief operations very closely.

(ii) All the drought affected districts were assigned to Ministers/Ministers of State/Deputy

Ministers and they were designated as in-charges of the districts. They were asked to preside over at least one meeting in a month for each district and report progress on work under various items to the Chief Minister.

(iii) A Committee of Secretaries under the Chairmanship of the Chief Secretary was constituted to review the performance of various departments in implementation of the check-list sent by the GOI. The affected districts were assigned to Commissioners/Secretaries to the State Governments for close supervision. State level departmental officers were made incharge of districts for the purpose of ensuring timely action on sectoral relief measures. They were expected to visit the districts at least once in a month and report progress of action to the Chief Secretary and Relief Department.

5.2 Relief Department convened fortnightly meetings of the Officers in-charge of drought relief of all the districts. In these meetings all important areas of relief work were reviewed. This forum was very useful in collecting relief data promptly. In several States, the Chief Secretary presided over these meetings and reviewed the position on a continuing basis. A special cell was also established at the State level to coordinate efforts of the non-governmental organisations.

The District Level

6 At the district level, district relief committee functioned as a pivotal body. All important decisions including the nature of the relief works to be taken up, their number, areas to be identified for start of relief works, arrangement of drinking water, fodder, and providing gratuitous relief were decided in the meetings. Vigilance Squads headed by senior level officers were also deployed to inspect relief works and give reports about the implementation of relief measures and their quality from their surprise checks.

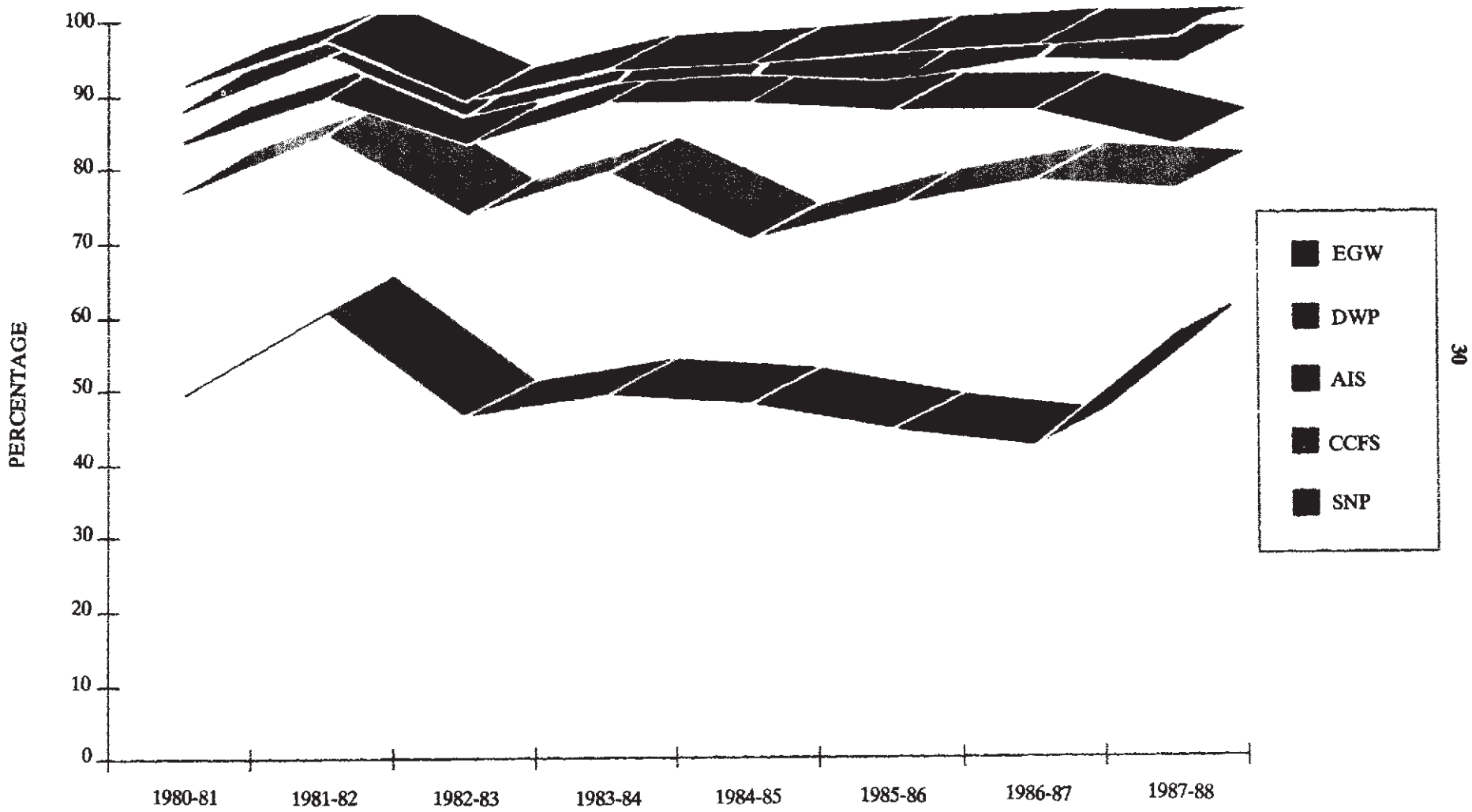
Management Information System

7.1 The State Governments evolved their own management information system to tackle the drought situation. The management information system of Gujarat was found to be quite elaborate and adequate to meet the requirements of the complex drought situation to a great extent. Some of the salient features of the system are given below.

7.2 Flow of information emanated from sub-village level/work level. The muster clerk in-charge of a work recorded presence of labourers in the muster roll. A form was prescribed under the Gujarat Relief Manual for recording presence of labourers. The muster clerk sent daily report to *taluka* office by a post card. A form for this was also prescribed. The information was consolidated in the *taluka* office. On the basis of this information the taluka office sent a weekly report to District Officers, and the Collector sent a weekly report about various relief measures including the number of works and the labourers engaged to the state headquarters. Similar drill for flow of information was undertaken by officers of forests, soil conservation, irrigation, and roads and buildings departments.

7.3 Relief Commissioner monitored and reviewed the situation report about the drought relief operations on the basis of these reports. It was the system of reporting which enabled the Relief Commissioner to send to GOI daily/weekly reports about the number of works in progress and number of labourers engaged promptly. Similarly, a fortnightly report as to the number of cattle camps and *pinjrapoles* and number of cattle being maintained by them was sent by the Relief Commissioner.

8. It is evident from the responses to the challenges posed by the drought of 1987 that the country has acquired the necessary administrative capability and resilience to face challenges of a very high order. That the management of the crisis was not confined only to the immediate challenge but also envisaged long term positive response is a pointer to the quality of perceptions at the policy and administrative levels. That financial considerations were not allowed to come in the way and inhibit extending of adequate relief also indicate the commitment of the Government to the welfare of the vulnerable sections especially in times of distress. Accessability of the vulnerable groups to foodgrains all over the affected areas and more particularly in the tribal areas was an integral part of the 1987 drought relief programmes. The cohesion and the effective coordination in the functioning of the various Ministries/Departments of the Government at the Centre, State and local levels was the dominant theme that can be discerned throughout the drought management efforts in 1987.


PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
EGW
DWP
AIS
CCFS
SNP
30

5 RESOURCE MOBILISATION

The successive natural calamities faced by the country in the form of droughts and floods, necessitated deployment of substantial resources for taking up adequate rehabilitation and reconstruction operations. These natural calamities not only disrupt the current living standards of the affected population but also have an adverse impact on the economic development of the affected area over a longer time span. Relief becomes a highly emotive issue due to the suffering caused to the affected population which has to be taken note of by the Central and the State Governments. In their effort to mitigate immediate suffering of the population and taking steps for reconstruction of the infrastructure, Governments have to subordinate their other objectives. In the Indian system, providing relief to victims of natural calamities has been accepted primarily as the responsibility of the States. The Centre's role is to supplement the States' efforts through provision of additional resources.

Recommendations of Finance Commissions

2.1 The policy regarding the financing of relief expenditure has been undergoing changes from time to time on the basis of the recommendations of the successive Finance Commissions. The present policy of extending financial assistance in the case of natural calamities has evolved out of the recommendations of the Seventh Finance Commission. The Seventh Finance Commission felt that margin money for each State Government should cover the immediate requirements for providing relief in the wake of natural calamities. Fifty per cent of this amount of margin money is to be borne by the GOI. For expenditure in excess of the margin money, the State Government is required to submit a memorandum and the HLCR, on the basis of the estimates provided by the Central team, determines the ceilings of expenditure for different purposes. In the case of drought, the State Government makes a contribution from its Plan upto 5 per cent of its Annual Plan outlay. The expenditure, in excess of such contribution, qualifies for assistance from the Central Government to the full extent, by way of 50 per cent grant and 50 per cent loan, in the case of drought; the contribution of the State Government from its plan is also made available to the State by the GOI as

Table 8: Margin Money Recommended by Seventh and Eighth Finance Commissions

(Rs. in crore)

S. No.	States	Seventh Finance Commission	Eighth Finance Commission
1.	Andhra Pradesh	8.58	24.50
2.	Assam	3.46	7.25
3.	Bihar	13.08	33.75
4.	Gujarat	9.56	28.75
5.	Haryana	1.47	4.50
6.	Himachal Pradesh	0.51	1.75
7.	Jammu and Kashmir	1.30	1.50
8.	Karnataka	2.00	6.00
9.	Kerala	1.59	5.00
10.	Madhya Pradesh	1.83	4.75
11.	Maharashtra	4.57	7.25
12.	Manipur	0.08	0.25
13.	Meghalaya	0.07	0.25
14.	Nagaland	0.14	0.25
15.	Orissa	8.71	26.25
16.	Punjab	2.68	6.00
17.	Rajasthan	7.74	16.75
18.	Tamil Nadu	8.59	8.75
19.	Tripura	0.18	0.75
20.	Uttar Pradesh	10.80	32.50
21.	Sikkim	0.01	0.25
22.	West Bengal	13.60	23.75
	Total:	100.55	240.75

advance plan assistance. The Eight Finance Commission, whose recommendations are currently in force, followed this pattern of financing of relief expenditure but fixed the margin money for the States at much higher levels. The recommendations of the two Finance Commissions in respect of margin money may be seen in Table 8.

2.2 The current procedure for dealing with memoranda of the States is that a memorandum for Central assistance is required to be submitted by a State Government, when it anticipates the relief expenditure in excess of its margin money. Thereupon, the GOI deputes a Central Team for making an assessment of the requirements for resources for relief measures. The report of the Central team is considered by the HLCR. On the basis of the recommendations of the HLCR, the Ministry of Finance (MOF) issues sanctions determining ceilings of expenditure for different items of relief. The HLCR has laid down in 1987 that (a) a Central Team should be consituted within 7 days of the receipt of the memorandum; (b) the Central Team should submit its report within 7 days of the conclusion of the visit; and (c) the sanction letter of MOF should issue within 30 days of the confirmation of the State Government of the visit of the Central team.

2.3 The quantum of Central assistance for natural calamities relief since the First Five Year Plan is shown in Table 9. The Central assistance to the States has risen from less than Rs. 10 crore per annum in the first three plans to Rs. 1,755 crore in 1987-88. The low levels of Central assistance in the earlier years may be due to the limited number of purposes for which assistance was extended; the scope of Central assistance has been undergoing changes, from time to time, due to the recommendations of the successive Finance Commissions. The increase in the amount of Central assistance in recent years is attributable to a significant extent to the enlarged scope of Central assistance.

2.4 The Seventh Finance Commission introduced differential pattern of assistance for the drought on the one hand and floods, cyclones, hailstorms, etc. on the other. This differenciation was also

Table 9: Central Assistance Sanctioned to States for Natural Calamities Relief, 1951-52 to 1987-88.

(Rs. in Crore)

S. No.	Period	Total Amount Sanctioned (Ceilings of Expenditure)	Average Annual Assistance (Ceilings of Expenditure)
1.	I Five Year Plan (1951-52 to 1955-56)	28.18	5.64
2.	II Five Year Plan (1956-57 to 1960-61)	38.55	7.71
3.	III Five Year Plan (1961-62 to 1965-66)	32.07	6.41
4.	Annual Plan (1966-67)	58.36	58.36
5.	Annual Plan (1967-68)	99.97	99.97
6.	Annual Plan (1968-69)	105.54	105.54
7.	IV Five Year Plan (1969-70 to 1973-74)	1197.97	239.59
8.	V Five Year Plan (1974-75 to 1978-79)	651.40	130.28
9.	Annual Plan (1979-80)	341.43	341.43
10.	VI Five Year Plan (1980-81 to 1984-85)	2791.97	558.39
11.	VII Five Year Plan (1985-86 to 1989-90)		
	(a) 1985-86	1035.26	1035.26
	(b) 1986-87	1041.97	1041.97
	(c) 1987-88	1755.04	1755.04

maintained by the Eighth Finance Commission. The figures of Central assistance for drought relief from 1979-80 to 1987-88 are shown in Table 10.

2.5 The Eighth Finance Commission observed that with the increase in the margin money to Rs. 240.75 crore with a 50 per cent contribution by the Centre, the State Governments would contain the relief expenditure within this amount. However, the expectation of the Finance Commission has not proved correct. The expenditure on natural calamities relief has increased manifold. Most of the States did not carry over the unspent margin money to the next financial year. The State Governments always showed expenditure under local calamities and claimed central share of margin money for meeting such contingencies.

2.6 The sectorwise ceilings of expenditure approved for drought relief from 1980-81 to 1988-89 (pre-monsoon) are shown in Table 11. The bulk of the Central assistance has gone for employment generation and drinking water supply (See figure 5). The Central assistance for drought relief has been steadily going up and even as a proportion of the plan outlays, it has registered steady increases. A statement showing Central assistance released against approved ceilings in respect of States, whose ceilings exceeded 5 per cent of the Plan outlay for the period from 1979-80 to 1986-87 may be seen at Table 12. It will be seen that the net Central assistance, after setting off margin money and 5 per cent of the Annual Plan outlay, has also been rising.

Central Assistance for States and Union Territories

3.1 All the drought affected States and Union Territories except the Union Territories of Dadra and Nagar Haveli, and Daman and Diu sought Central assistance for drought relief during the drought of 1987. Ceilings of expenditure totalling Rs. 1,472.10 crore including Rs. 382.47 crore for utilisation in April-July 1988 were approved for these States and Union Territories for tackling the situation effectively. Ceilings of expenditure approved for States/Union Territories during the drought of 1987 are shown in Table 13.

3.2 Nine States which were affected during the post-monsoon period 1986-87 were required to continue drought relief operations during April-June, 1987. Ceilings of expenditure of Rs. 226.43 crore were approved for these States: (1) Andhra Pradesh (2) Gujarat (3) Madhya Pradesh (4) Maharashtra (5) Rajasthan (6) Karnataka (7) Goa (8) Kerala, and (9) Tamil Nadu.

3.3 Two out of the 35 meteorological sub-divisions had excess rainfall and 12 had normal rainfall during south-west monsoon period of 1987. The north-eastern part of the country faced floods and heavy rains. The States of Assam, Arunachal Pradesh, Bihar, West Bengal, Sikkim and Uttar Pradesh

Table 10: Central Assistance to States/Union Territories for Drought Relief, 1979-80 to 1987-88.

(Rs. in crore)

S. No.	States/Union Territory	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
1.	Andhra Pradesh	22.05	42.97	26.25	68.77	28.26	54.42	63.09	63.24	94.089
2.	Arunachal Pradesh					0.09				
3.	Assam	6.40							7.40	
4.	Bihar	11.82	24.82		25.01	8.98				
5.	Goa									0.64
6.	Gujarat		6.12		30.68	9.18		31.83	156.87	282.67
7.	Haryana	4.50	4.02	8.25	11.82		8.70	9.21	16.70	37.275
8.	Himachal Pradesh	3.70	10.01	2.65	13.02		12.70	23.13	0.70	18.705
9.	Jammu and Kashmir	2.79						4.12		18.981
10.	Karnataka		6.65	13.81	8.81	14.00	32.73	62.46	53.82	47.628
11.	Kerala				4.10	42.46		0.30	3.65	47.352
12.	Madhya Pradesh	22.80	47.90		34.36 6.63**	22.29	11.38	51.11	22.70	81.059
13.	Maharashtra	8.54	16.25		56.89	11.63	30.63 1.20@	65.56	97.24	68.689
14.	Manipur	2.72							0.76	
15.	Mizoram					1.43	0.84	0.24		
16.	Meghalaya	0.77							0.17	
17.	Nagaland	0.67								3.876
18.	Orissa	14.05	17.66		15.90 3.80**	24.65	2.95	6.00		59.585
19.	Punjab						6.35@	8.14		29.386
20.	Rajasthan	18.75	40.31	87.83	74.00	39.85	5.43	89.65	142.52	433.158
21.	Sikkim				0.17	0.13				
22.	Tamil Nadu			49.77	10.39	59.15			31.77	62.937
23.	Tripura	1.33			2.01*				0.86	
24.	Uttar Pradesh	34.91	47.52			1.57	8.10	51.78	10.88	155.736
25.	West Bengal	27.67		1.50	74.27	30.59				
26.	Andaman and Nicobar Islands									0.28
27.	Chandigarh									0.08
28.	Delhi									0.36
29.	Pondicherry				0.31	0.44		1.19	0.06	0.594
	Total:	183.47	264.23	190.06	430.51 10.43** 440.94	294.70	175.43	467.81	609.34	1433.075

Note: *Includes Rs. 1.10 crore sanctioned for 1981-82 to Tripura.
@Cold wave and loss of Cotton.
**Sanctioned in 1984-85.

had been affected by floods. In Himachal Pradesh the district of Shimla was marginally affected due to flash floods. Nagaland State was also marginally affected due to heavy rains. Jammu and Kashmir experienced hailstorms and rains once during May-June, 1987 and again in October, 1987. The State of Punjab also reported damage due to hailstorms. The State of Andhra Pradesh experienced cyclonic storms thrice in October-November, 1987 causing damage to life and property. All these 11 affected States sought Central assistance for taking relief measures. A ceiling of expenditure of Rs. 289.05 crore was approved during 1987-88 and another ceiling of Rs. 4.44 crore was approved during 1988-89 for flood, etc. relief measures.

3.4 In addition to the above ceilings as part of the strategy of optimising fodder production in the area where residual moisture was available, GOI sanctioned financial assistance amounting to Rs. 8.90 crore for the States of Rajasthan (Rs. 2.33 crore), Gujarat (Rs. 2.00 crore), Orissa (Rs. 0.195 crore) and Rs. 0.875 crore each to Madhya Pradesh, Tamil Nadu, Haryana, Punjab and Bihar.

3.5 Serious shortage of vegetables was expected in the wake of the drought. As such a special programme for increasing vegetable production by way of assisting the small and marginal farmers by

Table 11: Sectorwise Ceilings of Expenditure Approved for Drought Relief, 1980-81 to 1988-89 (Pre-Monsoon)

(Rs. in crore)

S. No.	Year	Agri-culture Input Subsidy	Drinking Water Pro-gramme	Employ-ment Gene-ration Schemes	Cattle Conser-vation and Fodder Supply	Supple-mentary Nutri-tion Pro-gramme	Gratui-tous Relief	Public Health	Coope-rative Loans		Total
1.	1980-81	15.75	73.71	131.29	12.92	6 86	13.79	6 59	3.32*		264.23
		(5.96)	(27.89)	(49 69)	(4 89)	(2 60)	(5 22)	(2.49)	(1 26)		(100.00)
2.	1981-82	9.72	45.96	114.76	9.66	4.65	2.85	2.46			190.06
		(5.11)	(24.18)	(60.38)	(5.08)	(2.45)	(1 50)	(1.30)			(100.00)
3.	1982-83	43.09	123.08	207.14	15.66	9 03	24 33		26.61*		448.94
		(9 60)	(27 41)	(46.14)	(3.49)	(2 01)	(5 42)		(5.93)		(100 00)
4.	1983-84	27.72	88.78	144.49	7.71	5 20	7 80		13.00*		294.70
		(9.41)	(30.13)	(49.03)	(2.62)	(1 76)	(2.65)		(4.40)		(100.00)
5.	1984-85	32.38	39.31	83.61	6.32	2.50	1.70	1 50	7 84	0 27*	175.43
		(18.46)	(22.41)	(47.66)	(3 60)	(1.43)	(0.96)	(0.86)	(4.47)	(0.15)	(100.00)
6.	1985-86	59.47	142.47	206.26	18.97	17.24	5.04	3 95	14 41		467.81
		(12.71)	(30.45)	(44.09)	(4 06)	(3.69)	(1.08)	(0.84)	(3 08)		(100 00)
7.	1986-87	58.76	216.90	255.38	42.69	9.26	4.35	1.85	20.15		609 34
		(9.67)	(35.68)	(42.01)	(6.78)	(1.52)	(0 72)	(0.30)	(3.32)		(100.00)
8.	1987-88	16.43	69 67	123 51	9.35	2 08	1 25	1.15	2.99		226.43
	Pre-monsoon	(7.26)	(30.77)	(54.55)	(4.13)	(0.92)	(0 55)	(0 50)	(1 32)		(100.00)
9.	1987-88	65.20	209.10	624 30	119 29	41 07	19.10	9 32	2.25		1089.63
	Post-monsoon	(5.98)	(19.19)	(57.29)	(10.95)	(3.77)	(1.75)	(0 86)	(0.21)		(100.00)
10.	1988-89	18.88	60.94	217.75	56.91	15.74	10.00	2.25			382.47
	Pre-monsoon	(4 94)	(15 93)	(56.93)	(14.88)	(4 12)	(2 61)	(0.59)			(100.00)

Note : *Other schemes
Figures in parentheses indicate percentages.

supply of quality seeds in 267 districts in the affected States with an outlay of Rs. 2.44 crore and also assistance to 26 Agricultural Universities @ Rs. one lakh each for production of vegetable seeds were approved.

3.6 In view of the urgency of the situation, the GOI decided that it would not be prudent to wait for the memoranda for Central assistance from the States to extend support in the drinking water supply sector. Therefore, action was initiated on the basis of the reports from the field agencies and the reconnaisance and assessment reports of the DAC to extend ways and means advance to the States to make immediate arrangements for supply of drinking water to the affected area. These

Table 12: Central Assistance Released for States with Approved Ceiling Exceeding 5 per Cent of the Plan Outlay, 1979-80 to 1986-87.

(Rs in Crore)

S No	State	1979-80		1980-81		1981-82		1982-83		1983-84		1984-85		1985-86		1986-87	
		Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent	Upto 5 per cent	Beyond 5 per cent
1	Andhra Pradesh			25 05	14 18			30 25	35 61			45 92	7 77	40 50	10 88	55 00	16 59
2	Gujarat															47 50	92 03
3	Karnataka													32 55	18 98	38 25	8 43
4	Kerala									16 00	22 35						
5	Madhya Pradesh			27 05	11 71			36 05	3 18								
6	Manipur	1 55	1 05														
7	Orissa	9 55	0 75							17 25	4 80						
8	Rajasthan	13.75	2.45	16 69	7 71	17 00	48 04	17 00	80 12					21 50	51 89	26 25	115 01
9	Tamil Nadu					25 70	4 20			42 25	5.71						
10	West Bengal							24 50	36 16								

Table 13: Central Assistance Extended to States/Union Territories during Drought of 1987.

(Rs. in Crore)

S. No	State/Union Territory	Assistance Extended		Total
		Upto March, 1988	From April to June/July, 1988	
1.	Andhra Pradesh	68.90	13.17	82.07
2.	Gujarat	251.12	132.74	383.86
3.	Haryana	37.27	1.69	38.96
4.	Himachal Pradesh	18.70	0.99	19.69
5.	Jammu and Kashmir	18.98	3.33	22.31
6.	Karnataka	46.64	13.45	60.09
7.	Kerala	31.85	3.75	35.60
8.	Madhya Pradesh	63.38	48.71	112.09
9.	Maharashtra	37.68	30.62	68.30
10.	Nagaland	3.88	0.28	4.16
11.	Orissa	59.58	14.15	73.73
12.	Punjab	29.39	0.14	29.53
13.	Rajasthan	364.03	235.01	599.04
14.	Tamil Nadu	28.20	4.73	32.93
15.	Uttar Pradesh	155.74	16.35	172.09
16.	Andaman and Nicobar Islands	0.28		0.28
17.	Chandigarh	0.08		0.08
18.	Delhi	0.36		0.36
19.	Pondicherry	0.59		0.59
	Total	1216.65	519.11	1735.76*

Note : *—Includes assistance sanctioned for special schemes, viz., production of fodder (8.025), completion of identified irrigation projects (236), distribution of vegetable minikits (1.98), and handloom/handicraft sector (17.65). Ceiling of expenditure approved based on Central Team/High Level Committee on Relief recommendations: 1089.63 upto March, 1988 and 382.47 April to July, 1988. (All figures in Rupees in crore).

advances were adjusted against the ceilings of assistance approved later on the basis of the recommendations of the Central Team following the usual procedure. The advance Central assistance released to States for drinking water supply may be seen in Annexure-XII. In addition, assistance was also extended to procure high power drills and other machinery like hydro-fracturing units and geo-electrical equipments to the State Governments and the C G W B since these had a long lead time for procurement.

3.7 Due to intensification of drought, the urban area of Ajmer and Jodhpur in Rajasthan, and Rajkot and Jamnagar in Gujarat started facing acute problem of drinking water supply. In order to augment the water supply to Ajmer including 5 other nearby towns, the Bilaspur project was started in 1987-88 with a total estimated cost of Rs. 64.37 crore for completion by March, 1990. The APA of Rs. 8 crore was provided under drought for expediting this project. This was supplemented by another instalment of APA of Rs. 5.5 crore in 1988-89. Similarly, the normal supply of 18 million gallons per day (MGD) of water to Jodhpur city got reduced to critical level due to failure of monsoon during the drought. A project, namely, Indira Gandhi National Project (IGNP) Lift Canal Scheme (Phase-I) with a revised cost of Rs. 85.22 crore for augmenting water supply to Jodhpur city and 158 villages was started by Government of Rajasthan in 1984. For accelerating the pace of work on this project APA of Rs. 4 crore in 1987-88 and Rs. 5.5 crore in 1988-89 was provided. This amount was further supplemented by Rs. 3 crore sanctioned for employment generation scheme as drought relief. On similar consideration, Rs. 10 crore of APA was provided for Rajkot water supply scheme and Rs. 4 crore for Jamnagar water supply scheme during 1988-89. The APA accelerated the pace of progress. To maintain the tempo of works on these schemes requisite provisions were also made in the Annual Plans of the respective States.

3.8 The drought of 1987 brought to the fore the need for taking long-term measures so as to drought proof the affected area. It is in this context that Planning Commission approved an additional outlay of Rs. 236 crore for expediting identified irrigation projects under execution in the

drought affected area. For this purpose, 94 major and medium irrigation projects and 19 minor irrigation programmes were identified in 14 States. These projects were identified as it was felt that with the additional assistance, they might be completed within a period of 2 years to create an additional potential of 1.64 lakh hectare. The additional assistance was provided subject to the State Governments utilising the Plan outlays for the identified projects in full so that there was no reduction in the outlay.

3.9 The additional outlay provided for completion of the projects within a period of 2 years was funded as follows: (a) 50 per cent of the additional outlay required was found from the funds allocated for the employment-generation programmes under the drought relief assistance, as approved by the GOI on the recommendations of the HLCR; and (b) The remaining 50 per cent was made available as net additionality under drought over and above the amount sanctioned as drought relief assistance to the State. This amount was spent on material components, as was agreed to in individual cases by the Planning Commission.

3.10 In the Conference of Chief Ministers held on 3rd September, 1987, the Prime Minister observed: "We need to consider how vastly improved irrigation and water supply management might free Indian agriculture of the constraints of the weather. This might require additional resources and a fresh look at priorities." In pursuance of this direction, the Planning Commission advised the States that they could divert resources from other sectors to irrigation and water management after utilising fully the approved outlays.

3.11 The States were also asked to separately examine the possibility of taking up more programmes relating to (i) National Watershed Development Programme/Dryland Agriculture, and (ii) Assistance to small and marginal farmers for increasing agricultural production, on the specific understanding that these would be completed within 1987-88.

Credit for the Farmers

4.1 In the wake of drought as early as August, 1987, the Reserve Bank of India (RBI) advised the banks to provide financial assistance to the affected farmers/persons on a priority basis in order to enable them to undertake a second sowing, raise an alternative short duration crop and for fodder cultivation. The banks were further advised to allow conversion of short-term loans into medium-term loans as also to reschedule investment credit in case of a complete loss of crops. In addition, banks were to provide loans for minor irrigation and setting up of fair price shops.

4.2 The RBI and the NABARD advised the banks that in case of farmers affected by drought for three or more years in succession ending with 1987-88, the following concessions may be extended:

(i) The State Co-operative Banks, Central Co-operative Banks, Regional Rural Banks, and so also the commercial banks shall defer for a period of 2 years or till the next normal year, if it occurs earlier, the recovery of the amount falling due on account of principal as well as interest in the current year (July 1987 to June 1988);

(ii) For each of the years affected by drought, banks shall grant the conversion/reschedulement facility to the affected borrowers for a period of 7 years (instead of the usual period of 5 years) inclusive of the 2 year moratorium period referred to in sub-para (i) above. The loan will thus be rescheduled over a total period of 10 years;

(iii) Ordinarily, the rate of interest charged for such converted/rescheduled loans is 11.60 per cent (upto Rs. 5,000) which is same as that for crop loans. However, the short term (crop) loans of each of these years converted/rescheduled in 1987-88 as in sub-para (ii) above, and repaid in future years within due date as per instalments fixed, shall be charged interest at 10 per cent, if such short-term (crop) loan so converted/rescheduled loan does not exceed Rs. 5,000 each. Higher loan will be charged at the normal rate of interest;

(iv) Banks shall not charge penal interest on individual agricultural loans upto Rs. 25,000 borrowed during the period of 3 or more years of consecutive droughts;

(v) Banks shall not charge compound interest on the dues converted/rescheduled; and

(vi) In the case of short-term (crop) loans, the total interest payable by small and marginal farmers shall not exceed the principal amount.

4.3 These measures announced by the RBI/NABARD did not provide any relief by way of write

off. The banks were, therefore advised not to collect interest from small and marginal farmers in excess of the principal amount (by application of the rule of *dampudat*). Similarly, banks were advised not to collect penal interest on agricultural loans defaulted during three consecutive droughts.

4.4 Banks were also advised that the lead bank machinery in the concerned districts should be activated and immediate meetings of the District Consultative Committee (DCC) should be held. The progress in implementing the Action Plan should be monitored closely by the Standing Committee by holding special mid-month meetings. This was to be reviewed by the DCC. In all affected States, the nature of assistance to be extended to the affected persons was also to be discussed on an urgent basis by the State Level Bankers Committee. Regional Managers of the banks were required to pay special attention and oversee the performance of each of the branches under their control in re-rendering assistance on the basis of the agreed programme allotted to them. They were directed to visit all the bank branches in the affected area and review the progress and provide necessary guidance.

4.5 The limit of consumption loans to small and marginal farmers and other weaker sections of the society was doubled from Rs. 250 to Rs. 500. The banks were also advised that in case a bank faces temporary resource constraint in extending assistance to the affected persons, it may approach the RBI for accommodation under the existing refinance facilities.

Additional Resources

5.1 A budget provision of Rs. 622 crore for providing assistance to States for natural calamities for 1987-88 was made. Following steps were taken to mobilise additional resources. The GOI announced surcharge on personal income tax, corporate income tax, wealth tax and customs duties as well as surcharges on upper class railway fares. These surcharges were expected to yield additional revenue of Rs. 500 crore. Administrative efforts to improve revenue collection were also intensified. At the same time the GOI also initiated economies in expenditure which were expected to yield a saving of Rs. 650 crore. Furthermore, to help finance the substantial additional imports of essential items such as edible oils and pulses necessitated by the drought, the GOI took a number of initiatives for additional mobilisation and accelerated disbursement of external assistance.

5.2 The policy regarding external assistance in the wake of the drought was also considered by the GOI and it was decided that the situation should be tackled through the country's own efforts though the drought was severe. It was therefore decided that no foreign assistance should be solicited either in cash or in kind for drought relief and that efforts for commercial credit could be considered on merit on a selective basis. Assistance from multilateral agencies/countries for taking up measures in the wake of drought was also to be considered on a selective basis. In pursuance of this policy, external assistance was received from donor countries and multilateral agencies.The Internatinal Bank for Reconstruction and Development (IBRD) provided an assistance of U.S. dollar 150 million while International Development Association (IDA) provided an assistance of U.S. dollar 200 million. The European Economic Community (EEC) provided an assistance of ECU 20 million. Japan provided an assistance of yen 29.5 billion, the U.S.A. Rs. 8.10 crore, the U.S.S.R. 6 drilling rigs, West Germany DM 10 million, France FF 40 million, Italy U.S. dollar 5 million, Sweden S.Kr 50 million and Turkey 200 tonne of lentils.

Climatic variability is a predominant feature of Indian agriculture and, therefore, crop production is greatly conditioned by climatic risks. Often due to the late onset of the monsoon, prolonged dry-spells during the cropping season or total failure of monsoon leads to partial or complete failure of crops. The management of the drought primarily involves development of crop management strategies for minimising the severity of the impact caused by the weather aberrations.

1.2 Even though the area under irrigation in India has gone up considerably over the years, most of the irrigation systems are based on the availability of surface water, which in turn depends on the rainfall. During unfavourable monsoon period, reservoir levels go down, shallow wells dry up and tank irrigation systems have low capacity to support crops.

1.3 When a major drought is preceded by a series of 3-4 years of unfavourable monsoon the problem gets accentuated and it is all the more difficult to support crop systems with groundwater sources which are already exhausted due to poor replenishments over the consecutive drought years. The consecutive droughts lead to destruction of biomass in varying degrees creating hardship to millions of farm families.

1.4 South-west monsoon (June to September) is the main season in which about 80 per cent of the precipitation is received. Out of net sown area of about 141 million hectare in the country, 70 per cent of the area is unirrigated and follows cropping patterns as determined by the erratic and unpredictable rainfall, soil type and traditions of the farming community. In the post-Independence era the country has faced major droughts in 1965-66, 1972-73, 1979-80 and 1987-88. Over the years a number of strategies have been evolved to mitigate the impact of drought.

Contingency Crop Planning

2.1 In India approximately one - third each of the arable area receives 500-750mm, 750-1125mm and 1125mm and above, rainfall. As the rainfall increases the co-efficient of variability decreases. With low rainfall the variation of rainfall from the mean is much higher than with high rainfall. Axiomatically the likelihood of breaks in rainfall, leading to drought are more in low rainfall areas.

Table 14: Magnitude of Drought in Selected Years, 1965-1987

S.No.	Year	Number of Sub-Divisions Affected	Geographical Area with Deficient / Scanty Rains as Percentage of the Total Area	Percentage of Normal Food-grains Production Accounted for by Affected Sub-Divisions
1.	1965	19	66	53.23
2.	1966	13	48	43.21
3.	1972	19	57	45.55
4.	1974	17	55	47.99
5.	1979	18	52	53.50
6.	1982	10	36	21.45
7.	1986	14	34	26.88
8.	1987	21	63	53.66

For instance in Bellary in Karnataka with an annual rainfall of 508mm, 5 years out of 10 years are sub-normal leading to drought. On the other hand in the sub-mountaneous region of Dehra Dun in Uttar Pradesh with an annual rainfall of over 2000 mm, a drought is likely to occur once in six years.

2.2 Besides the cumulative rainfall of an area, the other variables which are important while considering the moisture availability to crops are: (a) Distribution of the rainfall; and (b) Intensity of the rainfall. The distribution has a significant impact on the moisture availability at different phenological stages of crop growth. Even though the total rainfall is adequate, if its distribution is such that in critical stages (flowering and grain formation) there is no moisture availability, the crop yields would be seriously affected. Similarly, if the intensity is very high i.e., more than 25 mm per hour much of the rain water runs off the farm fields. Thus an understanding of rainfall and its characteristics becomes important for effective planning for increased moisture availability to crops and for better crop planning through choice of crop varieties and cropping systems. Well defined cropping patterns exist in the country which have emerged on the basis of long-term traditional experience. The latest crop production technology applies only to normal monsoon years and, if for any reason, monsoon fails, they need to be modified to fit into the changed situation.

2.3 During 1987 as many as 21 meteorological sub-divisions out of 35 recorded deficient / scanty rains leading to drought. These sub-divisions account for about 54 per cent of the total foodgrains production in the country. A comparison of the magnitude of the problem during selected drought years is shown in Table 14.

It may be seen that India faced eight agricultural drought years in the past 25 years and the drought of 1987 was one of the severest and widespread in terms of its impact and sweep. The drought of 1987 threatened significant loss in crop production in respect of rice, wheat, coarse cereals, groundnut, cotton and jute. Another striking aspect was that drought of 1987 was preceded by 3 unfavourable seasons of 1984-85, 1985-86 and 1986-87. No other previous major drought was preceded by consecutive unfavourable seasons extending to 2-3 years.

2.4 The India Meteorological Department(IMD) had established Agromet Advisory Centres in 9 States and from each of these centres agromet advisory bulletins were issued in coordination with the State Agricultural Departments which took into account the state and stage of growth of crops. The bulletins were passed on to the farming community for planning various agricultural operations starting from sowing to harvesting stages. In addition, the climatic conditions and the rainfall predictions as received from IMD were critically examined in the DAC every week and necessary measures were suggested to the States for follow up action. The IMD alerted the DAC in June end/ early July 1987 regarding the likelihood of a 'weak' monsoon during the season.Immediate steps were taken and on 3rd July, 1987 States were advised about the contingency crop plans, the details of which may be seen at Annexure-XIII.

2.5 Based on research recommendations, regionwise, alternate crop strategies were suggested to various States to meet the drought situation of 1987. These contingency crop production plans contained alternate crop / varieties depending on commencement of rains and availability of soil moisture. This greatly helped States in formulating their strategies to meet the challenge of drought of 1987.

2.6 With the deficient / scanty rains in the beginning of the monsoon, the growing season of the crop was reduced. The normal crop varieties may not remain suitable for the later periods of the season. Under such a situation, alternate crops / varieties have to be chosen and sufficient quantities of seeds of these crops / varieties have to be made available to the farmers. During drought of 1987, the DAC suggested some changes in the crops and cropping systems. It recommended adoption of alternative varieties / crops particularly in the case of pearl millet, paddy, sorghum and maize. Similarly, some alternate fodder crops and short duration pulses were recommended to be cultivated in place of pearl millet and groundnut in the States of Gujarat and Rajasthan. Alternate systems of sowing, particularly in regard to increased seed rate, was recommended in the case of delayed planting under moisture stress conditions.

2.7 In some States, drought situation developed after the crop had already been sown. Under such situation, some corrective measures were taken which included (a) re-sowing of shorter duration crops, (b) under-taking mulching operations if mild stress occurred, and (c) removal of weed from the fields so that there was minimal competition for moisture and nutrients to the standing crops. These measures proved quite helpful in minimising crop losses.

***Rabi* 1987-88**

3.1 During 1987-88 when drought situation developed in *kharif* 1987, emphasis was laid for more increased production during the following *rabi* season. Crop production programmes were reviewed and it was felt that with the reasonably good rains in the subsequent months, it might be possible to have an adequate stored soil moisture for raising good crops even under rainfed conditions. Emphasis was also laid for more rational use of irrigation water and a cropping system was suggested which included low water duty crops in place of rice, wheat and sugarcane which are high water duty crops. Emphasis was also laid to increase the efficiency of irrigation management systems so that irrigation water could be saved and maximum area could be irrigated from the limited water resources. In order to implement the compensatory programme, it was considered essential to develop the seed programmes which could provide sufficient quantity of required varieties of seed in such a drought situation. About 4 lakh quintal of wheat seed for covering additional area was arranged during 1987-88 and a scheme for distribution of 1.37 lakh minikits in drought affected area for growing vegetables at an outlay of Rs. 2.06 crore was sanctioned.

3.2 In order to make good the *kharif* losses due to drought a *rabi* production strategy was formulated to take maximum advantage of available water in the reservoirs / wells by following strict water budgeting for various crops. Details of the strategy may be seen at Table 15. The drought situation of 1987 posed a number of problems. The most important one was proper coordination amongst Ministries of Agriculture, Water Resources, Power and Energy and Rural Development. The reservoir position was not satisfactory and it needed concerted efforts on the parts of Ministry of Agriculture and Ministry of Water Resources for strict water budgeting. The arrangement worked to a large extent but it could have been much better had the releases of water been made at critical crop stages.

3.3 The efforts made by the Ministries of Water Resources, Petroleum and Chemicals and Power had greatly helped in containing the crop losses. Vital inputs like irrigation water, uninterrupted power supply for a minimum 8 to 10 hours a day on priority basis to agriculture sector and provision of high speed diesel (HSD) and other petroleum products ensured the success of *rabi* strategy in the drought affected area.

3.4 With the approval of the CCD, an amount of Rs. 15.92 crore was sanctioned to NSC for the procurement of good quality wheat grain from Food Corporation of India to meet the requirement of wheat seed of the State of Bihar and Jammu and Kashmir during *rabi* 1987-88. The uncertified wheat seed was supplied to both these States in time after germination test for the sowing during *rabi* 1987-88.

Table 15: Compensatory Crop Production Programme, 1987-88.

STRATEGY FOR CROP PRODUCTION 1987-88

WHEAT PRODUCTION

The State of Uttar Pradesh, Punjab, Madhya Pradesh, Haryana, Bihar and Rajasthan account for 88 per cent of Wheat area in the country.

Punjab and Haryana

— Treat the seed with Vitavax/bavistin to control loose smut.
— Since water availability is not sufficient, apply irrigations at critical growth stages and according to water availability. Crown root initiation and boot stages are most important.
— Balanced use of fertilizers including micronutrients wherever deficient.
— Top dress N, if winter rains are received.
— Control weeds by applying Isoproturon or Dosanex.

Uttar Pradesh and Rajasthan

— Adopt timely sowing of the crop.
— Divert part of the wheat area to oilseeds and pulses where irrigation water is a serious constraint e.g. in the tail end area of the command.
— Increase fertilizer use particularly of N and P.
— Top dress N, if winter rains are received.
— Regulate canal water supplies to provide irrigation at critical growth stages.

Bihar

— Ensure availability of quality seed of varieties suitable for late planting.
— Use higher seed rate to ensure optimum plant population.
— Increase area under wheat by late planting in the flood affected districts.
— Ensure moderate application of fertilizers (40 Kg N, and 20 Kg P_2 O_5 per hectare).
— Increase water availability by exploiting under ground water.

Madhya Pradesh

— Popularise use of seed drill.
— Use fertilizers under rainfed conditions.
— Irrigate the crop at crown root initiation stage.
— Divert part of the area to oilseeds and pulses, below Vindhyan belt.

RICE PRODUCTION

Minimizing loss in current Kharif

— The rainfed upland crop may now be protected from diseases, insect pests, and post-harvest losses.
— The rainfed lowland crop should be topdressed with N @ 15-25 kg per hectare soon after the withdrawal of water, if it has not reached grain filling stage. This be followed by appropriate plant and weed protection measures.
— The irrigated crop fertilized adequately and irrigation schedule and plant protection measures should be followed to maximize production.

Rice crop during *rabi* 1987-88 in the areas with sufficient water

— Apply adequate quantity of compost and 50kg each of N and P_2 O_5 per hectare to the nursery bed to raise vigorous seedlings.
— Select high yielding varieties of 90-110 days duration.
— Raise healthy seedling from 15th January to 15th February and transplant after 20 days.
— A fertilizer dose of 80-100Kg N and 40-50Kg P_2 O_5 per hectare should be applied. Out of total nitrogen, 75 per cent should be applied as basal and remaining 25 per cent at panicle initiation stage.

— The crop should be protected from insects, pests and diseases by following recommended plant protection schedule.

Rice under restricted water supply

At least four irrigations are required for raising a moderate rice crop, preferably at transplanting, pre-tillering, flowering and grain filling stages.

Following alternate crops are suggested in the order of reduced availability of water:

—Andhra Pradesh	:	Groundnut, Maize, Sunflower, *Mung, Urd,* Chickpea.
—Karnataka	:	Groundnut, Maize, Soybean (paddy fallows), *Ragi, Bajra* (Seed crop), Cowpea, *Mung, Urd.*
—Tamil Nadu	:	Groundnut, Soybean, *Ragi, Bajra, Mung, Urd.*
—Maharashtra	:	Groundnut, *Bajra, Mung, Urd.*
—Orissa	:	Groundnut, Maize, Small Millets, *Mung, Urd.*
—Assam	:	Maize, Lentil, *Mung, Urd.*
—West Bengal	:	Maize, Soybean, Lentil, *Mung, Urd.*
—Bihar	:	Maize, Wheat, Lentil, Linseed.

BARLEY PRODUCTION

— Barley can be cultivated in saline area and diaraland which could be planted as late as mid-December.
— This year barley has better scope in Uttar Pradesh, Rajasthan and Haryana where rains have been scanty and soil moisture is limited and cannot support high moisture requiring crops.
— For higher yield, grow varieties, *Azad, Amber, Vijay, Jyoti and Kedar* in Uttar Pradesh and Madhya Pradesh; RDB 1, RD 31, RD 103, RD 57, *Rajkiran,* and RS 6 in Rajasthan and BG 25, BG 105, and BH 75 in Haryana.
— Grow linseed, gram and mustard as intercrops.

PULSES PRODUCTION

— Pulse crops grown: during *rabi* are: gram, lentil, pea, horsegram, lathyrus, *rajmash, mung, urd* and cowpea.
— Gram should be preferred over wheat in situation of limited water supply. In area like Bundelkhand, Bikaner, and Ganganagar divisions of Rajasthan, Marathawada in Maharashtra, parts of Madhya Pradesh, Punjab and Haryana where supplemental irrigation is possible, area under gram should be increased.
— Area under lentil should be increased in the states of Bihar, Assam, West Bengal, and Eastern U.P., as this crop can be planted late (upto December) after the flood waters recede.
— In the coastal areas of Orissa, Andhra Pradesh and Tamil Nadu, and in the States of Uttar Pradesh and Bihar *mung* or *urd* may be planted in the rice fallows upto the end of December.
— A good crop of early maturing horsegram can be raised in the moisture deficient area of the four southern states.

Increasing Productivity

— Seeds treatment with appropriate rhizobium culture.
— Apply Di-Ammonium Phosphate (DAP) @ one quintal per hectare.
— Spray against pod borer with 0.07 per cent Endosulfan at the pod initiation stage. Repeat the spray after 10-15 days, if necessary.

— Keep the fields free of weeds upto 40 days by removing either mechanically or by pre-emergence application of tasso/Basalin, untertake inter-cropping of *mung* and *urd* with *rabi* sorghum in Karnataka and Maharashtra and with spring planted sugarcane in Uttar Pradesh.

OILSEEDS PRODUCTION

Toria Catch Crop

— Taking advantage of recent rains, intensify *toria* sowing as a 'catch crop' preceding wheat under assured irrigation (Punjab, Haryana, Himachal Pradesh, Rajasthan and Uttar Pradesh).
— After *kharif* harvest under residual soil moisture condition (Eastern Uttar Pradesh, Bihar, West Bengal, Orissa and Assam).
— After the cessation of flood (Eastern Uttar Pradesh, Bihar, West Bengal and Assam).

CROP SUBSTITUTION

For better exploitation of limited water, replace 5-10 per cent wheat area by mustard (Punjab, Haryana, Rajasthan and Uttar Pradesh) and rice by sunflower/groundnut in southern states including Maharashtra and Gujarat.

INTRODUCTION IN NEW AREA

Introduce/popularise spring/summer sunflower, groundnut/sesame in non-traditional area and intensify efforts to bring more area under these crops during *rabi*/summer in traditional area under assured irrigation.

INTERCROPPING

Under rainfed situation, to minimise risk and to fetch higher net monetary return per unit area, time and input, inter-crop rapeseed-mustard with sugarcane, wheat, potato and chick-pea; linseed with chick-pea; lentil with dryland wheat and potato, and safflower with dryland wheat, coriander, *rabi* sorghum and chickpea.

Rainfed

— Paira/Utera crop in all linseed growing area where nothing is grown after the harvest of paddy.
— In Malwa region of Madhya Pradesh, plateau region of Chotanagpur, Deccan plateau and its adjoining area, go for safflower, if adequate moisture after *kharif* harvest is available.
— Plant *taramira* where soil moisture is inadequate and planting of mustard is delayed (Rajasthan, Haryana, Punjab and Delhi).
— Go for high yielding, disease and pest resistant and early maturing varieties.

RABI SORGHUM PRODUCTION

Adequate Soil Moisture

— Apply pre-sowing irrigation where possible.
— Planting should be completed between September and early October.
— Grow only CHS 9, CSV 8R, and M35-1 in Andhra Pradesh; CSH 8R, M35-1, and CSV 8R in Karnataka; CSH 8R, CSV 8R, M35-1 and *Swati* in Maharashtra.
— Apply entire fertilizer dose of 50 kg N and 25 Kg P_2O_5 per hectare at planting.
— Control weeds by pre-emergence application @ 0.5 kg atrazine per hectare.
— Minimize the incidence of midge and ear-head bug by growing the varieties/hybrids of similar maturity duration in the same region.

Limited Soil Moisture

Where moisture is limited, in place of *rabi* sorghum, the following crops should be raised:

Andhra Pradesh:	Chickpea, *Urd, Mung, Safflower,* Coriander.
Maharashtra:	Chickpea, *Urd, Mung,* Safflower, Coriander.
Karnataka:	*Ragi, Urd, Mung,* Cowpea, Safflower, Coriander.

RABI/SUMMER MAIZE PRODUCTION

— The major *rabi* maize growing states are Bihar (0.4 million hectare), Andhra Pradesh (0.07 million hectare) and Karnataka (0.33 million hectare).

— The average productivity of maize is 1450 kg per hectare, whereas that of *rabi* maize is 3500-4000 kg per hectare; Yields as high as 6000-7000 kg per hectare are not uncommon.

— The high productivity of *rabi* maize is due to better management of water, favourable temperature, abundant sunshine, better response to nutrients, better plant population and better weed and pest control.

Increase Area

During this year more area under *rabi* maize may be brought:

— In Bihar, Assam, West Bengal and Eastern Uttar Pradesh where rice and other *kharif* crops have been damaged, the fields of these crops will be available for *rabi* maize.

— In Andhra Pradesh, Orissa, Tamil Nadu, Assam and West Bengal, in place of rice, maize may be grown as 2-3 times more area under maize can be planted with the same quantity of irrigation water.

— At the sowing time of wheat the average temperature should be 22°C. In case the present drought spell continues, the average temperature will be higher than 22°C. even during middle of November, the peak period of sowing of wheat. Under such situation maize cultivation may be beneficial.

Crop Management

— Plant only improved hybrids and composites. The recommended hybrids are Hi-starch, *Ganga 2, Ganga 5, Ganga 9, Deccan 101* and *Deccan* 103 and composites are *Pratap Manjiri* and *Hunius.*

— Use 20 Kg per hectare seed rate and spacing of 60×20 cm.

— Apply NPK @ 120, 60 and 40 kg per hectare respectively.

— Apply atrazine @ 1 kg per hectare before seedling emergence for the control of weeds.

— In general 4 to 6 irrigations are required. If limited irrigation is available, irrigation at vegetative stage may be avoided.

— For controlling seedling diseases, treat the seed with Thiram @ 2.5 g per kg of seed.

— Short duration pulses like *rajmash, urd, mung,* linseed, soyabean and coriander may be intercropped with maize.

SEED PRODUCTION

There will be a shortage of quality seed for planting during *kharif* 1988. To overcome the shortage in *kharif* 1988 the following steps are proposed.

Seed Assessment

— Requirement of seed of different *kharif* crops for planting during *kharif* 1988.

— Likely production of seed from current *kharif* crops.

— Deficit in respect of each of the crops for which production during *rabi* 1987-88 to be organized.

Areas for seed production during *rabi* 1987-88 and spring/summer, 1988

— Rice:	Assam, West Bengal, Andhra Pradesh, Tamil Nadu and Kerala.
— *Bajra:*	Tamil Nadu, Andhra Pradesh, Gujarat and Maharashtra.
— Sorghum:	Tamil Nadu, Andhra Pradesh, Gujarat, Maharashtra and Karnataka.
— Maize:	Bihar, Andhra Pradesh and Karnataka.
— Groundnut:	Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu.
— Sunflower:	Gujarat, Maharashtra, Karnataka and Tamil Nadu.
— *Urd, Mung* and Cowpea:	Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu and Orissa.
— Sesamum:	Tamil Nadu, Kerala, Maharashtra, Andhra Pradesh and Madhya Pradesl
— *Soyabean:*	Tamil Nadu, Andhra Pradesh and Karnataka.
— *Rabi* Summer	*Urd, Mung* in the northern states and after the harvest of cowpea *rabi* crops.

Production Management

— Select fields having good fertility, accessibility, adequate irrigation, or assured growing conditions.

— Planting crops with recommended seed rate, spacing, time of planting and other requisites to satisfy seed certification standards.

— Keep crop free from weeds, insects, pests and diseases.

— Adopt recommended water management/irrigation schedule.

— Harvest at appropriate time for processing, packing and storing.

3.5 A proposal for the approval of CCD was initiated to provide a short-term loan of Rs. 48.62 crore to the Government of Gujarat to procure 44,400 tonne of groundnut which after processing was to be used as seed for sowing during *kharif* 1988. In response MOF released Rs. 40.00 crore to Gujarat as additional short-term loan. With the help of this loan, the Government of Gujarat was able to procure the requisite amount of groundnut to be used as seed from outside the State.

Achievements

4.1 A severe situation arose in Thanjavur district which is the rice bowl of Tamil Nadu where the normal area under paddy is 6 lakh hectare. During 1987 due to poor storage in Mettur Dam water was released only in November instead of in June. The *Kuruvai* cultivation (the summer crop) could be taken up using filter point tubewells in an area of 25,000 hectare in comparison to the normal area of 1.68 lakh hectare. The delay in the release of water made even raising a single crop *samba* paddy (rabi season) doubtful. A novel plan of 'direct' sowing was adopted for the first time in Thanjavur district. The strategy was to raise the crop in the rains and then as and when Mettur storage improved and it became possible to release water, it could be utilised to supplement the rainfall. This required constant monitoring and co-ordination at all levels. The farmers in the first instance had to be convinced of the necessity for this strategy. But, once it was realised that at least on some portion paddy could be raised, a large number of farmers came forward to adopt this strategy. But for this strategy, the entire *samba* paddy crop would have been lost whereas by this direct sowing method 2.09 lakh hectare (49 per cent of the normal area) was brought under paddy. The paddy variety used was the high yielding ADT 36 of 107 days duration. The average yield from the direct sowing crop was 3.9 tonne per hectare and a total production of 8.25 lakh tonne of paddy was obtained. Due to this strategy the production level in 1987-88 was maintained inspite of the drought situation.

4.2 The State Government of Uttar Pradesh took up the sowing of potato as an early crop in an area of 40,000 hectare to compensate shortfall in foodgrain production to the extent possible. An assistance of Rs. 400 for fertilisers and Rs. 200 for plant protection measures per hectare as incentive to the farmers who completed the potato sowing by 10th October, 1987 was provided. As a result of implementation of this scheme, an additional quantity of 2.48 lakh tonne of potatoes was produced. During 1987 record production of potatoes was obtained.

4.3 The successful implementation of the Contingency Crop Planning even though the area under various crops shrunk from 1986-87 level, which itself was a bad monsoon year, helped to minimise crop loss. The details of area and production during 1986-87 and 1987-88 are given in Table 16.

4.4 During *kharif* 1987, the production of rice fell from 53.6 million tonne in *kharif* 1986, to 48.8 million tonne. During *rabi* 1987-88 season, however, the rice output increased to 7.7 million tonne from the 1986-87 level of 7.0 million tonne. Thus the fall in *kharif* rice production was partly off-set by an increase in *rabi* production of rice. Except for Andhra Pradesh and West Bengal all other major rice growing States recorded decline in rice production in 1987-88. It was significantly lower in Bihar (2 million tonne), Uttar Pradesh (1.9 million tonne), Punjab (0.8 million tonne), Haryana (0.7 million tonne) and Karnataka (0.6 million tonne).

4.5 Wheat is the most important *rabi* crop in the country. It occupies 50 per cent of the area under *rabi* foodgrains crops and contributes to 70 to 72 per cent of the total foodgrains production in the *rabi* season. An area of 23 million hectare is covered under this crop out of which 12 million hectare is under dependable irrigation, 6 million hectare under limited irrigation and 5 million hectare under rainfed conditions. Despite the fall in soil moisture content and also adverse effect of the 1987

Table 16: Area and Production of Foodgrains and Oilseeds in 1986-87 and 1987-88.

S. No.	Category	Area (million hectare)			Production (million tonne)		
		1986-87	1987-88	Percentage Difference	1986-87	1987-88	Percentage Difference
1.	Total *kharif* Foodgrains	81.46	74.45	(−) 8.6	80.20	73.89	(−) 7
2.	Total *rabi* Foodgrains	45.74	44.26	(−) 3.2	63.22	64.52	(+) 2
3.	Total Foodgrains	127.20	118.71	(−) 6.7	143.42	138.41	(−) 3
4.	*Kharif* Oilseeds	11.51	11.47	(−) 0.3	6.38	6.28	(−) 1
5.	*Rabi* Oilseeds	7.12	8.53	(+) 19.9	4.89	6.10	(+) 24
6.	Total Oilseeds	18.63	20.00	(+) 7.4	11.27	12.38	(+) 10

drought on the subsequent *rabi* season, wheat production was maintained at the previous years' level. This was largely on account of the contigency measures taken to protect and augment *rabi* production. Among the wheat growing States, while Uttar Pradesh, Punjab, Madhya Pradesh and Maharashtra recorded increase in output, Bihar, Gujarat and Rajasthan registered decline in production in 1987-88 as compared to production in 1986-87.

4.6 The important coarse cereals are *jowar, bajra,* maize and barley. Maharashtra is the largest *jowar* growing State in the country accounting for 42 per cent of the area and 50 per cent of production of *jowar* in 1987-88. Rajasthan, Gujarat and Haryana are the major *bajra* producing States. Maize is an important crop in the States of Uttar Pradesh, Rajasthan and Bihar. Barely is mainly grown in the States of Uttar Pradesh, Rajasthan and Haryana. The majority of the area under coarse grains is under unirrigated conditions — *bajra* (94 per cent), maize (79 per cent), *jowar* (96 per cent) and barley (54 per cent).

4.7 Despite severe drought conditions the production of *jowar* increased substantially from 9.19 million tonne in 1986-87 to 11.85 million tonne in 1987-88. This was, however, offset by the decline in production of other coarse grains like *bajra,* maize and barley. *Bajra* output declined from 4.51 million tonne in 1986-87 to 3.28 million tonne in 1987-88 while maize declined from 7.59 million tonne to 5.63 million tonne during the same period. The fall in other coarse cereals was marginal.

4.8 The production of pulses in 1987-88 was 11.04 million tonne as against 11.71 million tonne in 1986-87. The slight increase in output of *kharif* pulses (*arhar, mung, urad,* etc.) was, offset by a decline in the production of *rabi* pulses (gram, peas, lentils, *rabi urad* and *mung,* etc.) from 7.51 million tonne in 1986-87,to 6.7 million tonne in 1987-88. *Kharif* pulses are grown in an area of 11 million hectare. *Mung, urad* and *arhar* are the main pulses grown during *kharif* season while gram is the major *rabi* pulse crop. The production of *arhar,* which accounts for more than 50 per cent of *kharif* pulses and which is mainly grown in Uttar Pradesh. Maharashtra, Madhya Pradesh, Karnataka, Gujarat and Tamil Nadu amounted to 2.23 million tonne in 1987-88 as against 2.27 million tonne in 1986-87 and 2.44 million tonne in 1985-86. However, the decline in the output of *arhar* was more than offset by an increase in the production of other *kharif* pulses. In the *rabi* season, the production of gram, which is mainly grown in the States of Madhya Pradesh, Uttar Pradesh, Rajasthan, Haryana, Maharashtra and Bihar suffered a set back due to drought conditions. Production declined from 4.53 million tonne in 1986-87 to 3.62 million tonne in 1987-88.

4.9 The production of nine oilseeds increased from 112.7 lakh tonne in 1986-87 to 123.8 lakh tonne in 1987-88. This was largely on account of a substantial increase in the acreage and output of *rabi* oilseeds, especially rapeseed and mustard which increased from 26 lakh tonne in 1986-87 to a record level of 33.7 lakh tonne in 1987-88. *Rabi* oilseeds production totalled 61.0 lakh tonne in 1987-88 as against 48.9 lakh tonne in 1986-87. On the other hand, without any perceptible decline in acreage, *kharif* oilseeds output declined by only one lakh tonne to 62.8 lakh tonne in 1987-88. This was mainly on account of fall in the production of groundnut in the worst drought affected State of Gujarat where production declined from 12.92 lakh tonne in 1986-87 to 1.40 lakh tonne in 1987-88. But Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu recorded

Table 17: Production of Oilseeds, 1985-86 to 1987-88

(lakh tonne)

S.No.	Oilseed		1985-86	1986-87	1987-88
1.	Groundnut				
		Kharif	37.6	44.3	40.1
		Rabi	13.6	14.5	16.4
		Sub-Total	51.2	58.8	56.5
2.	Castorseed		3.1	2.3	1.8
3.	Sesamum		5.0	4.5	5.6
4.	Rapeseed and Mustard		26.8	26.0	33.7
5.	Linsed		3.8	3.2	3.7
6.	Nigerseed		1.9	1.3	1.8
7.	Safflower		3.5	3.5	4.5
8.	Sunflower				
		Kharif	1.7	2.5	2.7
		Rabi	1.1	1.7	2.4
		Sub-Total	2.8	4.2	5.1
9.	Soyabean		10.2	8.9	11.1
		Total *Kharif*	59.5	63.8	62.8
		Total *rabi*	48.8	48.9	61.0
		Grand Total	108.3	112.7	123.8

substantial increases in groundnut production. The *kharif* crop in Gujarat suffered widespread damage due to drought conditions since it is grown under rainfed conditions. Reduced soil moisture content and other effect of drought also affected the *rabi* crop in the State. The production of different oilseeds during 1985-86 to 1987-88 may be seen in Table 17

Table 18: *Kharif* and *Rabi* Foodgrains Production for Selected Years, 1966-67 to 1987-88.

(million tonne)

S.No.	Year	Favourable (F)/ Unfavourable (UF) Season	*Kharif* Foodgrains Production	*Rabi* Foodgrains production	Total Foodgrains Production
1.	1966-67	UF	48.49	25.34	74.23
2.	1970-71	F	68.92	39.50	108.42
3.	1971-72	UF	62.99	42.18	105.17
4.	1972-73	UF	58.64	38.39	97.03
5.	1973-74	F	67.84	36.83	104.67
6.	1974-75	UF	59.10	40.73	99.83
7.	1978-79	F	78.08	53.82	131.90
8.	1979-80	UF	63.25	46.45	109.70
9.	1982-83	UF	69.90	59.62	129.52
10.	1983-84	F	89.23	63.14	152.37
11.	1984-85	UF	84.52	61.02	145.54
12.	1985-86	UF	85.99	64.48	150.47
13.	1986-87	UF	80.20	63.21	143.41
14.	1987-88	UF	73.88	64.53	138.41

Table 19: Changes in Rainfall and Foodgrains Output for Selected Years, 1964-65 to 1987-88.

S.No.	Year	Percentage Change in Cumulative Rainfall Index (CRI) from Normal	Percentage Fall in Output Over the Previous Year.			Total Foodgrains Output (million tonne)
			Kharif	*Rabi*	*Total*	
1.	1964-65	(+) 6.0				89.9
2.	1965-66	(−) 18.7	(−) 18.7	(−) 17.7	(−) 18.4	72.3
3.	1978-79	(+) 10.0				131.9
4.	1979-80	(−) 20.0	(−) 19.0	(−) 13.7	(−) 17.0	109.7
5.	1981-82	(+) 0.2				133.3
6.	1982-83	(−) 13.2	(−) 12 5	(+) 9.2	(−) 2.9	129.5
7.	1985-86	(−) 4.0				150.5
8.	1986-87	(−) 13.8	(−) 4.3	(−) 4.0	(−) 4.3	143.4
9.	1987-88	(−) 27.5	(−) 7.9	(+) 2.1	(−) 3.5	138.4

4.10 For crops in watershed, sowing within the watershed was done in nearly 50 per cent to 100 per cent (average 70 per cent) of the area normally sown in the *kharif*, while outside the watershed area, only 15 per cent to 60 per cent (average 40 per cent) area was sown. In the watersheds experiencing severe drought conditions observation in the first week of September, 1987 showed that an average loss of 45 per cent was expected within the watershed (range 20 per cent to 70 per cent) while the loss outside was around 75 per cent from the cropped area (range 60 per cent to 100 per cent). Other benefits like source of supplemented irrigation created through surface storage, complete prevention of run off and increased groundwater recharge were prominent in the watershed area.

5.1 The trend in production in *kharif* and *rabi* season was as follows. The drop in unfavourable season of 1987-88 was very steep as in the case of earlier droughts of 1965-66, 1972-73 and 1979-80. In the case of pulses, oilseeds, rice and maize, there was some compensatory effect in the *rabi* season and in the case of wheat which is grown in the *rabi* season, the fluctuation in the production was not as sharp as in the case of *kharif* crops. The trend of *kharif* and *rabi* production of foodgrains are given in table 18

5.2 Table 19 indicates changes in rainfall and foodgrains output. The table shows that in terms of rainfall deficiency 1987-88 was one of the worst but in terms of production the fall was much higher in earlier droughts. The impact of rainfall deficiency on *rabi* foodgrains was clearly much less after 1980.

5.3 Net import of foodgrains between 1966-67 and 1976-77 was 47.7 million tonne. However, no foodgrains were imported since 1980 to tackle the drought situation in the country. A comparative position of the impact of drought in selected drought years may be seen in Table 20.

Table 20: Impact of Drought in Selected Years, 1918-19 to 1987-88.

(million tonne).

S.No.	Drought Year	Percentage of the Area Affected	Percentage Reduction in Foodgrain Production over the Previous Peak Year	Total Foodgrains Production	Import of Foodgrains
1.	1918-19	73	32.2	NA	NA
2.	1965-66	66	18.8	72.4	10.6
3.	1972-73	57	7.7	97.0	3.6
4.	1979-80	52	17.0	109.0	0.0
5.	1987-88	63	9.3	138.1	0.0

Note: NA = Not Available.

Lessons Learnt

6.1 Contingency crop planning in conjunction with appropriate administrative support goes a long way in tackling difficult drought situation on an emergent footing. Monitoring is a basic requirement for obtaining requisite data from the field for making appropriate mid-course policy correction and its implementation. The DAC arranged to receive regular weekly information of the various steps being taken in the States through its Area Officers. The information included the coverage and the crop situation, reservoir position and availability of critical farming inputs. Such a systematic monitoring also helped not only in providing timely financial assistance to the States but also assistance in physical terms particularly in making timely arrangements for seed, irrigation and power.

6.2 The drought of 1987 saw introduction of many precedent-breaking innovations. During drought management it was realised that systematic production of seed to meet the requirement of the next season's crops will go a long way in helping the farmers in offsetting their loss of drought affected crops. The State of Gujarat, where the groundnut crop almost failed, particularly in Saurashtra, leaving the farmers without any seed, took a bold step in requesting Andhra Pradesh farmers to grow groundnut seed and for this purpose it even advanced a loan of Rs. 40 crore in 1987-88 to the farmers of Andhra Pradesh. The loan amount was channelised through cooperatives of Andhra Pradesh. This innovation paid a rich dividend to Gujarat as it was able to meet the seed reqirement of its farmers to a large extent.

6.3 An agronomic manipulation also helped a great deal. The direct seeding of germinated seed of paddy in Thanjavur district of Tamil Nadu and Chhattisgarh area of Madhya Pradesh proved very beneficial. This strategy helped in increasing the area under rice cultivation despite late and inadequate rains. Further *toria* in the State of Bihar and eastern Uttar Pradesh was raised in the fields where *kharif* crops could not be sown or had failed due to inadequate or no rain.

6.4 For drought proofing what is more important is gathering detailed information on rainfall and temperature in determining the cropping system in a particular zone after identifying the assured moisture availability periods. The on-farm rain water management is the next important consideration for improved and extended availability of moisture to the crop grown in the dryland.This is achieved through the contour/graded bunds and inter-bund land treatment. Due to the high cost of engineering structures cheaper methods of soil and moisture conservation will have to be adopted to enable replicability of a higher order. The rain water has to enter the soil through the surface of the land. Therefore, the surface has to be kept receptive by different land configurations. Further, the rain water can be harvested into the farm ponds, percolation tanks and also through *nala* bunding and check dams. Diversion drains and the strengthening the waterways would be needed so as to see that the rainwater from non-arable land does not encroach upon arable land and creates erosion problems. The data generated shows that with these conservation measures there is an increased groundwater availability in different regions, the intensity depending on the rainfall and the soil type.

Most of the water resources of India are contributed by the precipitation received during the monsoon months. All over the country substantial flows are received in rivers, tanks and reservoirs. Ingress into the ground raises ground water levels. The storage and acquifers are generally used for providing irrigation for *rabi.*

1.2 There are more than 200 major and 900 medium irrigation projects in operation in the country. Excluding irrigation projects based on diversion of river waters, projects having storages account for roughly half of the surface water utilisation for irrigation. For having a broad idea of water availability situation, the Central Water and Power Commission (CWPC) in the Ministry of Water Resources (MWR) monitored weekly position of 47 reservoirs. The review on 20th July, 1987 indicated that live storage in 44 reservoirs was 26.486 thousand million cubic metre (TMCum) against the designed live storage capacity of 101.133 TMCum (Data for 3 reservoirs were not available). A study made for 15 important reservoirs indicated that on 10th August, 1987 the water availability had further reduced. Water availability as on 10th August, 1986, 20th July 1987, and 10th August 1987 vis-a-vis the designed capacity for the fifteen reservoirs has been tabulated in Table 21. Ramganga (Uttar Pradesh), Jayakwadi (Maharashtra), Balmela (Orissa) and Mettur (Tamil Nadu) had storages even less than 10 per cent of the designed capacity. In the case of others also the position was far from encouraging. It was therefore clear that if releases are not controlled during *kharif,* there may not be any water left for *rabi* irrigation. Sound judgement was therefore necessary for regulating the outflows to derive optimum benefit from the available water.

Action Plan

2.1 Recognising the acute shortage of water caused by drought conditions in most parts of the country, Secretary Ministry of Water Resources in August, 1987 held a meeting with Secretaries of State Irrigation Departments and Command Area Development (CAD) authorities. In this meeting review of the storages available in the reservoirs and tanks, impact of reduced storage on *kharif* and *rabi* irrigation, measure for optimum utilisation of storages and maximising ground water utilisation were discussed. Based upon the discussions, an action plan was recommended. Main features of this plan were as under:

(i) The available water resources shall be put to maximum use. For this purpose full inter-departmental cooperation at project/State level will be ensured particularly among the Departments of Irrigation, Agriculture, Public Health Engineering, State Electricity Board (SEB) and the Ground Water Department;

(ii) The State Governments will make a weekly compilation of live storage capacities of major and medium works in their States under operation and taking into consideration the normal levels that prevail during the corresponding periods, review the water availability position for various uses and draw up a water plan for judicious use of available water resources, giving first priority to drinking water supply, fodder and low water consumptive crops;

(iii) Reservoir operation plans will give highest priority for reserving water for drinking water supply in scarcity areas;

(iv) A Statewise fortnightly summary of live storage capacities available in 1987-88 along with information of corresponding storages in normal years will be made available to the Central

Water Commission (CWC) to enable periodical review to be taken up at the Central level;

(v) Effective coordination must be ensured between the Agriculture Department, Irrigation Department and CAD authorities to achieve the twin objectives of rational distribution of water and satisfactory implementation of crop strategy. A detailed action plan shall be worked out for conserving and for optimum use of water, and sent to MWR as quickly as possible;

(vi) In view of the deficient/scarce monsoon rainfall in 1987-88, the residual moisture in the soils will be low in the post-monsoon season and consequently *rabi* crops will have to be supported by irrigation to a greater degree. For this purpose, a trade-off will have to be made between the benefits accruing from the alternatives of *kharif* and *rabi* Irrigation. There should not be undue concern to save damaged *kharif* crops, and water may be released for standing *kharif* crops only for very compelling reasons and without compromising the drinking water supply for the months to come;

(vii) The endeavour should be to resort to longer rotation periods and to supply a minimum number of waterings to sustain crops so that the benefits of irrigation can be extended to as large an area as possible. High water-consumptive crops will be discouraged and alternate crops, including growing of fodder crops, will be encouraged. The farmers will be made aware of the situation by wide publicity;

(viii) Mulching will be popularised to minimise evaporation from fields. Compartmentalisation to reduce the surface area of stored water should be undertaken to reduce evaporation loss. These works could be done under NREP, RLEGP and drought relief works programme;

(ix) Irrigation Departments will initiate action to procure chemical retardants to be able to use them right from November, 1987 to reduce evaporation losses from stored water;

(x) Starting from September, 1987 bunds will be constructed across streams, where feasible, to create temporary storages consistent with the needs downstream. This should be accorded a very high priority under NREP and RLEGP;

(xi) If the monsoon improves, a review will be undertaken around mid-September to identify medium and minor storages likely to suffer spillover of water and action taken to temporarily raise the storage level by use of earth-filled gunny bags;

(xii) Water budget will be prepared for every reservoir covering drinking water, *kharif/rabi* requirement and evaporation losses;

(xiii) Ground water has a vital role to play in combating drought. Every effort will be made to maximise ground water utilisation by pressing into service all the created potential and creating additional irrigation potential by mobilising the resources as stated below:

(a) The irrigation pumpsets already energised be put to maximum use;

(b) A drive will be a launched for releasing service connections to all consumers who had submitted their applications with the concerned State Electricity Boards (SEBs). (The GOI wrote to State Governments on 13th August 1987);

(c) SEBs will be prevailed upon to assure 8—10 hours of power supply to all irrigation pumpsets;

(d) Availability of diesel supply will be ensured to all irrigation diesel pumpsets;

(e) Public tubewells will be pressed into immediate service and those remaining unused will be repaired and commissioned on top priority so that they are all in good working order during *rabi* season;

(f) All drilling capacity available will be mobilised including CGWB and the programme of drilling reoriented from exploration to development at the request of State Governments, who will also examine the need for entering into long-term arrangements with private companies for development of new wells;

(g) The concerned authorities will take over exploratory tubewells constructed by the

CGWB (Secretary, Ministry of Water Resources wrote to Chief Secretaries in this regard);

(h) While taking the above measures, the need for drinking water supply will be kept in view. In the area prone to drinking water scarcity as well as in area where the ground water table has been decreasing, caution and restraint shall be exercised to conserve ground water at optimum levels. Availability of power will be regulated where ground water is inadequate to prevent overdrawal of water; and

(xiv) To ensure better availability of water for drinking and agriculture sectors, water supply for industrial use will be regulated and the State Governments should take necessary steps in this direction, paticularly asking industrial units, large industrial and/or commercial establishments to increase storage capacity or to take water through pipes instead of open water courses.

2.2 The CWC in the Ministry of Water Resources monitored the weekly reservoir position of 47 reservoirs, and fortnightly Statewise position of water availability in the reservoirs of major and medium irrigation projects of various States. The data collected from the States was sent to the DAC for considering the periodic availability of water and to review their contingency action plan for agriculture production.

2.3 The data on 47 reservoirs for 1987-88 were compared with the data of water year 1986-87 (from 1st June 1986 to 31st May 1987). A graph showing the total live storage available in the two years starting from 1st June 1986 to 27th May 1988 has been plotted which may be seen in Figure 6. A perusal of the graph shows that live storage in the monsoon months of 1987 was much less than the corresponding storage in 1986. In 1986 maximum storage was 79.218 TMCum on 2nd September, 1986 whereas the maximum storage available in 1987 was only 48.258 TMCum on 9th September 1987 which is about 61 per cent of 1986. Compared to the designed live storage of these projects, the percentage availability in 1987 was only 46 per cent which showed that it may not be possible to supply water for *kharif*. It would be seen from the graph that there are rapid withdrawals for irrigation from September onwards in 1986 resulting into significant utilisation for *kharif*. But in 1987 there has been insignificant withdrawal and the water availability on 15th January 1988 was 47.063 TMCum compared

Table 21 : Position of Live Storage in Important Reservoirs as on 10th August, 1987

(thousand million cubic metre)

Sl. No	Reservoir	Live Capacity at Full Reservoir Level (FRL)	Live Storage as on			Percentage of Live Storage as on		
			10th August 1986	20th July 1987	10th August 1987	10th August 1986	20th July 1987	10th August 1987
1.	Ukai (Gujarat)	7.100	2.3921	2.135	1.962	33.69	30.07	27.63
2.	Gobind Sagar (Himachal Pradesh)	7.172	5.295	3.555	4.603	73.83	49.57	64.18
3.	Pong Dam (Himachal Pradesh)	7.119	4.705	1.339	1.546	66.09	18 81	21.71
4.	Gandhi Sagar (Madhya Pradesh)	6.827	0.489	1.423	1.167	7.16	20.84	17.09
5.	Ramganga (Uttar Pradesh)	2.053	0.631	0.117	0.156	30.73	5.70	7.60
6.	Rihand (Uttar Pradesh)	8.967	6.421	3.881	4.272	71.61	43.28	47.64
7.	Nagarjunasagar (Andhra Pradesh)	6.841	1.48	1.34	1.247	21.63	19.59	18.23
8.	Srisailam (Andhra Pradesh)	8.288	3.098	1.626	3.043	37 38	19.62	36.72
9.	Linganamakki (Karnataka)	4.294	1.526	1.013	1.012	35.54	23.59	23.86
10.	Tungabhandra (Karnataka)	3.276	1.908	0.882	0.781	58.24	26.92	23.84
11.	Jayakwadi (Maharashtra)	2.171	0.094	0.099	0.144	4.32	4.56	6.60
12.	Koyna (Maharashtra)	2.677	1.915	0.965	1.096	71.54	36.05	40.94
13.	Hirakud (Orissa)	5.822	3.110	1.492	2.338	53.42	25.63	40.15
14.	Balmela (Orissa)	2.676	0.100	0.102	0.165	3.74	3.81	6.17
15.	Mettur (Tamil Nadu)	2.647	0.383	0.229	0.196	14.47	8.65	7.40

Table 22 : Statewise Additional Irrigation Potential and Additional Outlay for Irrigation Projects, 1987

S. No.	State	Additional Irrigation Potential to be created (thousand hectare)	Amount of Additional Outlay Sanctioned (Rs. in crore)
1.	Andhra Pradesh	12.50	22.00
2.	Gujarat	29.37	30.00
3.	Haryana	2.00	2.00
4.	Himachal Pradesh	1.00	1.10
5.	Jammu and Kashmir	3.40	6.40
6.	Karnataka	11.00	25.00
7.	Kerala	2.50	5.50
8.	Madhya Pradesh	23.71	27.00
9.	Maharashtra	14.50	26.00
10.	Nagaland	0.50	0.50
11.	Orissa	13.01	22.00
12.	Rajasthan	25.31	37.50
13.	Tamil Nadu	1.30	3.00
14.	Uttar Pradesh	24.04	28.00
	Total	164.14	236.00

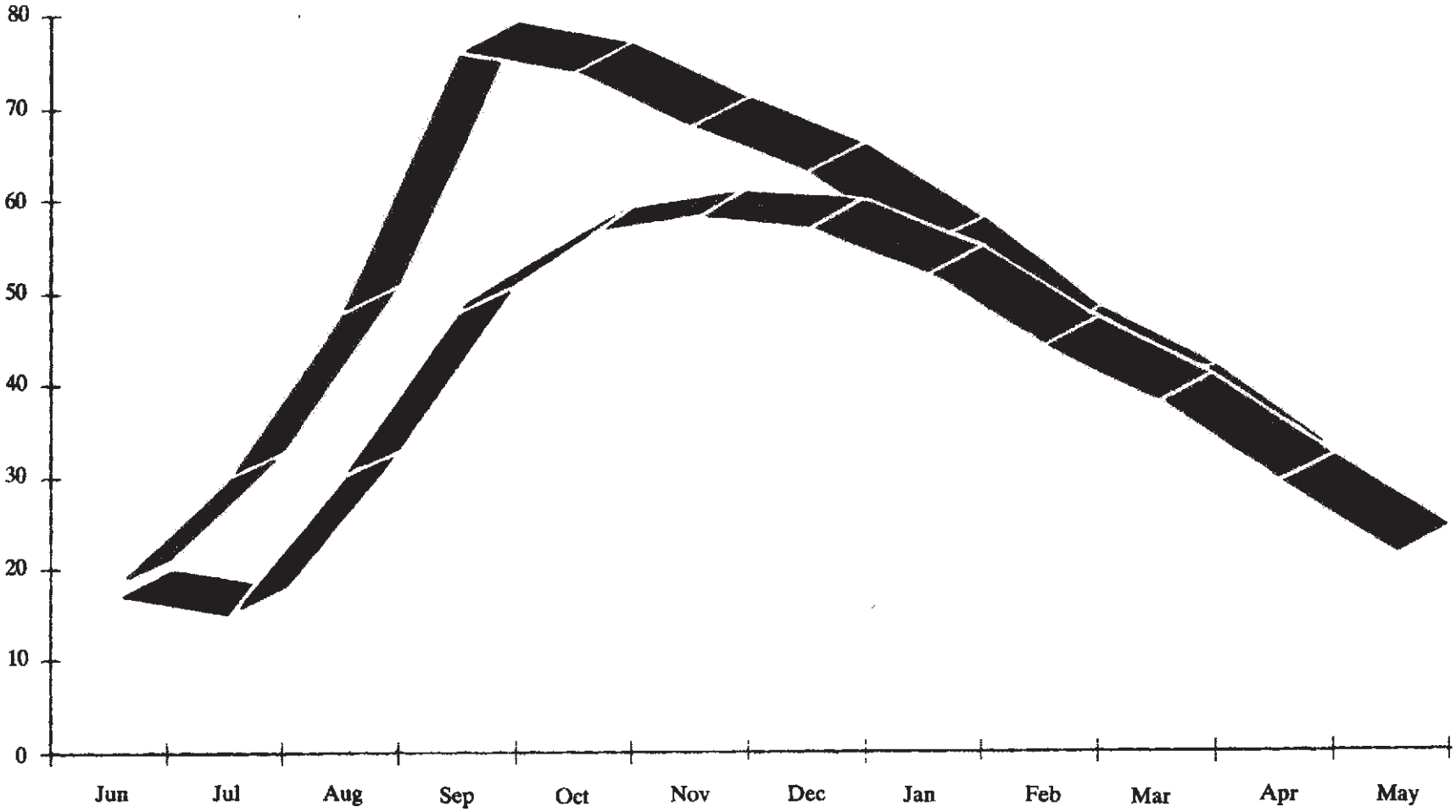
to 48.258 on 9th September 1987 and 58.488 on 30th December 1987. This achievement was possible by adopting the various steps suggested by the GOI. Around 29th January, 1988 the storage position mostly coincided with that of 1987. On 8th April 1988 the storage position was same as 1987. This shows that by monitoring of resevoir positions and persuading the State Governments it was possible to achieve conservation of water storage.

2.4 Due to some late rains storage position improved to some extent and reached the maximum of 58.478 TMCum on 30th October 1987 which was still much less than the corresponding storage total of 71.546 TMCum in 1986. Therefore it was necessary to exercise some control on releases for *rabi* also. A review meeting taken by Secretary, Ministry of Water Resources with the State Secretaries on 11th November 1987 showed that States had set up requisite co-ordination mechanism for scientific water management to optimise utilisation by according suitable priorities for various uses of water.

2.5 The CGWB offered the services of technical manpower and machinery to assist the State Governments. Drilling rigs numbering 25, deployed in the indicated area of various States completed 168 tubewells during 1987-88 and further added 76 tubewells by the end of June, 1988. The CGWB also monitored the efforts made by the State Governments in energisation of pump sets, operationalisation of inoperative tubewells, construction of new tubewells and taking over of exploratory tubewells constructed by the CGWB. The information in this connection was being collected on fortnightly basis through the nodal officers designated for the purpose in the States by the State Governments. Efforts were made to hand over the completed tubewells to State Governments. It was possible to hand over 51 tubewells to Madhya Pradesh, 27 to Maharashtra, 28 to Rajasthan, 13 to Haryana, and 6 to Delhi during 1987-88.

Special Assistance for Irrigation Projects

3.1 In pursuance of the long term objective of drought proofing, the Planning Commission approved an additional outlay of Rs. 236 crore for expediting identified irrigation projects under execution in the drought prone area as shown in Table 22. For this purpose, 94 major and medium irrigation porjects and 19 minor irrigation programmes were identified in 14 States in accordance with the details given in Annexure XIV. It was expected that with the additional assistance these projects and programmes will be completed within a period of 2 years creating an additional irrigation potential of 1.64 lakh hectare. The additional assistance was provided subject to the State Governments utilising the plan outlays for the identified projects in full.



1986-87

1987-88

Figure 6: Storage of 47 Important Reservoirs (Statorage in Thousand Million Cubic Metres)

3.2 The additional outlay provided, to complete the projects within a period of 2 years, was funded as follows:—

(a) 50 per cent of the additional outlay required was found from the funds allocated for the employment-generation programmes under the drought relief assistance, as approved by the GOI on the recommendations of the HLCR; and

(b) The remaining 50 per cent was made available as net additionality under drought over and above the amount sanctioned as drought relief assistance to the States. This amount was spent on material components as well, as was agreed in the individual cases by the Planning Commission.

3.3 Out of the 14 States selected for this programme, 2 States viz. Tamil Nadu and Himachal Pradesh with outlay totalling Rs. 4.10 crore for creation of addition potential of 2300 hectare, did not implement this programme, whereas all the other States took it up.

3.4 Progress of works on the projects/schemes implemented under the above programmes was monitored by Planning Commission on quarterly basis. Though the State Governments were expected to utilise the additional assistance under the programme during 1987-88 itself, yet most of them sought extension of time. Planning Commission also took the decision that while formulating Annual Plans from 1988-89 onwards the following aspects would be emphasised:—

(a) Priority and stepping up of expenditure on and completion schedule of such irrigation projects as are likely to benefit chronically drought-prone areas;

(b) Promote use of water-saving devices like the sprinkler system and drip-irrigation;

(c) Take the help of scientific organisations like the Department of Space for identifying water rechargeable locations, digging of tubewells, etc. (A complete mapping exercise needs to be carried out);

(d) Much greater research and push on dryland farming: and

(e) Stress on year-round propagation of water management conservation methods.

Drinking Water

4.1 During 1987-88, as many as 263 districts in 15 states and 6 Union Territories involving 54,310 villages were affected by drinking water scarcity. The worst hit States were Gujarat, Rajasthan and tribal area of Orissa. Anticipating the drinking water scarcity in these States, the GOI acted quickly. The CCD decided that the Department of Rural Development (DRD) shall co-ordinate all the arrangements regarding provision of drinking water both for rural and urban area.

4.2 On the basis of quick reconnaissance survey the GOI released Rs. 73.40 crore to the worst hit States in addition to the release of Rs. 14.58 crore for purchase of rigs and other equipments. The DRD drew up a contingency plan to combat scarcity of drinking water under which all the States were asked to reprioritise their plan programmes and divert funds to the worst-affected area.

4.3 Various measures were suggested to the State Governments to optimise the utilisation of water and to conserve surface water which they were having by using various methods by compartmentalisation, use of cetyl alcohol, control of use of water in rural and urban area and detection of over-use of water in irrigation and optimisation of water for *rabi* crop. Instructions were issued to State Governments as early as July, 1987. Various instructions had also been issued on health aspects so that water-borne epidemics did not spread. Emphasis was laid on the source finding activities and dovetailing plan programmes with the drought master plan.

4.4 The normal approach to drought was to provide the State Government funds for development of additional sources. Since 1985-86 the emphasis was on the development of sources through scientific source finding methodology that is with the use of satellite imageries, linear maps, ground truth surveys, geophysical surveys and proper drilling techniques. It is the scientific source finding and application of correct drilling techniques which can increase the life of a bore hole and provide sustained source of water—an aspect which was so far neglected in the Public Health Engineering Department.

Table 23 : Ceilings of Expenditure Approved for States for Drinking Water Supply, 1987-88.

(Rs. in crore)

Sl. No.	State	Approved Ceilings			
		July 1987 to March 1988		April 1988 to June 1988	
		Rural	Urban	Rural	Urban
1.	Andhra Pradesh	8.710	3.390		
2.	Gujarat	17.622	23.356	9.450	3.344
3.	Haryana	3.900	1.250		
4.	Himachal Pradesh	1.190	0.500		
5.	Jammu and Kashmir	1.405	0.600		
6.	Karnataka	4.430	2.905		
7.	Kerala	7.640	3.300		
8.	Madhya Pradesh	7.540	3.660	3.140	1.320
9.	Maharashtra	9.435	0.373		
10.	Nagaland	1.000			
11.	Orissa	3.000	0.850		
12.	Punjab	4.500	1.000		
13.	Rajasthan	18.436	38.344	18.598	19.750
14.	Tamil Nadu	5.600	7.110		
15.	Uttar Pradesh	8.700	4.840		
	Total	103.108	91.478	31.188	24.414

4.5 Under the Technology Mission on Drinking Water, emphasis was given on training of personnel for geohydrological and geophysical surveys and drilling technology. Hardware were also provided for appropriate drilling technology. UNICEF was helpful in providing combination rigs which were very useful in Rajasthan and Gujarat. The India Mark II handpump developed can even draw water from depth of 150 meter and that proved to be a boon. The GOI provided a large number of new drilling machines to the State Governments. To improve drilling efficiency a computerised rig monitoring system was introduced.

4.6 The State Governments submitted memoranda for seeking drought assistance. Various central teams visited the drought affected States in order to assess the situation. Based on the recommendations of the central teams, the GOI approved ceilings of expenditure of Rs. 103.208 crore for rural and Rs. 91.478 crore for urban water supply during 1987-88 and Rs. 31.188 crore for rural and Rs. 24.414 crore for urban water supply during 1988-89. Details may be seen in Table 23. In addition an amount of Rs. 17.928 crore was also sanctioned to the drought affected States for purchase of rigs etc. Additional rigs numbering 61 were approved for the States to take up the water supply programme in addition to approval of 15 hydrofracturing units with 11 terrameters and 9 well loggers.

4.7 During 1987-88, DRD released Rs. 288.29 crore for Accelerated Rural Water Supply Programme (ARWSP) for 15 drought affected States. Additional allocation under ARWSP amounting to Rs. 15.58 crore was also released for the area identified under the Desert Development Programme (DDP). The CCD also decided to extend the ARWSP to cover all the affected small towns and *nagar panchayats* of population of 20,000 according to 1981 census.

4.8 As regards physical progress under the normal plan programme of centrally sponsored ARWSP including special additional assistance given in the context of drought, 40,088 problem villages were provided with safe drinking water facilities in 15 drought affected States. Apart from this, 67,298 villages were covered for potable drinking water under the drought relief assistance. More than 1.5 lakh bore holes were drilled. With the use of satellite imageries, geophysical and geohydrological surveys, the failure rate of bore wells reduced from 42 per cent to 7 per cent or even less in the worst drought affected States of Gujarat and Rajasthan.

4.9 A group was constituted in the DRD with members from IMD, CGWB, DST, etc. to continuously monitor the water supply information in the country and to develop a model for forecasting the drinking water availaibility linking it to the monsoon rainfall. A computerised monitoring system of rigs based on UNICEF pattern was extended to all rigs owned by the State Governments including those operated by private contractors in the drinking water programme. All these activities had to be coupled with a strong vigil on health and sanitation aspects so that epidemic did not spread. Particularly before the onset of monsoon precautions were taken in rural area for chlorination of the wells as well as filling up of the trenches near the water sources so that seepage of water did not take place and pollution could be avoided.

4.10 Indian Railways in consultation with the State Governments placed tank wagon rakes/flats at the disposal of the State Governments for transportation of water. The details are as under:—

(i) 1.8 broad gauge rakes per day for 56 days and 2.2 metre gauge rakes per day for 46 days for transportation of water were loaded from Dhola, Rajula and Gandhinagar to Rajkot city in Gujarat in 1986-87; and

(ii) With effect from 8th July 1987 to 5th January, 1988 one water special per day was arranged from Peepar to Jodhpur in Rajasthan. This was stepped up to two specials per day from 6th January, 1988. Each special carried 2 lakh gallons of water.

Lessons Learnt

5.1 Close coordination between the irrigation engineers and PHEDs is necessary at the State level. Similarly close relationship between irrigation, drinking water schemes as well as water for industry is essential. A large amount of capital cost can be saved through integration of these projects and through management of the resources which are common for all. The solution to a total water management approach would be to adopt basin concept where a total demand and supply situation of basin is calculated and on the basis of availability of water in that basin the developmental plan of that area is taken up. In a number of basins such calculations have been made but mostly on surface water alone. A conjunctive model both for surface and ground water has been attempted under the Technology Mission by National Institute of Hydrology, Roorkee and Indian Institute of Science, Bangalore. Possibly this will mark a new beginning which will clearly indicate the potentiality of development of a particular basin and direction the growth should really take place.

5.2 The other aspect which tends to be missed is the cost of the water supplied. Every drop of water costs certain amount. However, it is never calculated. The time has gone when water was considered free. The time has also gone when it could be thought that entire water supply system could be handled by Government machinery. It requires decentralisation, involvement of non-governmental organisations and massive awareness campaign of community involvement both in development as well as maintenance of systems. Drinking water supply is not a mere hardware solution; it is more a societal problem and societal solution has to be obtained. More than that a consciousness of water and its importance in life and its scarcity should be brought out sharply. In order to make people appreciate the problems related with it, a joint endeavour is to be made to mitigate the crisis.

5.3 The involvement of the non-governmental agencies/organisations to a great extent helped involve the people in fighting this drought through Council of Advancement of People's Action and Rural Technology (CAPART). A large number of voluntary organisations were given funds and technical advice to set-up drinking water systems. The most notable and innovative experiment was conducted in Gujarat by an organisation called *Mahiti* where rain water harvesting was done in large tanks laying with low density ethyl polyfilms and evaporation was reduced by spraying cetyl alcohol. The experiences of voluntary organisations in water management like *Mahiti* in Gujarat, *Pani Panchayat* in Maharashtra, *Pani Chetna Sangh* in Rajasthan, *Kasa* Trust in Almora and National Association of Water Development Agency (NAWADA), Pune in various parts of the country, will help us to face the crises and develop water modules in future.

Energy sector plays a major role in the management of situation created by a drought. There is a massive step up in the demand for energy in sectors like agriculture and transport during a drought period. Several policy initiatives were taken and efforts on unprecedented scale were mounted to meet the burgeoning demand generated for energy by the drought of 1987.

1.2 In the petroleum sector efforts were directed for maximising the crude throughput of refineries, transporting of petroleum, oil and lubricant (POL) products to the drought-affected area and toning up the entire distribution system in order to effectively meet the challenge posed by drought.

1.3 Besides petroleum products the other major balancing energy source required during drought was electricity. The situation with regard to power generation in a drought year is further compounded by the lower levels of the hydel reservoirs in the face of greater demand of electricity for irrigation. Effective steps for meeting the increasing demand with lower power availability in the hydel sector were further directed towards maximising power generation from the thermal stations earmarking higher allocations of power for the agriculture sector and towards energising additional irrigation pumps.

Petroleum Products

2.1 Under the guidance of Ministry of Petroleum and Natural Gas (MOPNG) and the Oil Coordination Committee (OCC), the oil industry responded in an admirable manner towards meeting its responsibility during the drought period. Despite the peaking of demand for petroleum products, equitable supplies were organised. However, had there been any shortcoming either in the conception or in the execution or even in monitoring of relief measures pertaining to the area of supply of essential petroleum products, the resultant impact would have been severe.

2.2 Among the petroleum products the most widely used product is the High Speed Diesel (HSD). This product alone accounts for nearly 40 per cent of the total demand of liquid petroleum products. HSD is used for road transportation, rail transportation, captive power generation, grid power

Table 24 : Demand for High Speed Diesel (HSD) in Northern Region, 1984-85 to 1987-88.

Sl.No.	Year	Demand (Actuals) (thousand tonne)	Percentage Growth
1.	1984-85	4365	—
2.	1985-86	4573	4.8
3.	1986-87	5118	11.9
4.	1987-88 (Original Anticipated)	5580	9.0
5.	1987-88 (Actual)	5838	14.1

generation (as support fuel), operation of irrigation pumps, operation of tractors, harvesting, the threshing equipments, coastal bunkers, and operation of barges.

2.3 The drought of 1987 did not affect only the northern part of the country. However, the magnitude of problems faced by the oil industry in maintaining supply line to the northern part of the country was by far more pronounced than faced in maintaining the supplies to the other parts of the country.

2.4 The western, southern and south-eastern parts of the country are served by major ports such as Kandla, Bombay, Goa, Mangalore, Cochin, Tuticorin, Madras, Visakhapatnam and Haldia which all handle petroleum products. Further, there are a number of coastal refineries located at Bombay, Cochin, Madras, Visakhapatnam and Haldia. The north-eastern part of the country is also well served by the availability of indigenous crude oil and adequate refining capacity through the refineries situated at Digboi, Bongaigaon, Guwahati and Barauni. Thus there are a large number of supply sources of petroleum products to cater to these areas and more importantly, the leads involved are relatively shorter both in terms of distance and time required for replenishment. This, however, does not mean that these areas do not suffer from infrastructural inadequacies, locational difficulties and also availability problems. The oil industry had to stretch itself quite far in maintaining the supply line to these areas also.

2.5 The problems faced for maintaining the supply line to the northern part of the country is far greater in magnitude. Further the energy demand in the northern part for agricultural inputs, density of population and variations in weather conditions is subject to a greater degree of variation than the other parts of the country. There is only one refinery, viz., Mathura in the northern region and the production from Mathura meets only a part of the northern region's requirements. Consequently inputs are required to be organised from far off supply sources such as Bombay, Kandla and Baroda. Supplies from these long lead sources involve not only the capability of oil industry but its devetailing with railway operations as well.

2.6 In view of various factors influencing the demand of HSD the demand is seen to grow at a rate of around 9 per cent per annum in the northern region as is evident from Table 24.

2.7 Thus under normal circumstances the demand during 1987-88 in the northern region would have grown at a level of around 9 per cent over 1986-87. Since the demand had been met in full in earlier years, the pattern noticed would have continued in 1987-88 also had there been no severe drought in 1987. Due to the drought, instead of a growth of 9 per cent in demand, the actual growth proved to be as high as 14 per cent in 1987.

2.8 The annual growth rate, however, does not fully reflect the problem caused by spurt in demand from month to month. The impact of the drought was felt in full measure during the period June 1987 to February 1988. During this period the monthly growth rate in demand noticed over the previous years was above normal during all the months with pronounced peakings during June to August, 1987 and February, 1988 as shown in Table 25.

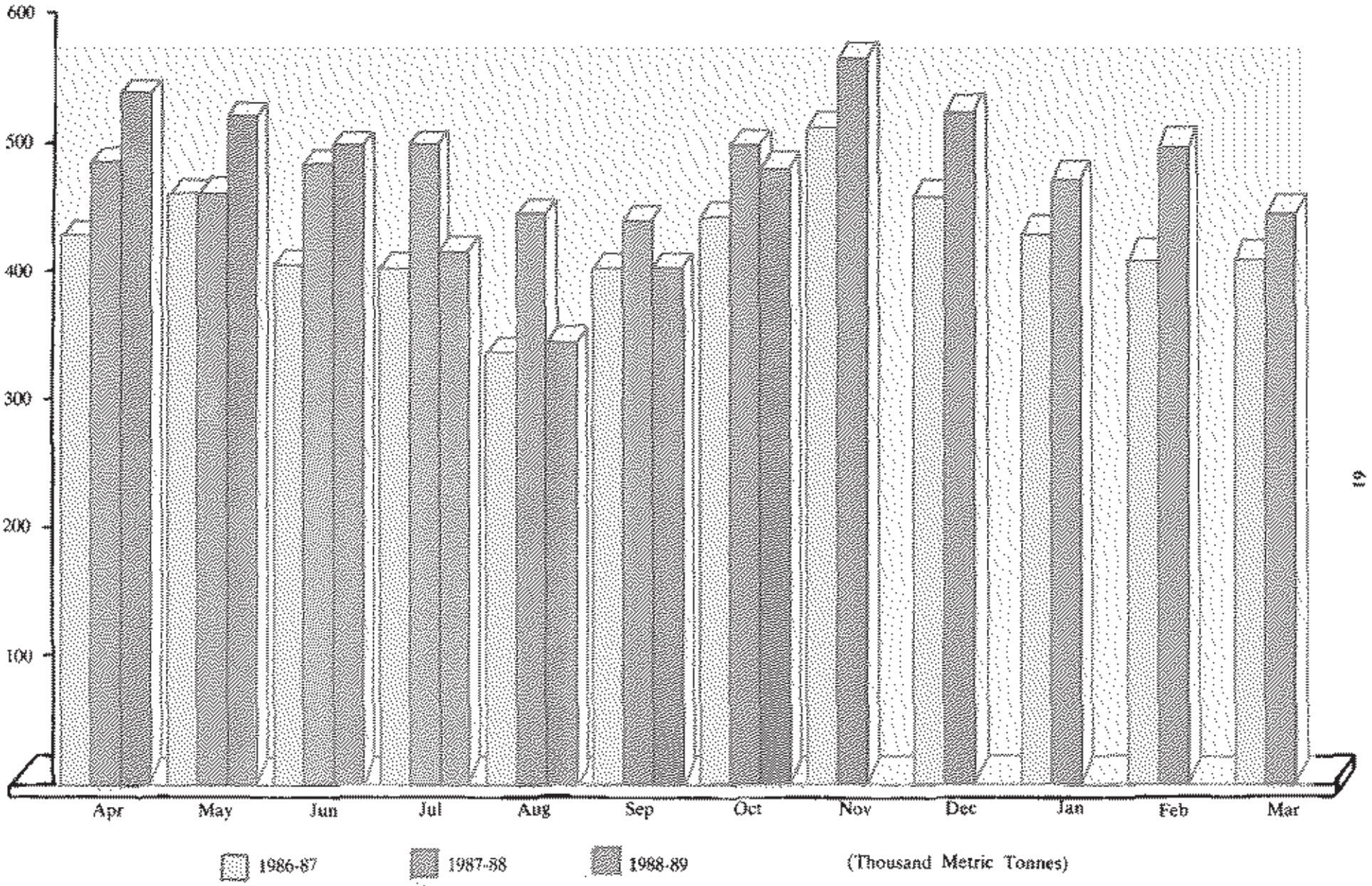


Figure 7: **High Speed Diesel (HSD) Demand Behaviour in Northern Region**

Table 25 : Monthly Demand for High Speed Diesel (HSD), June 1987 to February 1988.

S.No.	Month	Demand (thousand tonne)		Percentage Growth Rate
		1986-87	1987-88	
1.	June	408	486	19.1
2.	July	405	502	23.9
3.	August	339	447	31.8
4.	September	404	442	9.4
5.	October	444	500	12.6
6.	November	514	567	10.3
7.	December	459	525	14.4
8.	January	430	473	10.0
9.	February	409	497	21.5
	June to February	3812	4439	16.5

2.9 The peakings noticed in June, July and August represent the impact of failure of the monsoon and the subsequent peaking in February represents the impact of failure of winter rains. Thus during the period from June 1987 to February 1988, the average increase in demand over the corresponding period of previous year was as high as 16.5 per cent, an unprecedented massive increase in a period of nine months, by any standards, when it is noted that the total of actual demand in April, May and March in 1987-88 (viz. 1399 thousand tonne) was only 7 per cent higher than the total HSD demand of these months in 1986-87.

2.10 The demand noticed in May, 1987 did not give any indication about events to come at all. Normally the month of May is one of the highest selling months for HSD in northern region, as the demand behaviour analysis for the period 1977-78 to 1986-87 would reveal. However, during the month of May, 1987 the HSD demand stagnated consequent to early pre-monsoon showers. This abnormality can be noticed from the demand for the month of May during the last 5 years shown in Table 26.

2.11 The growth of 12.9 per cent in May, 1988 over May, 1987 would have actually been of the order of only 6 per cent to 7 per cent had the situation during May, 1987 been normal. The above pattern has been captured here only to highlight that no indication whatsoever was available for the severe drought that was about to set in June 1987. Thus the task of mobilising supplies to meet the peaking of demand in June, 1987 became a stupendous one.

2.12 The demand for the months of July, August and September in the northern region are normally far below the demand for the month of May. Thus the normal plan of the oil industry is to keep the stock levels at judiciously controlled levels at various stock points in the northern region so that adequate haullages are available for movement of products from Mathura refinery without forcing any reduction in crude processing at the refinery due to want of outlets for production during the lean season. Additionally the railways and the oil industry plan on a lower level of movement of

Table 26 : Demand for High Speed Diesel (HSD) in May, 1984-88.

S.No.	Year	Demand in May (thousand tonne)	Percentage Growth
1.	1984	397	
2.	1985	436	9.8
3.	1986	465	6.7
4.	1987	464	0.2
5.	1988	524	12.9

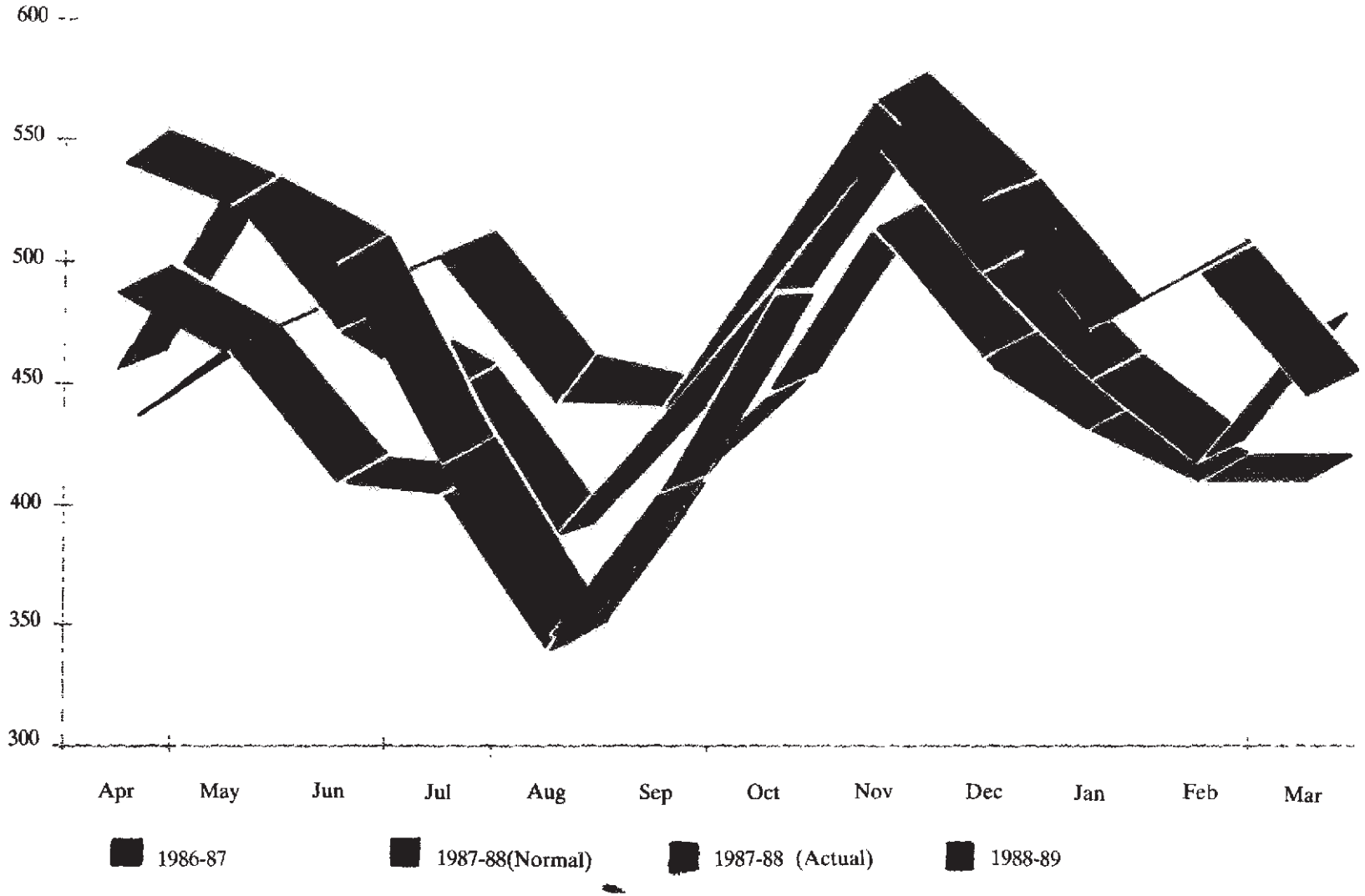


Figure 8: High Speed Diesel (HSD) Demand Behaviour in Northern Region. 1986-87 to 1988-89

(Thousand Metric Tonnes)

products during this period to the northern region to prevent rail tank wagons from getting detained at the depots of the oil industry and en route. If the stocks are maintained at high levels, then the tank wagons cannot be unloaded for want of space in storage tanks. This chokes the entire rail transportation system. Thus the stock management policies are radically different during the lean demand season.

2.13 While the oil industry had regulated the inventory position, import schedules and also evolved plans for maintenance shut downs of refineries during the lean season, the demand for HSD showed a sudden spurt in June. This pattern continued unabated throughout June to August. The growth rates in demand for HSD in the northern region during June, July and August were respectively 19.1 per cent, 24.0 per cent and 31.9 per cent over the off-takes of the previous year. This situation was abnormal.

2.14 Apart from upsetting the entire plans of the oil industry which are carefully designed taking due notice of the established behavioural pattern of demand, the situation actually posed big challenge to the oil industry to maintain the supply line. The confidence of public with regard to regular availability of diesel had to be maintained at a very high level. At the same time it was not known at what point of time would the monsoon which had failed would revive. Any revival of the monsoon would have brought down steeply the demand for diesel resulting in stocking problems. There was always a probability that the mobilisation of activities for concentrating on voluminous inputs of stocks into the northern region could become counter-productive if the demand were to drop.

2.15 At the same time, however, the demand was materialising at a very high level. The production of Mathura refinery meets only a part of the requirement of northern region. Supplies from alternate sources involved a long lead in terms of time. The product had to be positioned not only at a few pockets but at all over the north in step with the peaking of demand. The factor of time lag between upliftments from the depots and arrival of replenishments from alternate sources had to be counter-balanced.

2.16 The HSD demand continued to be at a higher level during the period September to January as well. During February, 1988 there was once again a quantum jump in demand, the demand recording growth of 21.5 per cent over the same month last year. Thus there was no respite to the oil industry or to the railways. All plans had to be continuously changed and the challenge grew stiffer. Normally, OCC and the oil industry review the stock position and evolve replenishment plan twice a week. During the period of this crisis, the frequency of the review meetings was increased. Daily monitoring was done for meeting the demand for HSD without any drop in the confidence level of the common man with regard to the availability of supplies.

2.17 The HSD demand behaviour monthwise for the years 1984-85 to 1988-89 (upto October) is given in Table 27. This shows as to how the demand was at abnormally high level during 1987-88. More particularly, the information reveals how the demand during July to October, 1986 and even in 1988 was far below the demand during the same period in 1987-88.

2.18 The bar chart at Figure 7 and the line graph at Figure 8 capture the peaking of demand during 1987-88. They show (1) how the demand during 1986-87 and 1988-89 was far lower than the actual demand during 1987-88; (2) how the demand during 1987-88 continued to be at a very high level; and (3) how the entire supply system which depends on gradual build up of stocks during lean season for meeting the demand during peak season was upset.

2.19 The details given in Table 28 and bar chart in Figure 9 reveal that even accounting for a high growth for HSD (say, 9 per cent) in 1987-88, how the actual demand outstripped the normal demand pattern month after month during the period June 1987 to February 1988. It would be noticed that during the period June, 1987 to February, 1988, the actual HSD demand was higher that normal HSD demand (with 9 per cent growth) in the northern region by as much as about 314,000 tonne. In other words the demand every month was on an average higher than normal demand by as much as 35,000 tonne. In actual effect the demand during the month of August, 1988 and February, 1988 was higher than the normal pattern of demand (with 9 per cent growth) to the extent of about 70,000 to 80,000 tonne per month.

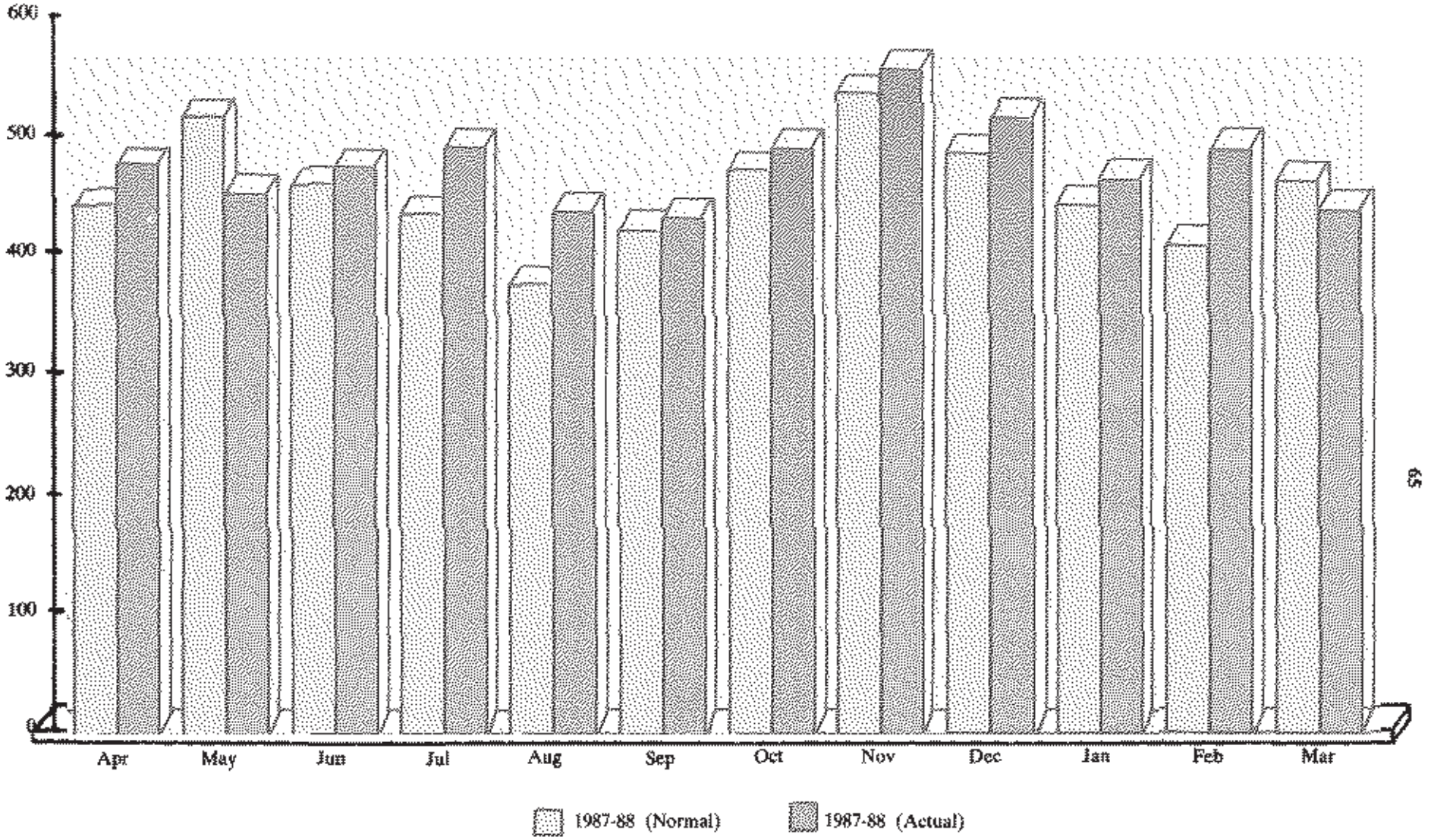


Figure 9: **High Speed Diesel (HSD) Demand Behaviour in Northern Region.**
(Thousand Metric Tonnes)

Table 27 : Monthly Demand for High Speed Diesel (HSD) in Northern Region, 1984-85 to 1988-89.

(thousand tonne)

S.No	Month	1984-85	1985-86	Percentage Increase	1986-87	Percentage Increase	1987-88	Percentage Increase	1988-89	Percentage Increase
1.	April	360.0	421.0	16.9	432.0	2.6	489.0	13.2	543.0	11.0
2.	May	397.0	436.0	9.8	465.0	6.7	464.0(−)	0.2	524.0	12.9
3.	June	358.0	399.0	11.5	408.0	2.3	486.0	29.1	501.0	3.1
4.	July	331.0	367.0	10.9	405.0	10.4	502.0	24.0	418.0(−)	16.7
5.	August	321.0	314.0(−)	2.2	339.0	8.0	447.0	31.9	346.0(−)	22.6
6.	September	279.0	322.0	15.4	404.0	25.5	442.0	9.4	404.0(−)	8.6
7.	October	366.0	365.0(−)	0.3	444.0	21.6	500.0	12.6	481.0(−)	3.8
8.	November	420.0	450.0	7.1	514.0	14.2	567.0	10.3		
9.	December	397.0	404.0	1.8	459.0	13.6	525.0	14.4		
10.	January	352.0	397.0	12.8	430.0	8.3	473.0	10.0		
11.	February	387.0	319.0(−)	17.6	409.0	28.2	497.0	21.5		
12.	March	397.0	379.0(−)	4.5	409.0	7.9	446.0	9.0		
	Total	4365.0	4573.0	4.8	5118.0	11.9	5838.0	14.1		

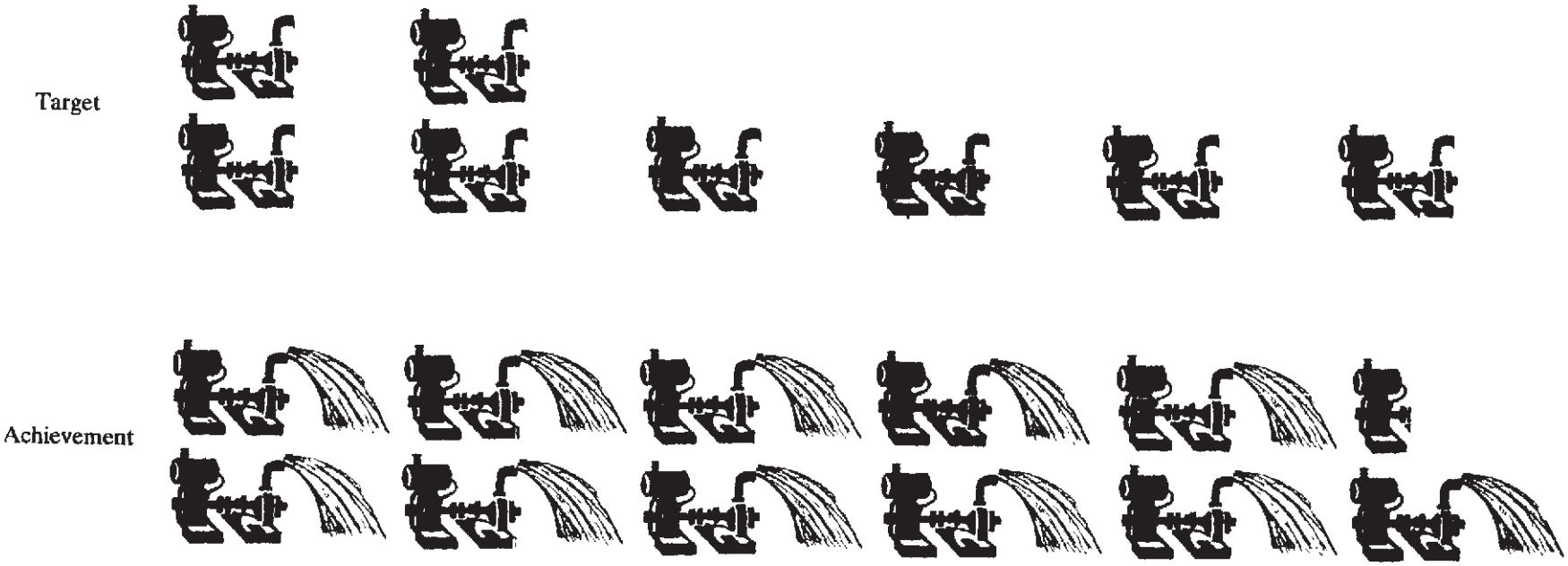
2.20 There were periods when the offtakes from some depots were registering increases of the order of 70 per cent over the same period last year. The average figure muffles these increases. The oil industry had to wage a continuous struggle for replenishment of stocks against depletion of stocks by keeping a very close watch on the daily demand behaviour and reinforcing supplies. The inherent difficulties due to the time lag between despatch from supply sources and receipt at long lead consumption centres had to be overcome.

2.21 The problem of the oil industry was not confined to HSD only; the demand for other products too was at a high level. Superior kerosene oil supplies had to be arranged in line with the allocations made by the Government from time to time, the demand of petrol shot up due to increase in vehicle population and there was a high level of demand for black oils too. The oil industry had to discharge its responsibility of meeting the demand in full and in an equitable manner for all products.

Table 28 : Actual and Anticiped Monthly Demand for High Speed Diesel (HSD) in Northern Region, 1986-87 and 1987-88.

(thousand metric tonne)

S.No.	Month	1986-87 (Actual)	Normal Level after providing for 9 per cent Growth (Anticipated)	1987-88 (Actual)
1.	April	432.0	455.0	489.0
2.	May	465.0	529.0	464.0
3.	June	408.0	472.0	486.0
4.	July	405.0	446.0	502.0
5.	August	339.0	385.0	447.0
6.	September	404.0	431.0	442.0
7.	October	444.0	482.0	500.0
8.	November	514.0	547.0	567.0
9.	December	459.0	495.0	525.0
10.	January	430.0	451.0	473.0
11.	February	409.0	416.0	497.0
12.	March	409.0	471.0	446.0
	Total	5118.0	5580.0	5838.0



Ref:—One symbol represents 50,000 pump sets.

Figure 10: Energisation of Pump Sets, 1987-88

Policy Initiatives

3.1 In the emerging drought situation, the MOPNG and OCC came out with specific policy initiatives in order to maintain the supply line all over the country in general and in the northern region in particular. The daily system of stock monitoring was brought into force. The OCC at New Delhi took total charge of the situation. Daily stocks, daily off-takes, stocks in transit, and daily despatches from loading bases were monitored with the involvement of all the oil companies Necessary corrective action was constantly taken for increasing inputs at various depot areas in tune with off-take levels.

3.2 Notwithstanding the earlier devised plans regarding maintenance schedules, in close coordination with IOC, the MOPNG and OCC evolved steps for maximisation of crude allocation to Mathura and Koyali refineries and enabled these refineries to operate at a far higher level than envisaged in the oil economy budget. This involved, *inter alia,* postponement of earlier planned maintenance shutdowns.

3.3 Increase in crude throughput of the refineries calls for a sequence of operational procedures, prevention of breakdowns in plant and machinery, high level of on line maintenance, prevention of untenable stock, build up with regard to surplus products such as naphtha, regular vigil on the operating conditions and parameters of every single strategic unit at the refineries concerned. The crude replenishments of the refineries also had to be arranged in tune with the increase in operating level. Notwithstanding the complexities involved in processing of various types of crude, the product yields were to be optimised while strictly adhering to the specifications laid down for each product during each period of the year.

3.4 The two refineries at Mathura and Koyali not only increased their crude intake but also operated their secondary processing facilities at far higher levels than designed capacities so as to optimise the yield pattern. Thus, for example, the fluid catalytic cracking units were operated at higher levels.

3.5 Provisions were made for the import of an additional one million tonne of crude over original plan to take care of increased processing of crude and also to increase the inventory of imported crude. In actual effect, as against the original plan for importing 17.336 million MTs of crude, the actual import was 18.045 million MTs, representing an additional import of 0.709 million MTs.

3.6 Simultaneously, efforts were made to increase indigenous crude production. The production from the north eastern fields did not materialise as per plan. The actual production was only 5.204 million tonne against the original plan of 5.64 million tonne. This shortfall, *inter-alia,* affected the plan to maximise the crude throughput of Barauni Refinery. On the other hand, the production from Gujarat oil fields and Bombay high off-shore fields was stepped up. Against an original plan to produce 24.824 million tonne from Gujarat/Bombay off-shore fields, the actual production was 25.153 million tonne, *viz.* an increase of 0.329 million tonne, enabling higher crude allocation to Mathura and Koyali refineries. Provisions were made for import of additional HSD in the event the deficit for HSD proving to be higher than originally projected even after implementation of plans for increasing HSD production from indigenous refineries.

3.7 The oil industry operates in close coordination with the railways. The movement plan on a month-to-month basis is arrived at in consultation with Railway Board. During the period of crisis, a system of regular interaction with railways was set in motion. The railways and the oil industry collaborated in maximising the availability of inputs in the northern sector as also in equitable movement of rail wagons to different depots of northern sector in accordance with the plans which were evolved/reviewed/modified from time to time.

3.8 There is a nominated senior officer in each State for interaction with the State Governments on behalf of the oil industry. During the drought-period, the state level coordinators of different States were in day to day contact with the civil supply authorities and the State Governments. A continuous feedback was given by the State level coordinators to the OCC and Ministry for ensuring replenishement in tune with the requirements. In other words, information, intelligence and daily situation control data available with each State Government was translated into the required mode, for arrangement of replenishments to various States.

3.9 The Central Government regularly interacted with the State Governments, *inter alia,* regarding

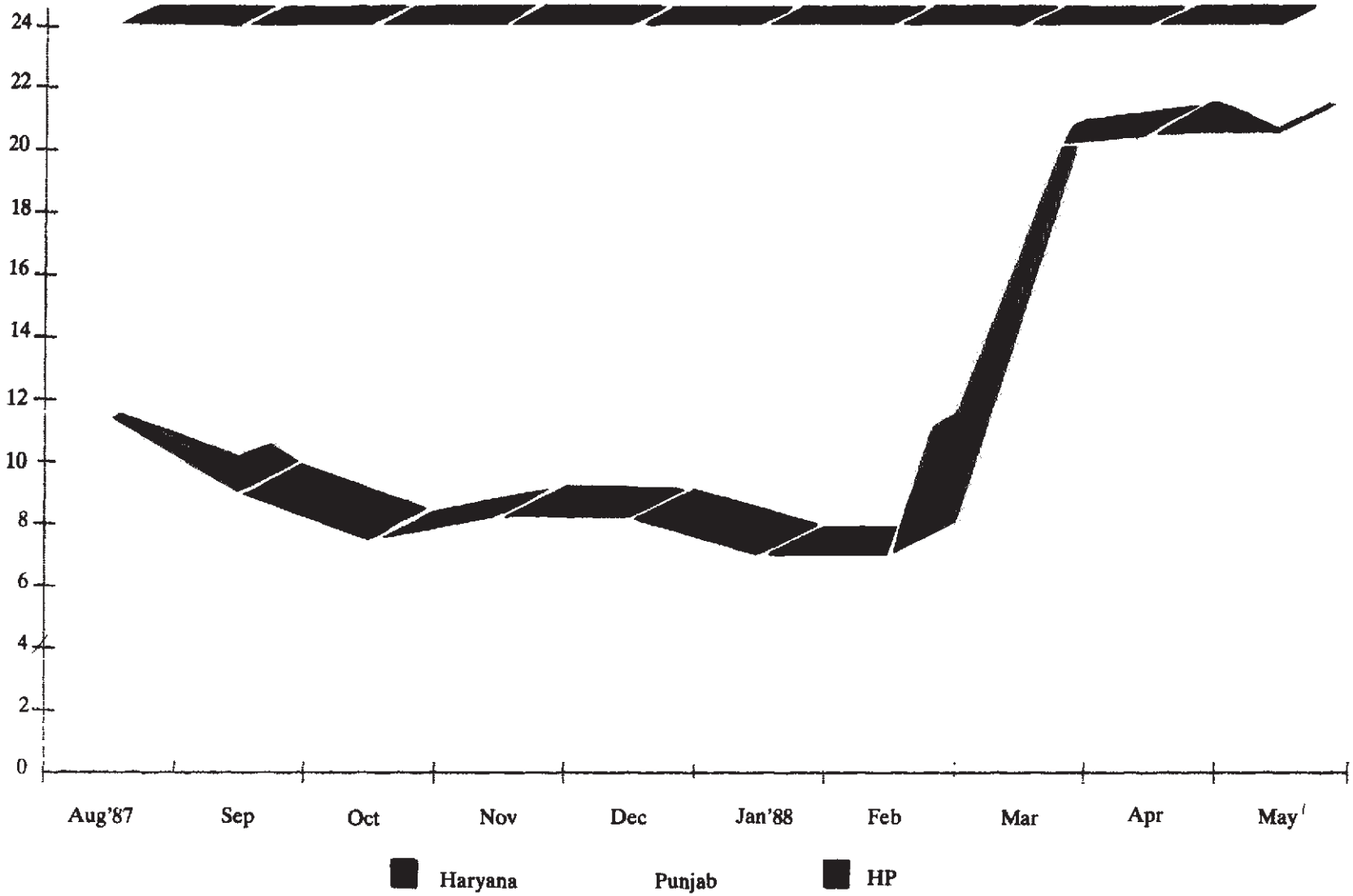


Figure 11: Average Hours of Power Supply to Agriculture

adequate availability of petroleum products and in particular HSD. Various State level coordination meetings were also organised chaired by senior officials of MOPNG with top level State Government officials, OCC and the oil industry to receive a first hand feedback from the concerned State Governments regarding the satisfaction level pertaining to supply of petroleum products in general and kerosene and HSD in particular. The chief executive of IOC had detailed meetings with the Chief Ministers and several State Government officials of the States. In these meetings, apart from assuring the State Governments about the efforts being made by the oil industry for arranging adequate availability of petroleum products, the views of the State Governments on various problem areas were also ascertained which were duly taken note of while making policy decisions regarding supply of petroleum products in industry coordination meetings and supply plan meetings.

3.10 Necessary instructions were issued by the MOPNG and OCC and implemented by oil companies for optimisation of operations at all terminals and depots to cope with the increase in workload. In particular, it was ensured that orders were executed in full within the stipulated time after receipt of indents, order execution was in line with the priorities set up by the GOI and also in strict conformity with the sequence of indents received. The terminals and depots worked on extended hours to prevent dry out at retail outlets and also consumer points. It was also ensured that the tank wagons (TWs) received at various depots were unloaded as quickly as possible so that turn round time for the TWs were reduced thereby increasing the transportation capacity for rail movement.

4.1 In step with the policy initiatives of MOPNG and OCC to maximise the crude throughput of Mathura and Koyali refineries, IOC responded admirably to the challenge and increased the operating level of both the refineries. In order to optimise the yield pattern, all secondary processing facilities such as the fluid catalytic cracking units were also operated at nearly 110 per cent to 115 per cent of the designed capacities.

4.2 Against the plan for processing of 5.77 million tonne at Mathura refinery during 1987-88, the actual throughput of Mathura refinery was as high as 6.535 million tonne representing an incremental processing of 765,000 million tonne of crude. Thus the actual throughput achieved was 13.3 per cent higher than the plan. With the help of additional crude processing as well as optimised operation of the secondary processing units, the HSD production was also at a substantially higher level than originally planned. Against the original plan for producing 20,13,000 tonne of HSD, the actual production was 23,68,000 tonne, representing an incremental production of 3,55,000 tonne. The actual production was 17.68 per cent higher than the planned.

4.3 Against the plan for processing of 7.85 million tonne of crude at Koyali refinery during 1987-88, the actual throughput of Koyali refinery was as high as 8.443 million tonne representing an incremental processing of 5,94,000 tonne of crude. Thus the actual throughput achieved was 7.6 per cent higher than planned. With the help of additional crude processing as well as optimised operation of the secondary processing units, the HSD production was also at a substantially higher level than planned. Thus against the original plan for producing 19,54,000 tonne of HSD, the actual production was 23,68,000 tonne, representing an incremental production of 4,14,000 tonne over the plan. The actual production was 21.2 per cent higher than the planned.

4.4 The main pipeline system which serves the northern region is the pipeline from Mathura to Jalandhar *via* Delhi and Ambala. Another pipeline from Barauni to Kanpur *via* Patna and Mugalsarai and Allahabad mainly caters to the eastern U.P. demand and also the demand at Kanpur and the markets in the vicinity of Kanpur. As against the throughput of 2.76 million tonne achieved in 1986-87, the pipeline was operated in 1987-88 at a throughput of 3.00 million tonne, representing an increase of 8.7 per cent. Similarly HSD pumping through the pipeline was increased from 1.63 million tonne in 1986-87 to 1.79 million tonne in 1987-88, representing an increase of 9.9 per cent. The Barauni-Kanpur pipeline is always being operated at its maximum capacity. The same was ensured in 1987-88 also. HSD pumping through the pipeline in 1987-88 was 1.02 million tonne, representing an increase of 2.2 per cent over the previous year. This was achieved despite difficulties in availability of Assam crude for Barauni refinery whereby the crude throughput at Barauni could not be maximised.

4.5 The oil industry and the railways interacted very closely for increasing the inputs of petroleum products in the northern region as also maintaining the supply line in other parts of the country. In

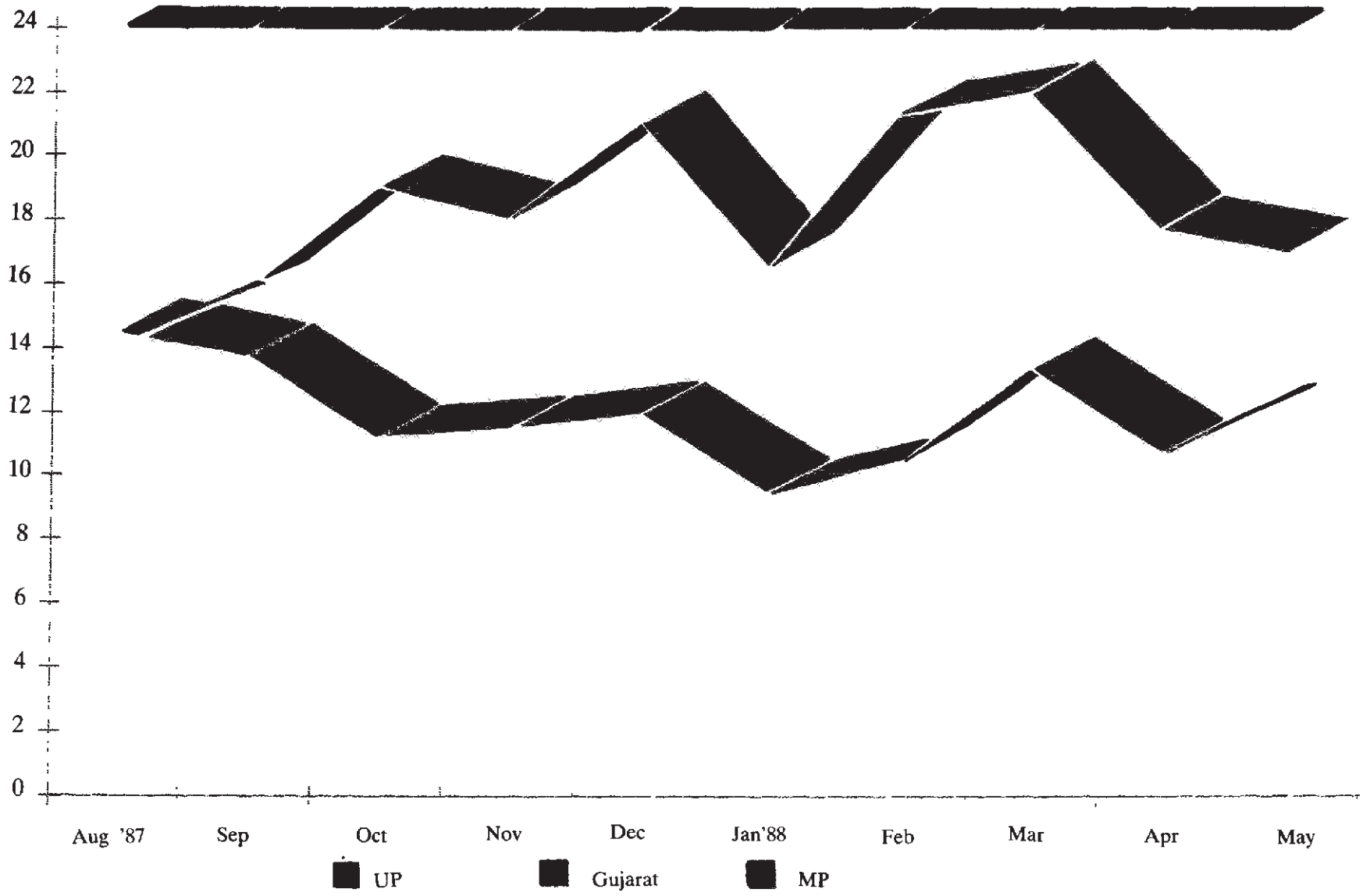


Figure 12: **Average Hours of Power Supply to Agriculture**

this regard there was close and regular coordination between OCC and the Railway Board almost on a daily basis. The oil industry members at the headquarters level were in close and daily contact with the chief wagon superintendent. Policies and procedures were jointly evolved by the oil industry and the railways for maximisation of tank wagon loading operations at the loading bases as well as speedy unloading of tank wagons at the depots. The implementation of decisions taken jointly by railways and OCC were constantly monitored by the OCC and reviewed in detail at the railway inland petroleum sub-committee meetings as well as at the supply plan meetings.

4.6 The Railways do not have surplus tank wagon (TW) fleet for catering to sudden increases in demand of the levels required in 1987-88. Nevertheless with the help of regular augmentation in fleet being carried out by them and more particulary through the optimisation of the TW movements resulting in better turn round time, the overall TW inputs in the northern sector were increased. The limitations due to non-availability of surplus fleet capacities did result in the inventory levels depleting in December 1987 and January, 1988 due to continuous unabated high level of demand for HSD. However, it must be noted that but for the wholehearted and dedicated involvement of the railways in increasing movement of petroleum products in the northern sector, the total normalcy in availability of petroleum products in general and HSD, in particular, could not have been achieved.

4.7 The Railway Board in close coordination with OCC issued instructions to the local railways for implementation of the priorities being evolved for movement of petroleum products by OCC. Thus there was an orderly execution of the priorities and strict adherence by all concerned agencies in the implementation procedure. In respect of all high throughput locations, wherever there was heavy stock depletion, the TW rakes were moved on top priority by the railways so as to ensure that the replenishments arrived on time. A regular watch on the movement of rakes in transit was kept, estimated arrival times taken note of and plans for further replenishments evolved ensuring avoidance of over-shipments to any particular location. At the same time it was ensured that the stocks at any location were not allowed to be depleted to critically low levels. Thus the issue tackled was not of merely average inventory in the northern sector but the inventory position at each and every stock point and equitable replenishment.

4.8 The northern region is catered to by railway broad gauge loading bases at Kandla, Bombay, Koyali, Mathura, Kanpur and Jalandhar. The Rajasthan area is fed by the metre gauge tank wagon loading bases at Mathura, Sabaramati and Kandla. Products such as petrol, naphtha, kerosene, aviation turbine fuel, and high speed diesel oil are loaded in tank wagons, known as TP and TK wagons, jointly classified as white oil tank wagons. Products such as furnance oil and low sulphur heavy stocks (LSHSs) are loaded in black oil or TOH tank wagons. In this regard, while dealing with the efforts and achievements in feeding HSD to the northern region it was felt worthwhile to highlight the overall achievements in white oil tank wagon loadings at the major broad gauge bases at Koyali, Kandla and Bombay. In the white oil TW loadings the dominant component was HSD tank wagons. The TW loadings were at a far higher level than the previous year. On an average the TW loadings during 1987-88 were higher than 1986-87 by 47 wagons per day.

4.9 Kandla is a major balancing source of supply for the northern sector. During 1987-88 the railways spared no effort to increase TW loadings *ex* Kandla. However, though the oil industry had fully greared itself to load about 270 TW per day, the railways were able to increase white oil TW loadings from a level of 50 TWs per day through most part of 1986-87 to about 160 TWs per day during peak drought months. On an average the improvement in TW loadings *ex* Kandla was 63 TWs per day.

4.10 Due to the limitations in handling of TWs through the congested railway system within the Bombay port complex, the facilities available with the oil industry for loading of TWs in the Bombay port complex was not used by the railways. The facilities available with the oil industry at Trombay viz. at BPC refinery and at HPC refinery suffered from certain limitations. A major gantry expansion programme at BPC refinery, though on hand, was not slated for completion during 1987-88. Nevertheless, after a series of discussions and implementation of optimisation procedures, the average TW loadings per day for white oil *ex* Bombay (from BPC and HPC) during 1987-88 was achieved at a level of 304 TWs per day vis-a-vis 224 TWs per day in 1986-87, representing a remarkable improvement of 80 TWs per day.

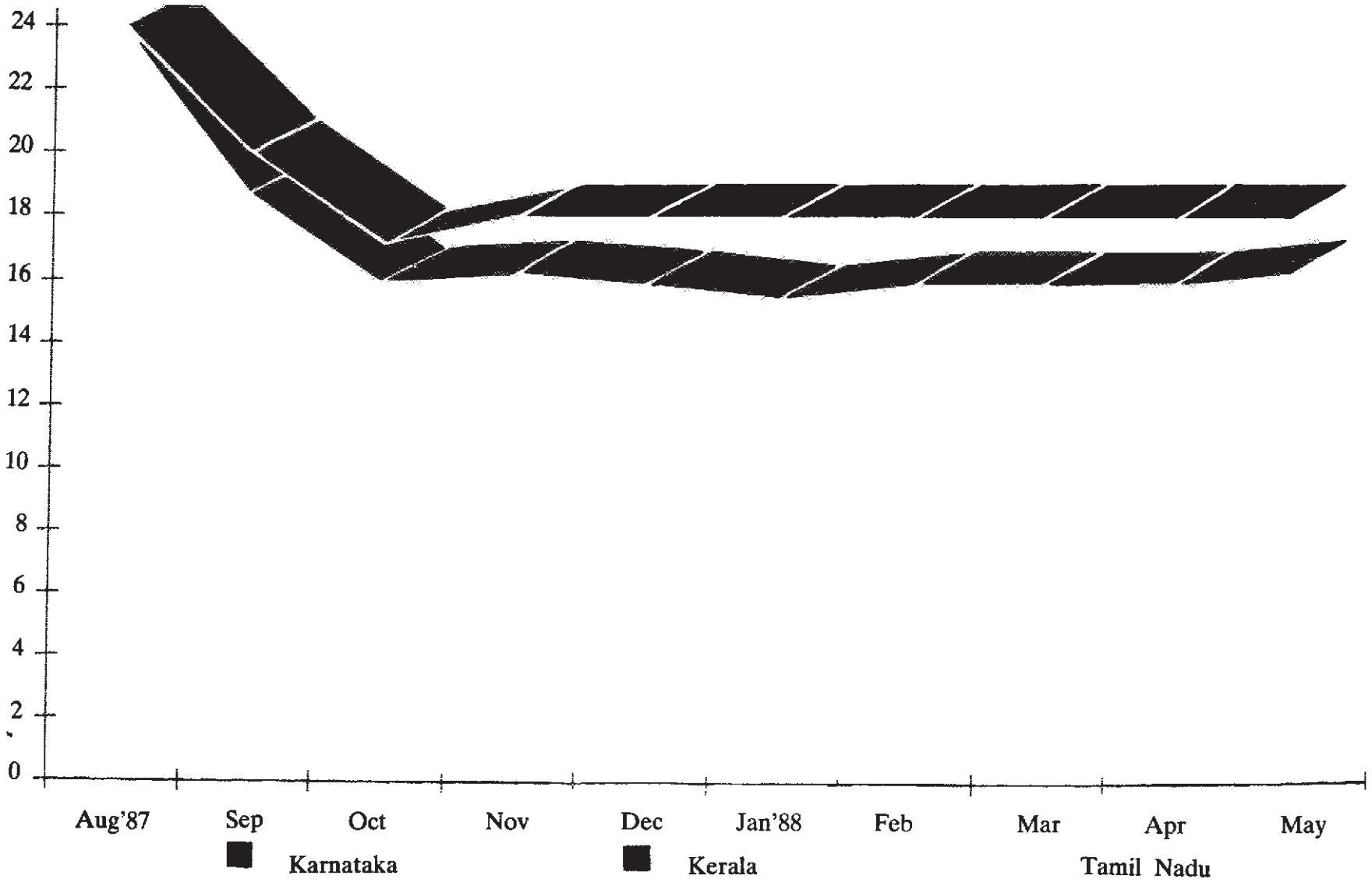


Figure 13: **Average Hours of Power Supply to Agriculture**

4.11 Due to sustained high level of demand during 1987-88 and pronounced peakings during several months, the inventory management had to be radically changed. Further, not only was the overall inventory of northern region of interest but also the actual inventory in each and every supply point. To achieve the objective of meeting the demand for HSD in full, necessary operational arrangements and monitoring systems were designed and implemented by MOPNG, OCC and the oil industry. Day to day inventory position, upliftment pattern and stock in transit position for various depots and terminals in the northern region were compiled, analysed and necessary course corrective action taken. The coordination work in this regard was carried out by OCC at New Delhi who were submitting daily situation reports to MOPNG on stock positions/upliftments.

4.12 Despite peaking of demand, the inventory levels were not allowed to deplete below 70 per cent of the tankage level during the period June to July 1987. By arranging massive inputs of products in the northern region, in line with the steep rise in upliftments, it was ensured that not only was the demand met in full but the inventory position was also kept at comfortable levels. In August 1987, the inventory improved. By September 1987, the inventory position improved to 111 per cent of the effective tankage (vis-a-vis 79 per cent in September, 1986). Further in anticipation of the need for high level of demand expected to prevail in October, November and December, special concentrated efforts were made to boost the inventory level to 330,000 tonne (116 per cent of effective tankage) by the first of October, 1987 which represents one of the peak inventory levels maintained in the northern region even during normal years. That this position was obtained during a drought year and despite continuous high level of off-takes throughout all the months by itself illustrates the magnitude of success achieved by the oil industry with regard to maintaining normalcy of supplies in the northern region.

4.13 With the help of inventory thus built up by 1st October, 1987 not only was the high level of demand during the months of November, December and January was met in full but the actual inventory levels were maintained at higher level than was achieved during 1986 which was a normal year. Further the inventory level was built up to 85 per cent of the effective tankage by the beginning of November, 1988. It is with the help of such an inventory level and massive inputs of products that the unprecedented peaking of demand in February, 1988 was met in full. It may be mentioned here that the demand in February, 1988 registered an increase of 21.5 per cent over the off-take in the previous year. By the 1st of March, 1988, the inventory position had been brought at par with effective tankage and further improved in April, 1988 so as to meet what could have been a peak demand in May, 1988.

4.14 The demand instead of increasing in May, 1988 registered a decline due to the onset of monsoon. Due to excellent monsoon in May, June and July, and consequent reduction in off-takes, the demand dropped sharply leading to very high inventory level. The position reverted to the normal pattern. It was now necessary to reduce the inventory level by reducing movements from far of ports and reserving space in storage tanks at depots for accomodating the production from refineries to prevent crude cuts. In line with the normal inventory management routine, the stocks were gradually built up to full tankage level by October, 1988.

4.15 Substantial inputs had to be organised far above normal level from alternate supply sources such as Koyali, Kandla, Sabarmati and Bombay. The depots and terminals in the northern region had to receive and supply larger quantum of products than normal. Even a marginal delay in receipt of inputs could have rendered the concerned locations vulnerable to dry outs/stock outs. In order to maximise inputs in the northern region various operational arrangements were made not only in the northern region but in other regions as well. Bottlenecks in TW loading capacities were identified and immediate action was taken at all loading bases in improving the capacity of oil industry to load TWs both in terms of number of TWs as well as speed in TW loadings. Special care was taken to ensure that the coastal movement and import programmes were properly evolved and implemented for ensuring adequate product availability at the port terminals for loading of tank wagons *inter alia* to the northern region. Since a tank receiving product from tanker cannot be used for loading of TWs. necessary tankage reallocations were carried out so that even when the tankers were under receipt, the oil industry was able to undertake TW loadings in an uninterrupted manner.

4.16 All tank wagon loadings were done on industry basis and on account of all oil companies and that too in proportion of the demand from the depots of each oil company at each location. Specific measures were implemented for equitable share of each oil company in each rake being despatched

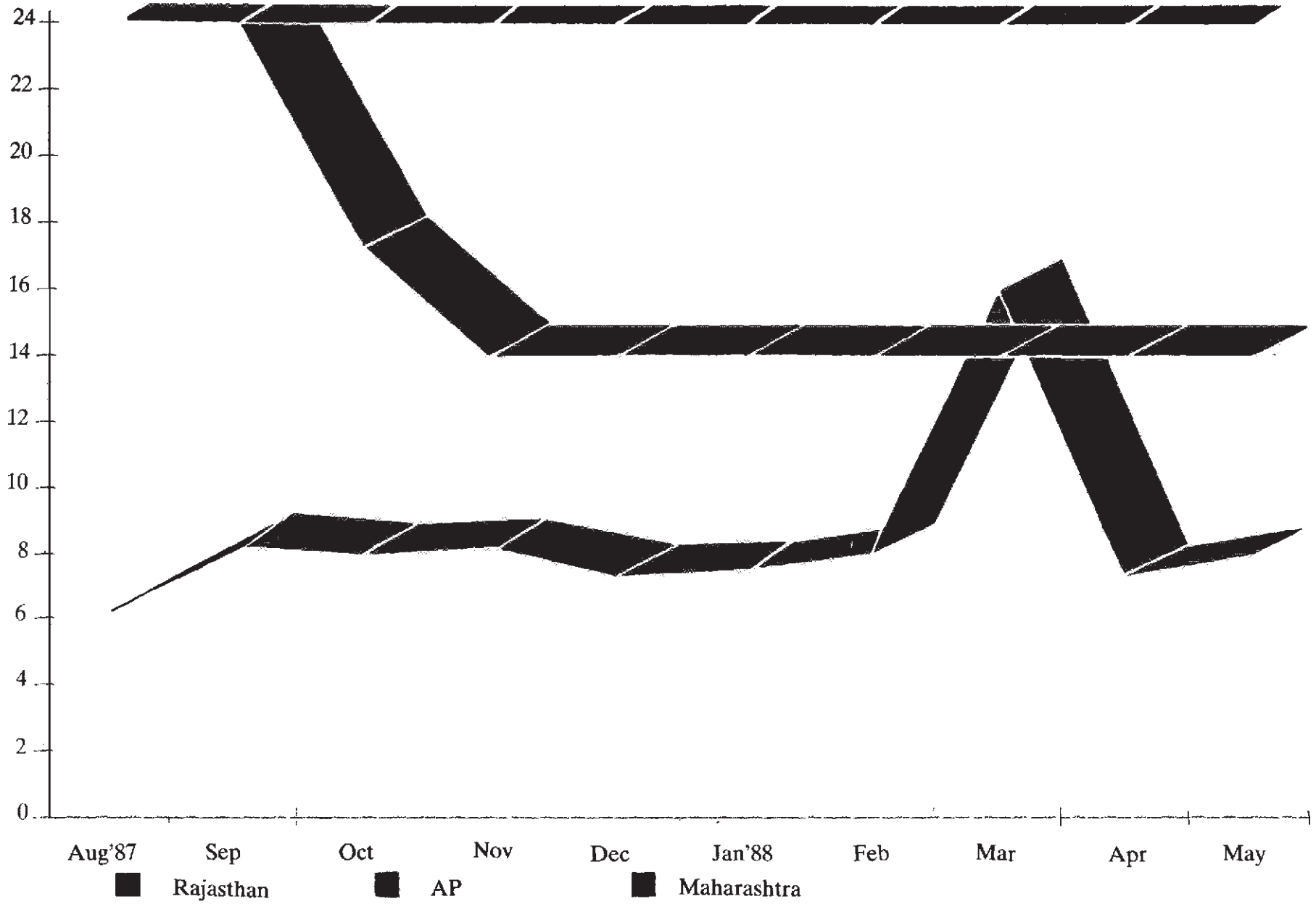


Figure 14: **Average Hours of Power Supply to Agriculture**

from each loading base. Priorities for movement of rakes to various destinations were decided on a centralised basis based on data collected from each depot in the northern region and suitable systems evolved for implementation of loading/despatch by the oil companies and railways in accordance with the priorities. After studying the lay out and capability for handling of TW at each and every depot/ location in the northern region, formation of rake for each destination and also the manner of clubbed loading of TWs on each oil company's account was worked out and given to the loading locations. This was done so as to prevent the need for sorting out of TWs at the receiving locations between the oil companies and to enable quick reformation of full rakes after unloading at the receiving locations. To the extent possible HSD despatches were organised in fully dedicated single product rakes.

4.17 Necessary arrangements were made at the receiving locations for speedy unloading of TWs to avoid detention to TWs. Procedures were evolved for unloading of TWs, by different oil companies on the basis of ullage availability rather than being strictly in accordance with booking particulars. This arrangement led to speedy decentation and release of rakes. Selected high throughput locations worked round-the-clock so that the successive rakes arriving at the locations were not detained and at the same time the stock releases from the depots could match the peak level demand that was prevailing. Necessarly arrangements were made to ensure that as long as at a given location adequate product was available with any oil company, the entire industry demand was met in full.

4.18 It was necessary not only to monitor the actual stock position but also the actual level of upliftment from each and every depot/terminal in the northern region. To ensure adequate product availability it was also necessary to monitor the product in transit, expected arrival, expected depletion rate and required replenishment rate so that no specific location went low on stocks. The OCC at New Delhi established the monitoring cell which comprised representatives of oil companies. The daily situation at each and every stock point was reviewed and priorities were jointly evolved for replenishment from alternate supply sources. The cell also monitored the stock positions at the alternate supply sources such as Kandla, Bombay, Koyali and Sabarmati. A daily check was kept on despatch schedule drawn vis-a-vis actual despatches made from the alternate supply sources so as to ensure that the evolved plans were implemented in full. Thus the monitoring was not confined only to northern region but was on a much broader scale. Regular daily feedback on the situation was given by the cell to the MOPNG. Similarly the oil companies constituted monitoring cells within their organisations through which the managements of the oil companies were also kept duly apprised of the day to day situation.

4.19 Barauni Refinery feeds Bihar, Eastern UP, Kanpur and markets in the vicinity of Kanpur. In order to increase the inflow to Kanpur, the MOPNG decided on maximising the crude throughput of Barauni. However, despite the plan to allocate additional north-eastern crude to Barauni refinery, this refinery could not be operated at its maximum possible capacity due to shortfall in availability of north-eastern crude vis-a-vis plan. Since the railways operationally find it inconvenient to provide surplus tank wagons to meet peaking of demand as was witnessed in the drought period, there is an urgent necessity to set up support transportation network such as product pipelines. During the later half of 1987, the demand for furnace oil and low sulphur heavy stocks also reached very high levels. Thus out of the available rail transportation capacity and TWs, it had become necessary to allocate additional TWs for black oil movement resulting in an additional constraint on white oil movement.

4.20 Throughout the drought period the Bombay-Pune pipeline remained under shut-down for reasons beyond the control of oil industry. Had this line been operational, it would have been possible to arrange additional inputs in the north from Bombay. This shutdown posed a very heavy strain on the logistics. A major part of the Rajasthan area is covered only by metre gauge. Since the availability of metre gauge TW fleet is limited, it was a very difficult task to meet the peaking of demand in the Rajasthan area. The constraints in feeding this important area need to be removed as quickly as possible. In this regard, there is a proposal to lay a product pipeline from Kandla to Bhatinda which is under active consideration of the GOI. This pipeline will pass through Rajasthan where tap off points will be provided at Sidhpur, Jodhpur and Sanganer to meet the requirement of Rajasthan.

Future Plans

5.1 There is a proposal for construction of a new 6 million tonne per annum capacity refinery at Karnal. Early commissioning of the proposed additional refining capacity is desirable so that the

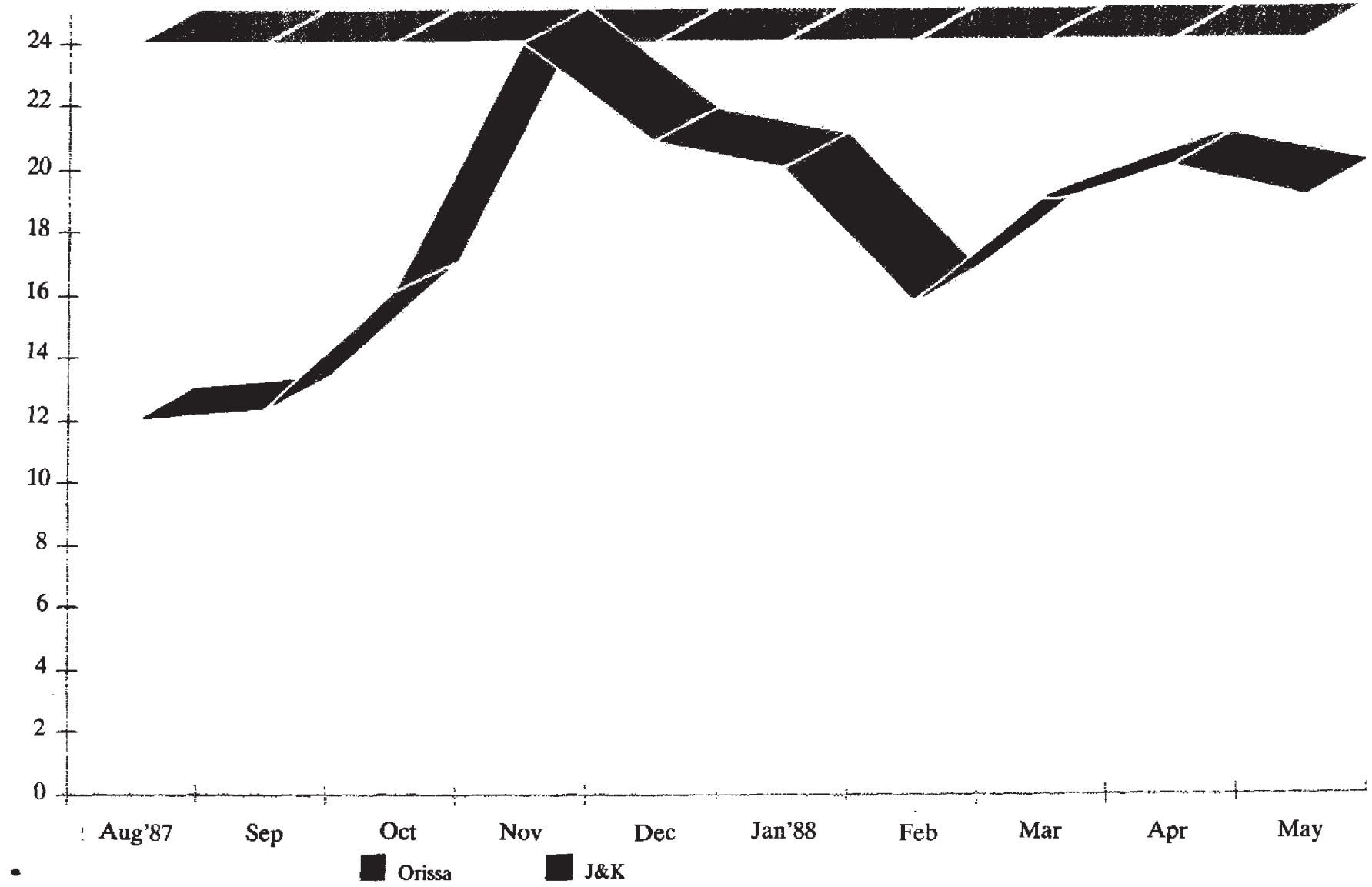


Figure 15: **Average Hours of Power Supply to Agriculture**

increase in demand of the northern region can be met with a higher degree of reliability and confidence level. In order to meet the increasing demand of the north-west region and the limitations in transportation capacity for arranging inputs from alternate sources, a proposal has been developed by the oil industry for putting up a product pipeline from Kandla to Bhatinda *via* Rajasthan. Several tap off point terminals have been proposed along the route of the pipeline. Timely execution of this proposal will go a long way in meeting satisfactorily the demand in the north west region. The demand growth profile and the estimates for the northern region reveal that even after the commissioning of the proposed Karnal refinery, the Kandla-Bhatinda pipeline would be required for meeting the demand of the northern region.

5.2 There would be an inevitable time lag before the proposed Kandla-Bhatinda pipeline and Karnal refinery are commissioned. In the intervening period the requirements of northern region can be met only through increase in rail inputs from Kandla and Bombay, apart from Mathura and Koyali. The TW loading facilities at Bombay with BPC refinery have been augmented. The MOPNG has studied in detail the augmentation of TW loading facilities by the oil industry and TW movement requirements by the railways *ex* Kandla. Unless the railways gear up their facilities to meet the full demand *ex* Kandla, it would be difficult to maintain the supply line.

5.3 The oil industry constructs additional tankage as a part of regular programme in order to meet the growth in demand for petroleum products. Keeping in view the importance of the northern region and also the long lead involved in supplies from Kandla and Bombay, the oil industry is now evolving plans for further improvement in the tankage cover in the northern region so that adequate inventory can be kept for meeting various requirements. This additional tankage programme needs to be implemented as per schedule. The crisis during 1987-88 could be met only through a well conceived and executed inventory management programme. Though such a programme continues to be in constant operation, it is important that notwithstanding various constraints, every effort is made to keep the inventory upto required levels so that whenever peaking of demand takes place, support can be drawn from the available inventory till augmented rescue inputs can be organised.

Electricity

6.1 To meet the situation created by drought, it was necessary to maximise the generation from thermal stations since there was no possibility of increasing hydel generation. It was also necessary to energise additional irrigation pumpsets in the drought affected area and to bring back into service pumpsets which were out of order. Besides, it was necessary to curb the consumption of power for ostentatious purposes. With a view to achieve the above objectives a contingency plan to meet the drought situation was formulated. This plan involved rescheduling the planned shut-down of thermal plants and expediting the commissioning of new plants as well as recommissioning of existing plants under forced shut-down, energisation of additional pumpsets in drought-affected States, regulating the water releases from hydel reservoirs for optimal use of the available water for generation of power and irrigation purposes to give high priority for supply of power to agricultural sector, reducing transmission and distribution losses and saving of energy through energy conservation measures.

6.2 For implementation of contigency plan to meet the drought situation following steps were taken:—

(i) For maximising thermal generation, power authorities were advised to postpone the scheduled maintenance of the plants unless very essential. The down-time of the units which was already under outage was reduced by expediting works. The scheduled maintenance of about 1,000 MW of the capacity was postponed;

(ii) The coal supply to thermal stations was closely monitored. Adequate quantity and quality were ensured for increased thermal generation;

(iii) The Rural Electrification Corporation (REC) implemented a crash programme for energisation of 1.5 lakh agricultural pumpsets in the drought affected States during August to November, 1987. Against the target of 1.5 lakh pumpsets, 2.27 lakh pumpsets were energised. In addition, 2.8 lakh pumpsets were made operational during the same period under the REC's programme of replacement of burnt out transformers. In this connection Figure 10 may be seen;

(iv) The State Governments of all the drought affected States were requested to give highest priority for supply of electricity for minimum 8-10 hours daily preferably during the day

light hours to the agricultural sector. All the drought affected States more or less ensured minimum 8 hours of power supply to agriculture sector during day light hours. In this connection Figure 11 to Figure 15 may be seen;

(v) The State Governments of all the drought affected States were requested to regulate the water releases from the hydel reservoirs for optimal use of the available water for generation of power and irrigation purposes;

(vi) Guidelines were issued to all the drought affected States and the concerned Electricity Boards to divert water and power from power intensive industries for agricultural purposes and for drinking water. It was also suggested that industries may be asked to run their captive units;

(vii) The monitoring of the projects under construction was also intensified to expedite the commissioning of additional generating capacity. The capacity commissioned during 1987-88 was about 5,000 MW, which is the highest ever achieved so far in the country;

(viii) The measures like staggering of load and programme shedding were adopted to have a better load management;

(ix) During the year 1987-88, the hydel generation was 9 billion units less than the target due to decline in reservoir levels. A contingency plan to augment thermal generation was implemented. By successfully implementing this plan, thermal generation was augmented by 6.4 billion units; and

(x) Increased productivity from thermal power plants was ensured during 1987-88.

6.3 The increased thermal generation required increased supplies of coal which was by and large acheived with cooperation of Coal India Ltd. and railways. All the drought affected State Governments and State Electricity Boards were requested to take necessary steps to meet the drought condition and send daily reports on action taken to Central Electricity Authority/Department of Power. The position was constantly monitored on the basis of the daily reports received from the drought affected States and periodical status reports were sent to Department of Agriculture and Cooperation, Cabinet Secretariat and Prime Minister's Office for their information.

6.4 All the power surplus States fully cooperated by diverting their surplus power to the deficit States. Since the contingency plan drafted by the Department of Power was successful in meeting the drought situation in the country during 1987-88 it is proposed that any future contingency plan, should be based on the same pattern, taking into account the requirement of the magnitude and geographical spread of the affected area.

9 EMPLOYMENT GENERATION

An immediate consequence of drought is crop loss which in turn affects gainful employment of the affected population resulting in loss of income and thus accessibility to food and other basic necessities of life. For mitigating the hardships of the people affected by drought, provision of reasonable employment, therefore, becomes an essential part of the strategy to meet the challenge of drought successfully.

1.2 Loss in crop production is assessed as the difference between the anticipated production in accordance with past trend and the actual production. Loss in production of various crops reported on account of drought of 1987 is shown in Table 29. It will be seen that maximum loss in production was recorded in the case of rice by about 5.07 million tonne, wheat by 5.9 million tonne and coarse cereals by 3.76 million tonne. Significant loss was also reported in production of groundnut (0.6 million tonne), cotton (1.8 million bale), jute and mesta (2.4 million bale). The actual foodgrain production was 138.97 million tonne in 1987-88 as against trend level production of 154 million thus resulting in an estimated loss of 15.03 million tonne.

Table 29: Loss of Crop Production due to Drought, 1987-88 (million tonne)

S.No.	Crop	Trend Production*	Actual Production	Loss in Crop Production	Value of Loss in Crop Production** (Rs. in crore)
1.	Rice	61.50	56.43	5.07	1462.5
2.	Wheat	50.9	45.00	5.90	934.2
3.	Coarse Cereals	29.6	25.84	3.76	621.0
4.	Pulses	12.0	11.70	0.30	160.0
5.	Total Foodgrains	154.0	138.97	15.03	3177.7
6.	Groundnut	6.2	5.60	0.60	198.9
7.	Cotton (million bale)	8.3	6.50	1.80	119.3
8.	Jute and Mesta (million bale)	9.1	6.70	2.40	103.7
	Total				3599.6

Note: * Trend production was obtained by fitting an exponential function of the from $y = a.b$ from the time series data for 1967-68 to 1986-87 and projecting it for 1987-88.

** Value has been assessed at minimum support/procurement prices fixed by the GOI Value at market prices would be higher.

1.3 Agricultural income consists of not only income from crop production but also from animal husbandry, forestry and allied activities. Drought affects production of crops as well as livestock since supply of fodder is also adversely affected by drought conditions. A loss in agricultural income computed for different drought years may be seen in Table 30. It would be seen that the loss in agricultural production during different drought years ranged from Rs. 1,066 crore to Rs. 8,970 crore at current prices. This level of loss is very significant during drought of 1987 as it accounts for about 9.6 per cent of the contribution of agriculture to the Gross Domestic Product (GDP).

1.4 Loss in employment is due to the following factors: (a) lack of coverage of area under cultivation, and (b) reduction in agricultural operations due to crop loss. Table 31 shows the reduction in manday in the agricultural sector during 1987-88 due to drought. Rice and *bajra* crop failure contributed to large scale loss of employment followed by cotton, jute and groundnut crops. The total loss in employment was estimated at 1,250 million manday.

1.5 There is already substantial under-employment in normal times in the agriculture sector which provides nearly 70 per cent of all employment in the country. The drought of 1987 disrupted agricultural operations on a massive scale in all the drought affected States and this led to the deprivation of income of the vulnerable sections of the society. The subsistence of small and marginal farmers was affected with the result that they had to be provided with employment for their livelihood. The employment opportunity for agricultural labourers in the farm sector was reduced forcing them to seek employment on relief works and in non-agricultural sectors. A fall in the agricultural output led to decline in non-agricultural employment potential also. A steep decline in the income of the poorer sections of the society coupled with anticipated rise in general price level

Table 30: Loss in Gross Domestic Product due to Agriculture in Selected Drought Years, 1965-66 to 1987-88.

(Rs. in crore)

S.No.	Year	GDP from Agriculture at 1970-71 Prices			Loss in GDP from Agriculture at Current Prices	Loss as Percentage of GDP from Agriculture
		Actual	Trend	Loss		
1.	1965-66	12698	14094	1396	1075	9.9
2.	1966-67	12567	14410	1843	1714	11.9
3.	1972-73	15601	16524	923	1066	5.6
4.	1974-75	16445	17293	848	1450	4.9
5.	1979-80	17578	19374	1796	3370	9.2
6.	1982-83	20032	20341	709	1648	3.4
7.	1986-87	21876	22715	839	3161	3.7
8.	1987-88	21000	23237	2237	8970	9.6

Table 31: Loss of Mandays due to Drought of 1987

S.No.	Crop	Average Manday Utilised (per hectare)	Anticipated Reduction in Area Sown (million hectare)	Anticipated Reduction in Productivity (per cent)	Assumed Reduction in Area Due to Fall in Productivity (million hectare)	Loss of Manday (million)		
						Area Reduction	Productivity Loss	Total
1.	Rice	140	2.91	(−) 3.2	1.22	417.2	170.8	588.0
2.	*Jowar*	50	1.09	(−) 9.2		54.0		54.0
3.	*Bajra*	50	2.35	(−) 33.5	2.91	117.5	145.5	263.0
4.	Maize	60	0.17	(−) 21.5	1.22	10.2	73.2	83.4
5.	Wheat	70	0.50			35.0		35.0
6.	Cotton	120	0.84	5.4	0.36	100.8	43.2	144.0
7.	Jute	60	0.21	(−) 4.1	0.03	12.6	1.8	14.4
8.	Groundnut	70	0.32	(−) 3.3	0.22	22.4	15.4	37.8
9.	Sugarcane	300		(−) 3.2	0.10		30.0	30.0
	Total Manday Lost (million)							1,249.6
	Value of Manday Lost (Rs. in crore)							1,874.4

compounded the distress of the vulnerable sections of the society. Therefore, substantial efforts were necessary in providing *gainful* employment to the affected people.

1.6 Keeping in view the magnitude and the severity of the problem, the GOI in pursuance of the directions of the CCD, identified employment generation programme as one of the major thrust area for immediate action for providing relief to the drought affected population. All memoranda received from the States and the Union Territories seeking Central assistance for drought relief were processed before September, 1987 and an outlay of Rs. 842.05 crore was approved for employment generation for various States. Provisions were made for generation of over 57 crore manday in various drought

Table 32 : Statewise Ceilings of Expenditure Approved for Employment Generation Programme for Drought Relief, 1987-89.

(Rs. in crore)

S.No.	State/Union Territory	1987-88		1988-89		Total	
		Ceiling of Expenditure Approved	For Employment Generation	Ceiling of Expenditure Approved	For Employment Generation	Ceiling of Expenditure Approved	For Employment Generation
1.	Andhra Pradesh	68.899	34.38	2.169		71.068	34.38
2.	Gujarat	251.125	141.00	117.740	68.25	368.865	209.25
3.	Haryana	37.275	15.00	0.690		37.965	15.00
4.	Himachal Pradesh	18.705	10.80	0.445		19.150	10.80
5.	Jammu and Kashmir	18.981	6.80	0.131		19.112	6.80
6.	Karnataka	46.638	19.30	0.948		47.586	19.30
7.	Kerala	31.852	7.50	1.002		32.854	7.50
8.	Madhya Pradesh	63.379	27.75	35.214	25.62	98.593	53.37
9.	Maharashtra	37.679	8.34	17.619	6.30	55.298	14.64
10.	Nagaland	3.876	2.00	0.026		3.902	2.00
11.	Orissa	59.585	32.00	3.150		62.735	32.00
12.	Punjab	29.386	8.00	0.141		29.527	8.00
13.	Rajasthan	364.028	203.00	216.258	117.58	580.286	320.58
14.	Tamil Nadu	28.197	7.43	3.232		31.429	7.43
15.	Uttar Pradesh	155.736	100.62	2.346		158.082	100.62
16.	Andaman and Nicobar Islands	0.280	0.10			0.280	0.10
17.	Chandigarh	0.080				0.080	
18.	Delhi	0.360				0.360	
19.	Pondicherry	0.594	0.28	0.004	..	0.598	0.28
	Total	1216.645	624.30	401.115	217.75	1617.76	842.05

affected States/Union Territories. The State Governments were free to create additional mandays from their own resources. The details of ceilings of expenditure approved for employment generation programme for the States may be seen in Table 32. It would be seen that out of the total assistance of Rs. 1,617 crore an amount of Rs. 842 crore was approved for employment generation programme which constituted 52 per cent of total assistance approved for the States.

1.7 The objective of undertaking employment generation programme under drought relief was not only to ensure that the employment resulted in the creation of permanent and productive assets to the extent possible but also to enable the affected people to withstand drought better in future. To achieve this objective, advance action was required for preparing, a shelf of projects which could be taken at the time of droughts. The GOI issued guidelines to the State Governments from time to time to keep this objective in view while providing employment to the affected people. In September, 1987, the GOI indicated the following order of priority in selecting works: (i) tubewells, (ii) ponds, (iii) field channels, (iv) soil conservation and water harvesting works, and (v) laying of roads where road links did not exist.

1.8 Under the NREP and the RLEGP, 25 per cent of funds was earmarked for social forestry. In the wake of drought conditions, instructions were issued to divert the earmarked funds for social forestry to soil/water conservation and water harvesting projects in the States. Fifty per cent of the second instalment of NREP/RLEGP funds and foodgrains for the drought affected States was released without insisting upon pre-conditions. On this basis sanction of Rs. 112.63 crore in cash and 3.7 lakh tonne of foodgrains was issued in September, 1987. The GOI decided to sanction an additional quantity of 0.5 million tonne of foodgrains under NREP/RLEGP to meet requirements of the drought affected States.

1.9 In order to bring about uniformity and more equitable distribution of foodgrains to vulnerable groups employed in NREP/RLEGP work, norms were laid for issue of foodgrains to a maximum of 2.5 kg per manday as part of payment of wages against the normal limit of 3 to 5 kg per manday. The distribution of foodgrains was further restricted to 1.5 kg per manday with effect from 1st April, 1988. The States were advised to take up additional projects in severely drought affected area having predominantly the population of landless labour and scheduled castes and scheduled tribes under rural employment programmes and dovetailing the scarcity relief funds with them to harness resources for achievement of the objectives.

1.10 The works to be undertaken were to be in conformity with the objective of drought proofing and the strategy outlined in the Drought Prone Area Programme (DPAP). Items of work like rural bank buildings, godowns for storage of inputs, community work sites, marketing yards, dispensaries, *panchayat ghars,* community centres, *anganwadi* centres etc. were discouraged and the emphasis was laid on taking up those works which would help in creating productive infrastructure like minor irrigation works, construction of irrigation wells, intermediary and main drains, field channels, rural water supply works, construction/renovation of village tanks for providing water for human and cattle consumption, land development and reclamation of waste/degraded land with a special emphasis on ecological improvement and augmenting existing ground water resources. The details of Statewise allocation of funds under NREP and RLEGP may be seen at Table 33. The Statewise progress of employment generation under NREP and RLEGP may be seen at Annexure-XV and Annexure XVI respectively.

1.11 The GOI decided to allocate upto 50 per cent of the ceilings of expenditure approved for employment generation for States for distribution to persons employed on relief works as payment of wages in kind. In order to ensure that nutritional requirement of labourers on relief works may be met, the GOI announced a policy of allocation of foodgrains for payment of a part of wages in kind at the rate of (i) 3 kg per manday in the severely drought affected area, and (ii) 2 kg per manday in all other drought affected area. The State Governments were also advised to introduce identity cards for the workers to minimise any malpractice in the implementation of relief works.

1.12 On account of loss of income in the rural area the purchasing power of the population declined considerably. There was a steep fall in the demand for the handloom products and handicrafts sectors. The persons engaged in these sectors were losing jobs and they were forced to

Table 33 : Allocation of Funds under NREP and RLEGP, 1987-88

(Rs. in crore)

S. No.	State/Union Territory	NREP	RLEGP
1.	Andhra Pradesh	34.99	45.76
2.	Gujarat	12.41	15.77
3.	Haryana	3.43	4.45
4.	Himachal Pradesh	2.21	2.29
5.	Jammu and Kashmir	2.73	3.61
6.	Karnataka	17.04	22.13
7.	Kerala	13.91	18.00
8.	Madhya Pradesh	30.37	39.73
9.	Maharashtra	29.35	38.13
10.	Nagaland	0.49	0.60
11.	Orissa	10.03	21.11
12.	Punjab	4.03	4.74
13.	Rajasthan	14.40	18.74
14.	Tamil Nadu	29.10	37.68
15.	Uttar Pradesh	65.12	84.37
16.	Pondicherry	0.60	0.40
	TOTAL	276.22	358.31

seek alternative employment alongwith unemployed rural labourers. Thus loss of the production under these sectors was apprehended. It was, therefore, felt essential to keep these artisans employed in pursuing their own crafts. For this purpose the State Handicrafts Corporations/Handloom Corporations were assisted. The GOI approved an amount of Rs. 17.17 crore mainly through margin money to enable these Corporations to provide raw material to the artisans and make marketing arrangement for the finished products.

States' Efforts

2.1 The State Governments were primarily responsible for implementing the various employment generation programmes. The employment opportunities were provided to the drought affected people keeping in view the following objectives: (a) to increase the purchasing power of the people to ensure that their basic needs were met, (b) to avoid large scale migration of the people by offering employment closer to their habitations, and (c) with advance planning to convert the drought as an occasion for accelerating development process by creating durable and permanent assets to the extent possible.

2.2 The State Governments had their own approaches to planning and execution of relief works. Certain general features were common to the States. The first stage in planning employment generation schemes for the rural population was the grouping of villages in each *taluk* into groups of 3 to 4 villages each. The object of this grouping was not merely to ensure administrative convenience in handling relief work but also to provide a unit wherein every person seeking employment could be provided work within a radius of 5 kilometres from his place of residence. The commitment of the State Governments to provide employment within a radius of 5 kilometres was one of the noteworthy features of employment generation programmes for drought relief in the country.

2.3 After the groupings had been made, a careful survey was undertaken at the village level to arrive at a figure of the number of persons who had to be provided work month-wise till the onset of the rains next year. This figure was actually based on several factors like (a) number of agricultural labourers in the group, (b) number of small farmers in the group, (c) number of marginal farmers in the group, (d) social and religious characteristics of the group, (e) general industrial activity of the group, and (f) number of workers actually reporting for work in scarcity relief operations in earlier years.

2.4 A reasonable and realistic estimate of the total labour force for whom work had to be provided as also the month by month build up of labour enabled the *taluka* level machinery to arrive at a fairly realistic picture of the number of mandays which were required to be generated to cater to the employment needs of each particular group of villages. Once this was known, an inter-departmental exercise was initiated to determine the number of State Plan, NREP and RLEGP works available for

a particular group to absorb the labour force. This exercise revealed the gap between the mandays which could be generated to absorb the labour force and which would report for employment during the drought year.

2.5 Apart from labourers who could undertake the excavation of earth, there was a class of workers who due to customary reason or non-familiarity with earth work needed alternative employment. An effort was made to provide employment to this category of workers also through works undertaken by the Khadi and Village Industries Commission and the State Handicrafts Corporations. These works catered to the requirement of persons who otherwise had to migrate to other area for seeking out a living during the drought.

2.6 Normally, one person per family possessing identity card issued by the State Government was provided employment. The State Government of Gujarat adopted a policy of providing emploment having regard to the size of the family. As per demographic data, a graded number of persons were admitted to relief works. Initially, in a family of six persons, three persons were eligible. In the event of members of family being more than six, for every additional three members one person was admitted. In Rajasthan, one member per family was employed first. After all the families were covered, second member from bigger families of more than six persons was employed. If labour ceiling fell short of employing even one member from each target family, families were rotated and employed on alternate fortnights to ensure that at least one member from each family could get employment for at least twenty days in a month. The unit cost per manday was on the basis of notified minimum wage varying from Rs. 7 in Maharashtra to Rs. 27 in Punjab. The details of notified wage adopted for relief employment may be seen at Annexure-XVII. Wage was given partly in kind and partly in cash.

2.7 Tools were issued to the labourers who were engaged on relief works keeping in view their financial constraints in purchasing the tools. The labourer at the time of his weekly payment would be eligible for allowance at the rate of 3 per cent of the wage as sharpening allowance and at the close of programme the tools were to be recovered. It was experienced by the Government of Gujarat that on many occasions the tools were not returned by the labourers. The Government of Gujarat, therefore, decided to give an option to a labourer to retain the tools after the close of programme. During the period of scarcity, the cost of tools was recovered in five instalments from a security deposit for tools which was made by a labourer from his wages in five instalments. In case the labourer wanted to return the tools, he could do so and get back the deposit. In case he decided to retain the tools, the deposit would be adjusted towards the cost of tools. Sufficient number of tools were provided by the Government to the workers in Rajasthan. For those workers who brought their own tools, an amount of Rs. 250 per worker was paid.

2.8 The wage payment system for scarcity relief works was based on the measurement of the work done by a gang of workmen. At the beginning of a given week, the supervisor allocated the task for the week to the gangs. At the end of the week, the work done was measured by the supervisor. This was recorded in the measurement book. There was daily roll call by muster *karkoon*. The attendance was taken twice a day. For every six days of work, the labourers got one day rest allowance. Once the measurement book was completed, the supervisor made the gangwise calculation for the volume of work done and the amount payable to each gang. This was verified by a *karkoon* in the Deputy Engineer's office. After verification, it was certified for payment. The payment sheet was sent to the *taluka* office where it was again verified. After verification, the cash was drawn and cashiers went to the site for making the payment.

2.9 State Governments took a special care of woman workers and directed the field level officers that the pregnant woman workers should be given light work. A pregnant woman was permitted to absent herself for 3 weeks before delivery and 3 weeks after delivery on payment of half wages provided she had been attending the relief work in the area for a period of 2 months or had been engaged in specific work since its commencement. In addition, she was also eligible for dependence allowance at the rate of Rs. 5 per day and Rs. 25 for medical assistance. The procedure for issue of eligibility certificate for these concessions in this regard was also simplified.

2.10 For giving an incentive to family planning, the Government of Gujarat provided special benefits to workers adopting family planning measures. The male/female workers were given holiday for 3 to 7 days for undergoing family planning operations depending upon the type of operation.

Creches were established at the work sites to take care of children. For providing shed and water facilities at the work sites, the norms were revised and upto 50 per cent of the wage bill was made available for this purpose.

2.11 When a massive employment generation programme is organised a strict vigilance has to be kept over the execution of works, particularly in the sphere of recording of measurements of work done by a labourer, classification of soil, which decides the rate of wage and the number of persons reporting for work. State Governments during the last three drought years constituted two sets of vigilance squads. Administrative cells were set up at the State level. Four such cells, each headed by a Deputy Collector and consisting of a *mamlatdar* and supporting staff, were set up as in-charge of specific districts. The administrative vigilance cells looked into the administrative aspects of relief works, water tanker deployment, and running of cattle camps. Another set of technical squads was also set up. Two such technical squads, each headed by a Superintending Engineer and supported by 2 Executive Engineers and 4 Deputy Executive Engineers, were set up. The technical vigilance squads inspected the works from the technical point of view, namely, classification of soil, and measurement of work done. Similar vigilance cells were also set up by Collectors at the district level. The composition of the cell at the district level was left to the Collectors. He was, of course, empowered to requisition services of officers from all departments. In Gujarat, the vigilance cells, both at the State and at the district level, inspected 28,669 relief works from October, 1986 onwards. In course of their inspection 3,833 cases of major and minor irregularities were noticed. Serious malpractices were noticed in a few cases and the remedial action was immediately taken. From October, 1986 to June, 1988 action was taken against, Muster Clerks, Supervisors, Deputy Executive Engineers and others for their lapses.

2.12 In Rajasthan for effective monitoring, for the first time, flying squads were constituted, which had a salutary effect on the execution of relief works. All the complaints regarding execution of relief works were attended to immediately by the flying squads comprising Executive Engineers, Assistant Engineers and Junior. Engineers.

2.13 A shelf of projects was prepared on the basis of the local requirements keeping in view the best use of locally available resources of men, money and material. These projects were first submitted to the respective Block Development Officers by *sarpanchs* who prepared village-wise/ agency-wise lists. A novel scheme was introduced in some of the districts like Barmer where "Face-to-face in Famine" (*Akal me Amne Samne*) meetings were held at *Panchayat Samiti* headquarters in which all the district level officers (DLOs) representing various executing agencies like Public Health Engineering Department (PHED), Irrigation, Soil Conservation, Public Works Department (PWD) and Education, Medical, etc. Departments attended. All the *sarpanchs* with list of works to be included in the shelf attended. The projects were listed agency-wise and were handed over to the Executive Engineers/DLOs of various executing agencies. They examined these projects and after technical surveys for feasibility of technically approved projects, presented before the District Relief Advisory Committee (DRAC) in which all the local public representatives like M.Ps, M.L.A.s, *Zila Pramukh, Pradhans* and nominated members of Scheduled Castes/Scheduled Tribes women alongwith the DLOs participated and discussed these projects in detail. With the advice of the District Famine Relief Advisory Committee, a final shelf of projects was prepared blockwise.

2.14 The programme approved with the advice of DRAC was forwarded to regional Heads of Departments/Relief Commissioner. The regional Heads of Departments after carefully scrutinising the works with reference to utility and technical viability and number of labourers to be provided in each area in proportion to its anticipated need, sent the proposals to Heads of Departments. Heads of Departments then sent their districtwise recommendations to Government in Relief Department. The Heads of Departments indicated the requirement of additional staff, if any, for carrying out necessary surveys, investigations and preparation of detailed estimates of works proposed in the district programme.

2.15 The following programmes were included in the shelf of projects: (1) Soil conservation works on a watershed basis, (2) Contour bunding, (3) *Khadins* , (4) Construction/repairs of minor irrigation tanks, (5) *Nala* bunding, (6) Pasture development works, (7) Terracing, (8) Construction of *diggis* , (9) Construction/deepening of drinking water wells, (10) Executing/preparing of rural water supply schemes in area of recurrent scarcity, (11) Completion of incomplete irrigation works of previous

years, (12) Construction of diversion channels, (13) Construction of tanks, canals and bunds, (14) Construction of protective works such as marginal bunds, spurs and diversion bunds, (15) Improvement/repairs of existing irrigation works, (16) Plantation works along roads and canals, and (17) Afforestation work.

2.16 It was represented that soil conservation works were not very much acceptable to labourers. With a view to encourage large number of soil conservation works, some of the Government's decisions were: (1) The wage rate payable on soil conservation works taken up as part of relief work was revised upward and brought at par with the wage rate on irrigation and road works; (2) In spite of revision of wage rate, the works of soil conservation could be taken up only if the cultivator in whose field the work was to be undertaken was willing. A formal consent was however not necessary in a drought year in terms of the relevant provision of the Land Improvement Act. Nonetheless, with a view to provide incentive, the Government decided that the cultivator in whose survey number soil conservation work was to be taken up would be eligible for 100 per cent subsidy instead of 75 per cent decided during the previous drought of 1986-87; (3) For the first time works of digging of new wells in private fields as relief work were allowed. These works of digging of new wells were taken up on a large scale in Rajasthan; and (4) Works for desilting of tank beds were also taken up as a part of relief work.

2.17 It was reported by the Rajasthan Government that significant achievements were made in terms of the following: (1) The major thrust was towards creation of durable assets with the assistance of material component from respective departments / organisations. For the first time, the construction of *pucca* water courses in private fields was taken up and digging of box-type trenches was experimented for increasing the fodder production; (2) Approximately 51,000 workers were provided employment on Indira Gandhi Canal Project. Special assistance was provided to the relief workers, such as providing assured minimum wages, supply of essential foodgrains, edible oil, sugar at subsidised rates, etc. *Sirki*/tented accommodation was made available to them; (3) As directed by Planning Commission earth work on identified major, medium and minor irrigation projects was also taken up on crash basis.

Table 34: Relief Works and Weekly Deployment of Labourers in Employment Generation Programmes, 1987-88.

S. No.	Date as on	Relief Works	
		Number	Labourers (million)
1.	2-11-1987	94173	2.460
2.	9-11-1987	70710	2.173
3.	16-11-1987	72099	2.602
4.	23-11-1987	74308	2.665
5.	30-11-1987	86525	4.432
6.	7-12-1987	93269	4.731
7.	14-12-1987	97763	4.558
8.	21-12-1987	97032	4.714
9.	28-12-1987	97032	4.714
10.	4-1-1988	98011	4.845
11.	11-1-1988	99557	5.059
12.	18-1-1988	99710	5.271
13.	25-1-1988	99591	5.295
14.	1-2-1988	90423	5.267
15.	8-2-1988	94096	5.247
16.	15-2-1988	95341	5.476
17.	15-3-1988	102693	5.234
18.	21-3-1988	102910	5.363
19.	28-3-1988	113540	5.948
20.	4-4-1988	113819	5.918
21.	11-4-1988	119868	5.889
22.	18-4-1988	119395	6.013
23.	25-4-1988	119407	6.011

Execution of Relief Works

3.1 A statement showing weekly progress of relief works may be seen in Table 34. The Statewise and monthwise progress of relief works may be seen at Annexure-XVIII. The State Governments of Andhra Pradesh, Himachal Pradesh, Haryana, Jammu and Kashmir, Karnataka, Kerala, Nagaland, Punjab, Tamil Nadu, Uttar Pradesh and Union Territories of Andaman and Nicobar Islands, Chandigarh, Delhi and Pondicherry discontinued their relief works by 31st March, 1988. The State Governments of Gujarat, Madhya Pradesh, Maharashtra, Orissa and Rajasthan continued relief works upto June-July, 1988.

3.2 Some of the severely affected State Governments indicated the data regarding manday generated under drought relief programmes during the 1987 drought as shown in Table 35.

Table 35 : Manday Generated in States, 1987

S. No.	State	Manday Generated (million manday)
1.	Gujarat	348.1
2.	Madhya Padesh	156.8
3.	Rajasthan	424.1
4.	Tamil Nadu	17.9
5.	Uttar Pradesh	63.0
	Total	1009.9

3.3 The details of projections of labour strength made by the State Governments while presenting the memoranda and the actual peak levels of labour attendance on relief works are shown in Table 36.

3.4 It can be observed from Table 36 that generally the projections fell short of the actual levels. The reasons for such gap were as follows: (i) Over-estimation of the number of people rendered unemployed in the agriculture and other sectors; (ii) The August/September rains in some States like Uttar Pradesh, Madhya Pradesh, Maharashtra helped in resuming agricultural operations by raising short-duration crops in effectively implementing agricultural contingency plans; (iii) The States of Haryana and Punjab and parts of Uttar Pradesh where large areas are under irrigation, with the onset of rabi cultivation, a large number of workers were absorbed in the normal agricultural works; and (iv) The peninsular States of Karnataka, Andhra Pradesh, Tamil Nadu received substantial rains during north-east monsoon period thereby helping the start of agricultural operations.

3.5 A team headed by Prof. Hanumantha Rao under the auspices of the Advisory Council for 20-Point Programme made field visits in October, 1987 in the States of Gujarat and Rajasthan. The team visited the districts of Sabarkantha, Surendernagar and Ahmedabad in Gujarat and Udaipur, Ajmer and Jaipur districts of Rajasthan. The following deficiencies were noticed by the visiting team:

(i) The work actually provided fell short of demand for work from the affected people, particularly in Rajasthan. Instances came to the notice of the team about the improper selection of beneficiaries by *sarpanches*. The team viewed that the poorest families who

Table 36: Employment Generation and Peak Labour Strength, 1987-88 (in lakh)

S. No.	State	Projected Labour Strength	Actual Peak Level Labour Strength
1.	Andhra Pradesh	36.40	1.97
2.	Gujarat	19.22	22.42
3.	Karnataka	15.00	0.39
4.	Madhya Pradesh	13.00	6.00
5.	Maharashtra	5.00	4.11
6.	Orissa	9.80	5.40
7.	Punjab	1.12	0.74
8.	Rajasthan	31.00	20.40
9.	Tamil Nadu	5.20	3.50
10.	Uttar Pradesh	20.12	6.49
11.	Haryana	15.60	0.98
12.	Himachal Pradesh	4.90	..
13.	Kerala	14.36	1.09

Table 37 : Peak Labour Strength and Population Affected in Selected Drought Years, 1965-66 to 1987-88

S. No.	Drought Year	Population Affected (lakh)	Peak Level Labour Strength (lakh)	Labour Strength to Affected Population (percentage)
1.	1965-66	476.00	32.04	6.70
2.	1972-73	2000.00	92.00	4.60
3.	1979-80	2204.83	62.00	2.81
4.	1987-88	2854.19	60.42	2.11

should have been given employment on priority basis were ignored. The peoples' representatives were not fully involved in selection of beneficiaries;

(ii) The payment of wage was less than the actual notified wage of the respective State Governments. Against the notified minimum wage of Rs. 11, people were actually paid Rs. 8 to 10 in Rajasthan;

(iii) The delay in payment of wage to workers was noticed. In some instances, the workers were getting wage after 3 weeks in Gujarat and the delay in Rajasthan ranged from 1 to 4 months. Since the wage was not paid in time and wheat was not available, poor people were put to difficulties. The team suggested that food should be provided to workers on credit through PDS, so that they were not dependent on moneylenders and private traders; and

(iv) The team noticed poor selection of work sites. The concentration appeared to be on roads and significant percentage of soil and water management works were taken up.

3.6 The team noticed innovative schemes such as:

(i) The "Food for All Scheme" in Gujarat giving separate ration cards to the poorest and the poor to enable them to buy wheat and other essential commodities through PDS;

(ii) The scrapping of permit system for release of stocks under PDS in Udaipur district of Rajasthan;

(iii) The changing of mate after every 15 days for identification of new labourers and new muster rolls in Rajasthan;

(iv) The identification and appointment of women mates where 50 per cent of the labour force consisted of women (Ajmer district of Rajasthan); and

(v) Consumption loans by Collectors upto Rs. 500 to enable relief workers to purchase wheat in Ajmer district.

Issues

4.1 An analysis of the peak level labour strength against the affected population during the major drought periods are shown in Table 37. It may be seen that the percentage of labour employed against affected population shows declining trend over years. However, this may also indicate that the size of population vulnerable to drought is getting reduced due to the overall economic development of the country and implementation of various rural development programmes.

4.2 According to a National Council of Applied Economic Research (NCAER) study (Annexure-XIX), the marginal land owners and landless labourers gained in the ownership of land between 1970-71 and 1981-82, while large owners experienced a reduction in their land holdings. As a result, the structure of land holdings changed with increase in the proportion of land in marginal holdings and decrease in the proportion of land in larger holdings. The reasons for this shift in the structure of land ownership are complex, but the outcome is reflected in the structure of income by sources for

Table 38 : Peak Labour Strength and Population Affected in Rajasthan in Selected Drought Years, 1968-69 to 1987-88.

Sl. No	Crop Year	Affected Population (lakh)	Peak Level Labour Strength (lakh)	Labour Increase over Affected Population (percentage)
1.	1968-69	131.62	17.57	13.50
2.	1972-73	135.71	12.84	9.87
3.	1979-80	240.00	8.04	4.39
4.	1982.83	171.00	6.28	3.67
5.	1985.86	219.00	10.30	4.75
6.	1986.87	252.70	14.76	5.84
7.	1987-88	262.69	20.42	7.70

different land owning categories of rural population; this is presented in Annexure-XX which is based on longitudinal data. The important features of the change in structure of income sources between 1970-71 and 1981-82 are: (a) An increase in the share of non-farm incomes for all household categories, except the landless agricultural wage earning households, and (b) A substantial increase in the share of income from agriculture and allied activities (self-employed) in the case of the landless and the agricultural wage earning marginal landowners due to acquisition of land and a decline in the share of income from agriculture consistently in all other categories of households. Similar results are also available from all-India data for 1970-71 and 1981-82 as presented in Annexure XXI. All India results show that the share of non-farm income for rural households increased from about 23 per cent in 1970-71 to 33 per cent in 1981-82.

4.3 An inference from the above data would be that as a result of increase of the share of non-farm income in the total income of rural households, the vulnerability of rural population to natural disasters like droughts has reduced. This is supported by the fact that while in the drought of 1965-66, a population of 4.76 crore was affected and in the drought of 1987-88 the figure rose sharply to 28.54 crore that is, a sixfold increase in absolute numbers, yet the peak level employment in 1987-88 was only 60 lakh which is less than twice the peak level employment in drought relief works in 1965-66 (Table 37).

4.4 An analysis also shows that even though the percentage of labourers to the affected population was on the decline in the long-term, this trend could be altered in the short-term, if the State was continuously affected by drought by 3 to 4 years. For example, Rajasthan was continuously under the grip of severe drought in 1980's barring the year 1983. The trend is however reversed in the years 1985-86 to 1987-88 due to persistence of droughts and their cumulative effect as is evident from Table 38.

4.5 A larger number of free kitchens were organised both by the domestic and foreign voluntary agencies to tackle Bihar drought situation in 1966-67 and 65 lakh people mostly able-bodied persons were fed in these free kitchens whereas only about 7 lakh persons were employed on relief works. Despite severe drought in Gujarat and Rajasthan in 1987, no free kitchens were organised for able-bodied persons. Moreover, the involvement of voluntary agencies in providing works to the people

had been only marginal. With advance planning and timely action it was possible to organise relief works and people earned their livelihood with dignity.

4.6 The Indian Council of Medical Research (ICMR) report on the drought survey has brought out the fact that the number of persons having energy intake below 500 kilocalories (kcl) (starvation level) was only 0.2 per cent in 1987 as compared to 36 per cent observed during earlier drought survey in Bihar and Andhra Pradesh in 1967. This again can be attributed to the prompt and effective distribution of foodgrains through various relief measures including employment generation programme.

4.7 While the loss in agricultural income consequent to loss in employment opportunities on account of the drought was significant, the massive employment programme taken up earmarking nearly 52 per cent of the relief assistance saved millions from hunger. The accessibility to foodgrains which this programme established was one of the record achievements in terms of its volume and was found to be adequate to meet needs of the situation. The States which experienced the third or fourth year of drought did certainly find difficulties in finding adequate number of productive works to be taken up in a decentralised way. Problems were also faced in matching the employment generation funds with additional allocation made for covering the "last mail" projects. Some States had substantially exceeded the allocation made by the GOI. Gaps in monitoring of the level of employment also came to the notice. But overall the employment generation effort to meet the requirement of the situation, despite its vast magnitude, was successful and is an eloquent testimony to the meticulous planning and implementation of the employment generation programme.

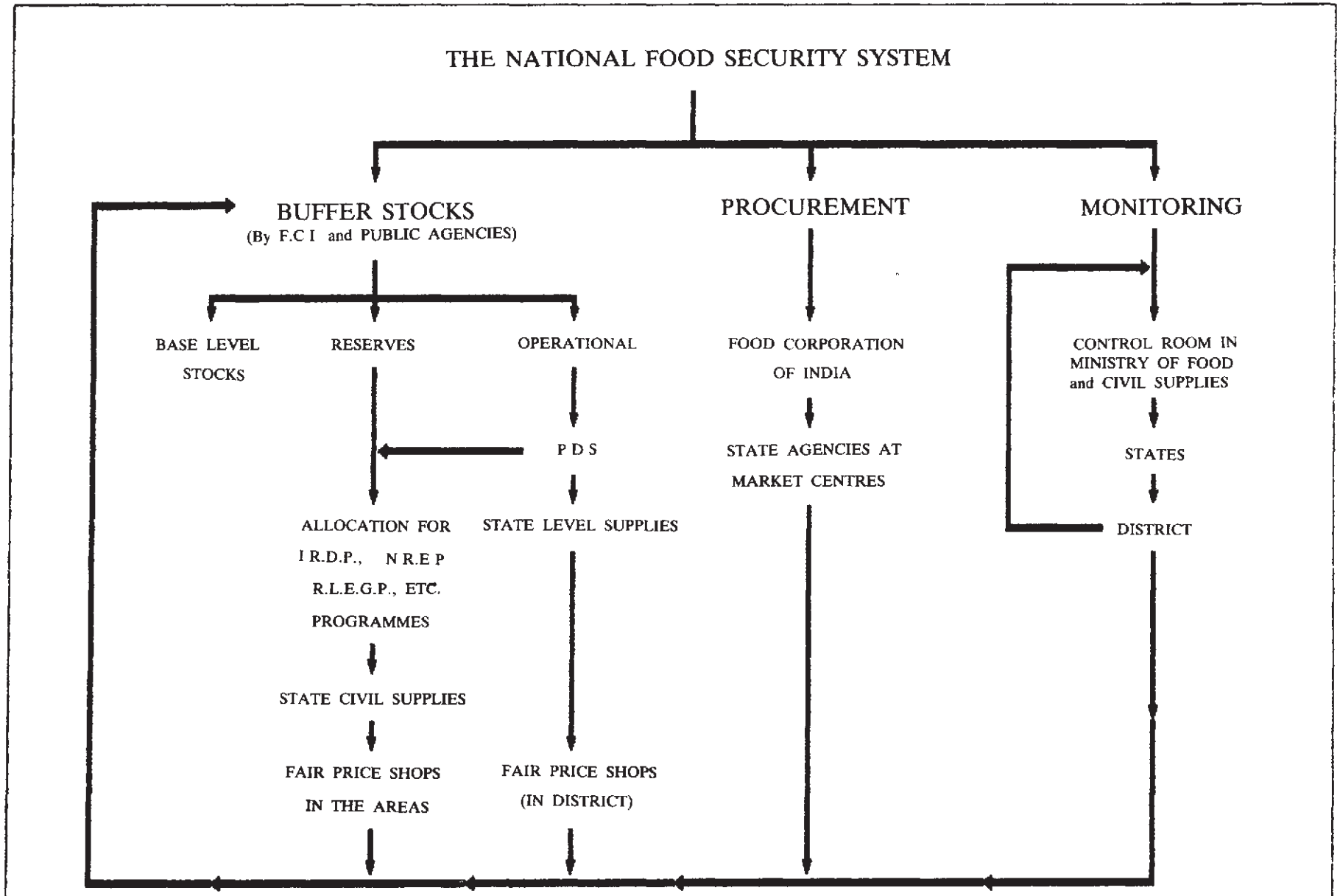

THE NATIONAL FOOD SECURITY SYSTEM
BUFFER STOCKS
(By F.C I and PUBLIC AGENCIES)
PROCUREMENT
MONITORING
BASE LEVEL
STOCKS
RESERVES
OPERATIONAL
FOOD CORPORATION
OF INDIA
CONTROL ROOM IN
MINISTRY OF FOOD
and CIVIL SUPPLIES
P D S
STATE AGENCIES AT
MARKET CENTRES
STATES
ALLOCATION FOR
I R.D.P., N R.E P
R.L.E.G.P., ETC.
PROGRAMMES
STATE LEVEL SUPPLIES
DISTRICT
STATE CIVIL SUPPLIES
FAIR PRICE SHOPS
IN THE AREAS
FAIR PRICE SHOPS
(IN DISTRICT)

FIGURE 16:

10 MANAGEMENT OF ESSENTIAL COMMODITIES

A public distribution system (PDS) in the country had been in operation in one or the other form for about four decades, and over a period infrastructure has been built up in nearly all the States. The Ministry of Food and Civil Supplies (MOFCS) at the Centre and Food and Civil Supplies Departments at the state level faced the formidable task of monitoring prices, availability situation and organising distribution of foodgrains and other essential commodities. The supplies had to be ensured in rural, far-flung and remote area so that the people in those area were not exploited by the unscrupulous traders and anti-social elements in the event of any shortfall in the distribution.

1.2 The main elements of policy initiatives and drought relief measures taken by the MOFCS can be grouped in the following categories: (a) effective operation of buffer stock, (b) expansion and strengthening of PDS, (c) production and procurement, (d) stringent enforcement, (e) intensive monitoring of prices and availability situation at various levels, and (f) export regulation and imports of essential commodities to supplement domestic availability.

1.3 The need for maintaining buffer stock of foodgrains has long been recognised. This has been considered necessary to ensure national food security, more so in a country where agriculture is still susceptible to vagaries of monsoon. Availability of adequate buffer stock not only provides an insurance against scarcity in bad years, but also helps in evening out fluctuations in availability and consequently in prices.

1.4 Over a period India has been able to evolve a comprehensive and integrated national food security system (Figure 16) consisting of buffer food stock and operational stock to cater to the

Table 39: Foodgrains Stocks with Public Agencies, 1983-88 (million tonne)

S. No.	Year (as on 1st July)	Rice	Wheat	Coarse Grains	Total
1.	1983	3.78	13.01	0.17	16.96
2.	1984	4.62	17.81	0 05	22.48
3.	1985	7.76	20.74	0.17	28.67
4.	1986	9.26	18.89	0 13	28.28
5.	1987	8.35	14.86	0.06	23 27
6.	1988	4 16	7.55	0.19	11.90

requirement of PDS. The main objectives of the food security system are: (1) to minimise "temporal" fluctuations in aggregate consumption arising out of year to year fluctuations in agricultural production and prices, (2) to minimise "spatial" fluctuations in consumption and prices (i.e. between States or urban and rural area), and (3) to minimise variation in consumption among various socio-economic strata arising out of differential purchasing power.

1.5 In a vast country like India, for a sensitive commodity like foodgrain the private trade cannot undertake the task of spatial stability; while it is also not expected to consciously reduce inter-personal variation in consumption on account of inequitable distribution of income and differences in purchasing power. The buffer stock policy by the Government is, therefore, needed to serve as an insurance against crop failure on the one hand and to protect the interests of farmers and consumers particularly the vulnerable sections of the population, on the other.

1.6 The buffer stocking policy as decided by the GOI earlier in March, 1984 continued to be in force. The statement given in Table 39 indicates the stock with public agencies.

1.7 It would be seen that the stock with the public agencies had touched the peak level of 28.67 million tonne on 1st July, 1985. On 1st July, 1986 also the stock level was 28.28 million tonne. During 1987 and 1988, there was heavy draw upon the stock. On 1st July, 1987, it was 23.27 million tonne, while on 1st July, 1988, it was 11.90 million tonne. The required level of stock on 1st July of a year under the present buffer stocking policy is 21.4 million tonne, comprising 8.0 million tonne of rice and 13.4 million tonne of wheat. While in 1985 (as on 1st July, 1985), the stock with the public agencies was in excess of the buffer stocking requirement by 7.3 million tonne and in 1986, (as on 1st July, 1986), the excess was of the order of 6.9 million tonne. The drought of 1986-87 changed the whole situation and in 1987 the excess came down to 1.9 million tonne only.

1.8 In 1987-88, there was considerable pressure on the PDS. Substantial quantities of grains were also required for relief purpose and employment oriented programme. The result was that the stock with the public agencies came down to a level of 11 9 million tonne on 1st July, 1988, showing a shortfall of about 9.5 million tonne with reference to the requirement under the buffer stocking policy. Thus, the severe drought of 1987-88 not only wiped out all the excess available stock but also pulled down the level to a critical position.

1.9 The PDS was continuously strengthened. The number of fair price shops increased from 2.36 lakh in January, 1980 to 3.38 lakh in March, 1987 and increased further to 3.45 lakh in December, 1987, and stood at 3.5 lakh in September, 1988. From July, 1987 onwards, States were advised to open fair price shops in hitherto uncovered area as a part of anti-drought campaign. Since August 1987, additional fair price shops numbering 7,740 were opened in the country.

1.10 It was suggested to the States that in area where static fair price shops could not be opened, mobile vans should be pressed into service. The Department of Civil Supplies (DCS) sanctioned Rs. 2.08 crore in 1987-88 for 83 mobile vans for Uttar Pradesh, Rajasthan, Madhya Pradesh, Karnataka, Andhra Pradesh, Orissa and Chandigarh. As on 31st March, 1988, 416 mobile vans were operating in various States. Reasonable requirement of States for wheat and rice was met by the Department of Food within the constraints. Their availability and distribution were carefully planned and closely monitored. The figures relating to allocation to and lifting of rice and wheat under PDS by various States/Union Territory Administrations during 1986 to 1988 are indicated in Annexure-XXII, Annexure-XXIII, and Figure 17. Special attention was paid in the matter of allocation of foodgrains under PDS to severely drought affected States of Rajasthan and Gujarat. The details

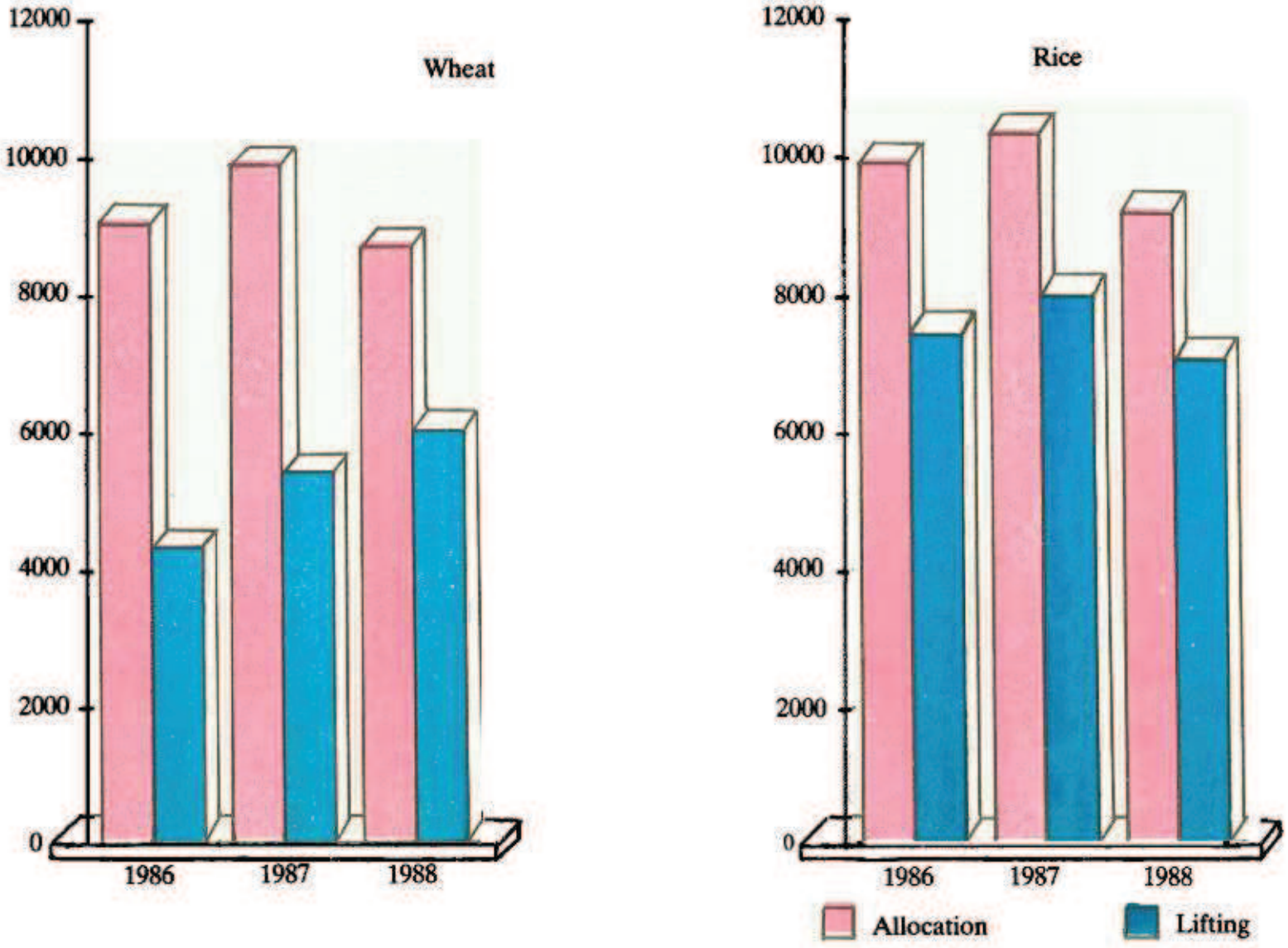


Figure 17: **Total Allocation and Lifting of Wheat and Rice, 1986-88**
(Thousand Metric Tonnes)

Table 40: Distribution of Wheat and Rice to States and Union Territories under the Scheme for Integrated Tribal Development Project Areas, 1985-88.

(lakh tonne)

S. No.	Period	Wheat	Rice	Total
1.	December, 1985-March, 1986	2.05	2.31	4.36
2.	April, 1986-March, 1987	10.11	10.02	20.13
3	April, 1987-March, 1988	11.31	11.66	22 97
4.	April, 1988-October, 1988	5.34	6.00	11.34

relating to allocation and lifting of foodgrains by Rajasthan and Gujarat during 1986 to 1988 are indicated in Figure 18.

1.11 Under the scheme for distribution of foodgrains at specially subsidised prices for the people in the Integrated Tribal Development Project Areas and in the tribal majority states, Table 40 shows the quantities of wheat and rice issued by the Food Corporation of India to States and Union Territories. Though the scheme was originally initiated as a poverty-alleviation programme in 1985, it was of great help to tribal and other people in these area during the drought period. Statewise distribution of foodgrains in major tribal area since July 1987 to August 1988 may be seen at Annexure-XXIV and also in Figure 19.

Public Distribution System

2.1 The major thrust of the policy was to increase the production of essential commodities and to maintain the supplies in such a manner that they were available throughout the year at a fair and reasonable price. Due to short-fall in production of foodgrains and some other essential commodities in the wake of drought, domestic supplies were supplemented by imports, and exports of essential commodities like pulses, oilseeds and edible oils were not allowed. Exports of some other commodities like onions and meat were regulated to ensure their availability at reasonable price in domestic market. Crop seasonwise production of foodgrains may be seen in Table 18. Table 41 indicates the commodity specific production of foodgrains in the country from 1981-82 to 1987-88.

2.2 The GOI followed a consistent food policy in the matter of price support and procurement operations, creation of a buffer stock and an appropriate distribution system. This policy stood the test of time and helped the Government to face many crises including the unprecedented drought of 1987 in the country. During the *kharif* marketing season which commenced from 1st October, 1987, all the public procuring agencies were directed to maximise procurement of rice through enforcement of levy. The State Governments were also requested to monitor the enforcement of levy with a view to check evasion by the millers and plugging leakages. The State Governments were also asked to maximise procurement of rice and paddy by banning the movement of paddy to outside the State. Table 42 indicates procurement of foodgrains during the last six crop years from 1982-83 to 1987-88.

Table 41: Commodity Specific Production of Foodgrains, 1981-82 to 1987-88

(million tonne)

S.No.	Year	Wheat	Rice	Coarse Grains	Pulses	Total
1.	1981-82	37.45	53.25	31.09	11.51	133.30
2	1982-83	42.79	47.12	27.75	11.86	129.52
3.	1983-84	45.48	60.10	33.90	12.89	152.37
4.	1984-85	44.07	58.34	31.17	11.96	145.54
5.	1985-86	47.05	63.83	26.20	13.36	150.44
6.	1986-87*	45.57	60 42	26.34	11.74	144.07
7.	1987-88*	44.62	55.78	25.70	10.92	137.02

*Provisional.

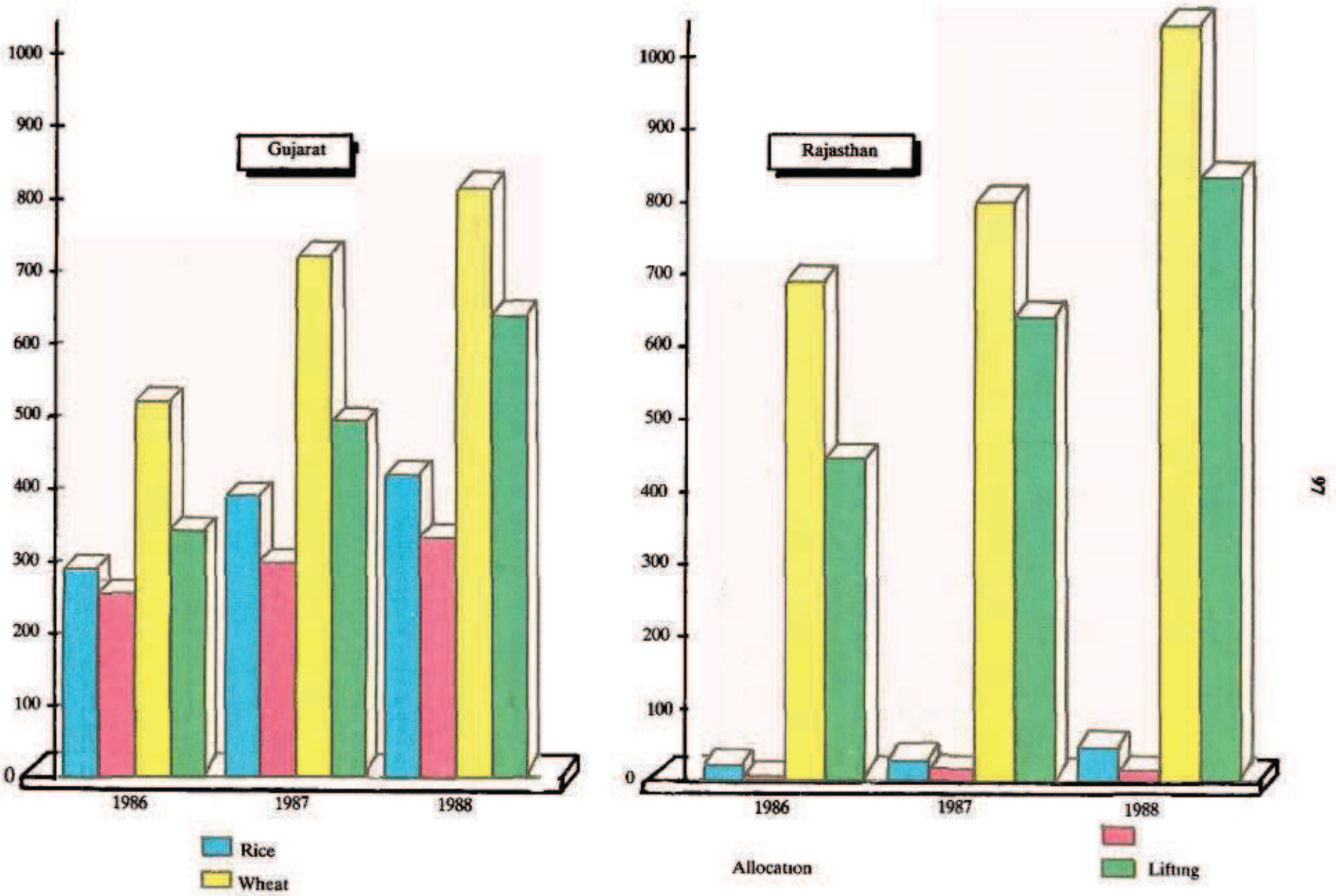


Figure 18: **Allocation and lifting of Rice and Wheat in Gujarat and Rajasthan, 1986 to 1988**
(Thousand Metric Tonnes)

Table 42: Procurement of Foodgrains, 1982-83 to 1987-88 (million tonne)

S.No.	Crop Year	*Kharif* Cereals			*Rabi* Cereals	Total
		Rice	*Kharif* Coarse Grains	Total *Kharif Cereals*	*Wheat*	*Kharif* and *Rabi* Cereals
1.	1982-83	7.05	0.17	7.22	8.29	15.51
2.	1983-84	7.73	0.04	7.77	9.30	17.07
3	1984-85	9.86	0.21	10.07	10.35	20 42
4.	1985-86	9.88	0.10	9.97	10.54	20 51
5.	1986-87*	9.21	0.02	9.23	7.88	17.11
6.	1987-88* (As on 2.9.1988)	6.87	0.21	7.08	6.52	13.60

* Provisional.

2.3 It may be observed that the total procurement of foodgrains which was 15.51 million tonne in 1982-83, rose to 17.07 million tonne in 1983-84 and to 20.42 and 20.51 million tonne in 1984-85 and 1985-86 respectively. These two years, 1984-85 and 1985-86, were peak years for procurement of foodgrains, both for rice and wheat. In the case of rice, the procurement touched a level of 9.88 million tonne while in case of wheat it reached 10.54 million tonne. In 1986-87, the total procurement was 17.11 million tonne , which comprised 9.21 million tonne of rice and 7.88.million tonne of wheat. Again, in 1987-88, the total procurement of foodgrains as on 2nd September, 1988 was 13.60 million tonne comprising 6.87 million tonne of rice and 6.52 million of wheat. Thus, there was a very steep fall in procurement in 1987-88 when there was maximum pressure on PDS. For maximising procurement, the following steps were taken: (i) To arrange continuous monitoring during the season at district level, (ii) Senior officers of the FCI and the State Governments supervised the procurement in the important wheat producing States, and (iii) The number of procurement centres in the interior area was increased.

2.4 The State Governments were requested to bring wheat and wheat products under licensing and also to fix stock limits for dealers so as to discourage hoarding with a view to maximise procurement. Minister for Food and Civil Supplies wrote to all the State Governments and Union Territory Administrations emphasising the need for fixing stock limits urgently in the light of the availability and the prices of foodgrains prevailing in their States.

2.5 Most of the States sought enhancement in the allocation of wheat, rice and sugar from the Central pool in order to check price rise in these commodities and ensure their availability. The Department of Food, which is administratively concerned with the allotment of these commodities, had to consider such requests within the policy framework and constraints. The PDS was subjected to a severe strain on account of increasing rquirements of the people in the affected areas. More and more people turned to purchase foodgrains from fair price shops due to higher prices in open market. Organisation of distribution of essential commodities from producing centres to far-flung consuming area in a vast country like ours required coordination of and interaction with various Ministries and Department at both Central and State levels. There were also some reports of inadequate supplies and leakages from the PDS.

2.6 The States and Union Territories were urged from time to time to strictly enforce the provisions of Essential Commodities Act and similar legislations in order to curb the activities of hoarders and other anti-social elements in trade and industry. Intensive anti-hoarding drive was continued. From August, 1987 to October 1988, as many as 1,15,056 raids were conducted in different States, 4,090 persons arrested, 3,880 prosecutions launched and goods valued at Rs. 39.90 crore seized. Raids were conducted to curb illegal forward trading in banned commodities including oilseeds and edible oils. From August, 1987 to August, 1988, 309 raids were conducted at several places and 84 persons arrested.

2.7 The States and Union Territories were urged from time to time to effectively monitor the availability of essential commodities and take appropriate steps to enlarge and strengthen PDS. They were also requested to set up advisory/vigilance committees at State, district and sub-divisional/*taluka* levels in order to give proper direction for efficient functioning of PDS and also to ensure that prices

1987

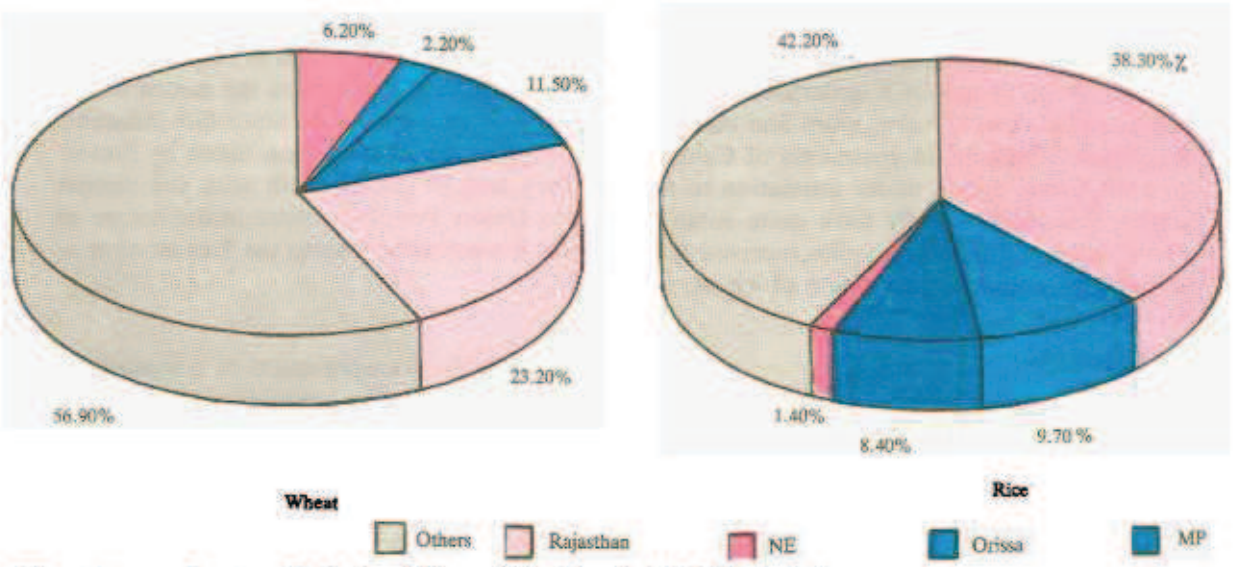


Figure 19: **Percentage Distribution of Cheaper Grains from Central Pool in ITDP Area** (July-December, 1987)

1988

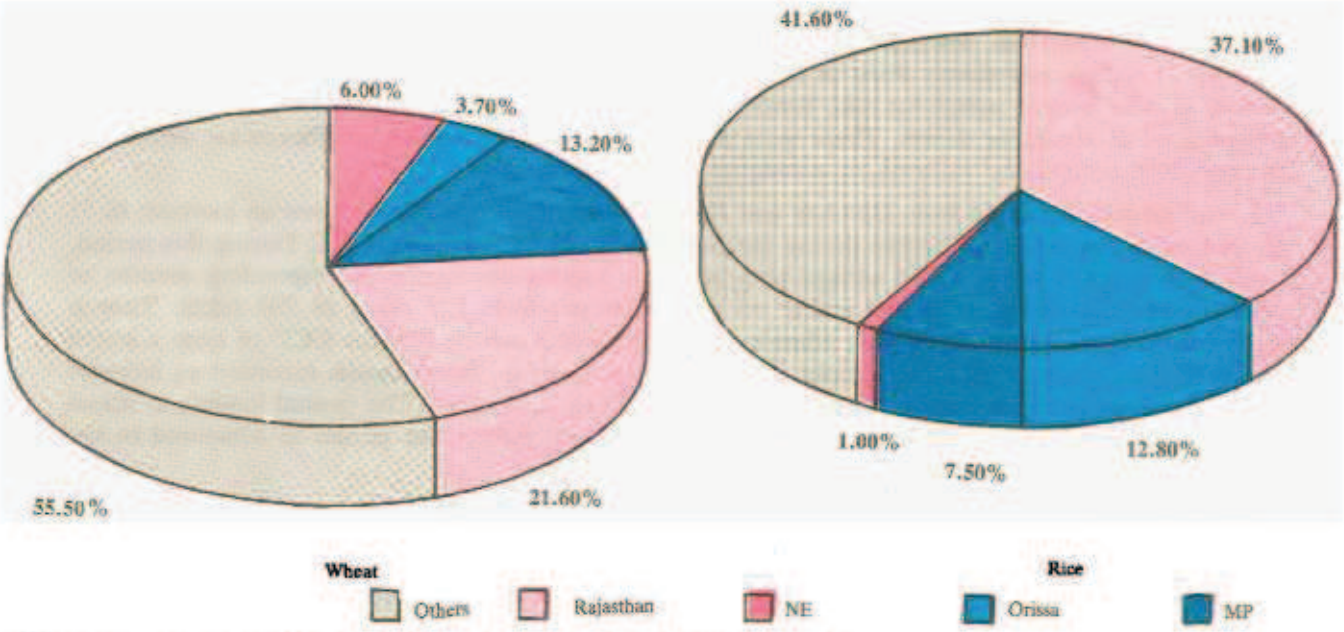


Figure 19: **Percentage Distribution of Cheaper Grains from Central Pool in ITDP Area** (Jan-August, 1988)

were contained and essential commodities were made available in the market at reasonable prices. The Minister of Food and Civil Supplies from time to time wrote to Chief Ministers of various States and Lt. Governors/Administrators of Union Territories drawing their attention to the need for taking various measures in order to keep rising prices of essential commodities in check and maintain their availability during the lean period.

2.8 The Control Room in the DCS was established in August, 1987 with the main objective to keep a watch on the prices and availability of essential commodities. Most of the States/Union Territories also established control rooms and advisory committees at State and district levels. The Control Room in the DCS undertook weekly analysis of centre-specific price trends in respect of rice, wheat, sugar, *jowar, bajra,* gram and edible oils. Abnormal trends were brought to the notice of the concerned Ministries/Departments of Central Government and to the concerned State Governments for appropriate action under intimation to the Control Room. Reports about action taken by States/ Union Territories usually took quite some time because they had to get in touch with the district administration. Basically, replies received from the States and Union Territories were in the nature of requests for additional allocation of wheat, rice and sugar which were passed on to the Department of Food to consider them.

Transportation

3.1 During the drought of 1987, State Governments' demands for transportation of commodities for drought relief through railways were met by the Railway Board. The normal railway set up provides for a close watch on the movement of passenger and freight traffic through the Control Rooms working round the clock at important Area Control, Divisional headquarters and Zonal headquarters. However, during crisis, officers are nominated for special items of work and Central Government Departments and State Governments are advised the names and addresses of such officers so that they can be approached as and when any assistance is required for relief operations. These steps were intensified in the wake of the drought of 1987.

3.2 Special watch was maintained for the movement of foodgrains, fodder, POL products including diesel oil, edible oil and water. During the period April 1987 to March 1988, 30.17 million tonne of foodgrains were loaded as compared to 29.01 million tonne during 1986-87, thus registering an increase of 4 percent. The loading during April to June, 1988 was less compared to April to June, 1987 due to less offer of traffic by FCI. Railways were advised to accord top priority to the loading of fodder and clear the demands expeditiously. Freight concession was also given for the loading of fodder to the drought affected area, when sponsored by the State Governments. During the period October 1987 to June 1988, 34,034 wagons were despatched to Gujarat and 4,379 wagons were despatched to Rajasthan. The loading mostly originated from Western, Northern and North-Eastern Railways. Loading was mainly done in block rakes as far as possible but the traffic was not always offered at rake loading points for rake handling destinations. This created difficulties for the railways and resulted in avoidable delays. There were some piecemeal despatches also. Piecemeal despatches caused problems for the railways in arranging supplies of wagons.

3.3 Imported edible oil from Bombay and Kandla transported by rail registered an increase of 31 per cent of the broad gauge system during the period August, 1987 to June, 1988. During this period, 11,017 tank wagons were loaded as against 8,387 tank wagons during the corresponding months of 1986-87. The movement of tinned edible oil also increased from 127 rakes to 207 rakes. Thus it registered an increase of 63 per cent. Ministry of Railways was directed by the CCD to keep a watch on the loading of diesel oil from Kandla. The loading of diesel oil from Kandla recorded an increase of more than 68 per cent during the period August, 1987 to June, 1988. The overall loading to diesel oil on all zonal railways registered an increase of 18 per cent during this period as compared to the corresponding period of 1986-87.

Lessons Learnt

4.1 The PDS needs to be expanded and further strengthened particularly in rural and far-flung area. The anti-hoarding drives stepped up by States acted as a great deterrent against hoarding. The monitoring arrangements at the Centre and in the States proved very useful in organising distribution operations. On account of huge buffer and operational stocks with the FCI, the Department of Food did not encounter any serious difficulty to tide over the situation arising out of drought. However, on

account of fall in production of foodgrains and significant increase in the open market prices, considerable difficulties were encountered in procuring foodgrains at the support/procurement prices.

4.2 The main elements of the strategy of buffer stocking of foodgrains and public distribution stood the test during the period of severe drought. They are proposed to be further strengthened and streamlined because in a vast country like India, a natural calamity like drought or flood takes place in one part or the other almost every year. It is in the fitness of things that PDS is so geared that it is flexible and strong enough to meet the requirements in normal period as also during the periods of natural calamities. Secondly, the procurement system should be further strengthened so that stocks depleted during the drought period are replenished at the earliest. Lastly, the monitoring system and control rooms at the Central, State and local levels created during the drought period should continue as they would, on the one hand, provide immediate and early warning signals and, on the other, help in monitoring and evaluating the current prices and availability situation.

4.3 There was a quantum jump in rail transport requirement due to sustained economic growth both in the agricultural and industrial sectors. In order to cope with the increased rail transport requirement, railways explored ways to optimise on the utilisation of rolling stocks particularly wagons. One of the universally accepted methods of optimisation of wagons is loading and movement in train loads as against the traditional system of loading and movement in wagon loads. Railways adopted this method and gradually switched over to the concept of train load movements. Trade and industry are gradually adapting themselves to the new pattern because this not only ensures quicker supply of wagons but also results in faster transit. As loose wagons, which were earlier available for clearance of piecemeal traffic, were being more and more mobilised for formation of block rakes, there were difficulties in supply of such wagons and delays in clearance of piecemeal traffic sometimes became inescapable. It would have, therefore, facilitated quicker transportation if the States had offered the traffic in rake loads even by clubbing the indents for one/two destinations for quicker clearance.

4.4 It is suggested that for quicker transport of relief material, the States should be advised: (i) to identify block rake points for loading and unloading of relief material with the help of the concerned zonal railway, and (ii) to arrange road bridging of material from way side stations to block rake loading points and again from unloading block rake points to consuming centres. Thus the movement between major nodal points/block rake points will be faster by rake loads. Such rake load movement also lends itself to effective monitoring—which is so very essential for any relief programme.

11 HEALTH AND NUTRITION CARE

The national policy for children adopted by the country in 1974 enjoins, among other things, that children shall be given priority for protection and relief in times of distress or national calamity. This policy is being followed in all situations of calamity like flood or drought where children are often serious victims. To combat the situation created by drought of 1987, health and nutrition care measures including those focussed on children were taken. Since the drought was unprecedented in severity and most parts of the country were in its grip, it became imperative to take special care of the nutritional and health requirements of children and pregnant and nursing mothers. While provision of supplementary nutrition is an essential component in the *anganwadis* in the blocks covered by the Integrated Child Development Services (ICDS) programme, special measures were initiated to operationalise drought nutrition programme in the areas affected by drought but not covered by the ICDS programme.

1.2 The immediate impact of unprecedented and widespread drought resulted in a reduced availability of food and dwindling purchasing power in the affected area. The impact was particularly disastrous on the families below or near the poverty line. Since exact figures of population in the States affected by drought were not available, projections were made on the basis of coverage by the ICDS projects, for the population of the affected children in 0-6 year age group and pregnant and nursing mothers. Nearly 65 per cent of the entire population was estimated to be affected by drought. A population of 100 million children and pregnant and nursing mothers was projected as affected by drought. With the government having already covered one-third of the country through the ICDS programme, which has supplementary nutrition as one of its components, it was estimated that nearly 33 million children and pregnant and nursing mothers were outside the ICDS area to be targeted for supplementary nutrition.

1.3 The problems of the drought affected population are compounded by the prevalance of acute poverty, illiteracy and backwardness in these areas. Deficiency of nutrition decreases the resistance of the body to infections and prevalent diseases in the community like tuberculosis. Infections and malnutrition form a vicious circle, often difficult to break in the drought context. Some of nutritional

Table 43: States and Districts covered under Nutritional Survey, 1987.

S.No.	State	District	Number of Villages Covered
1.	Andhra Pradesh	1. Mahboob Nagar	13
2.	Gujarat	1. Banaskanta 2. Kutch	34
3.	Karnataka	1. Mysore 2. Hasan 3. Tumkur 4. Kolar 5. Dharwad	32
4.	Madhya Pradesh	1. Khargaon 2. Dhar 3. Rewa 4. Rajanandgaon	16
5.	Orissa	1. Kalahandi 2. Phoolbani 3. Ganjam 4. Koraput	67
6.	Rajasthan	1. Jodhpur 2. Jaisalmer 3. Barmer 4. Jalore 5. Nagaur 6. Sikar	62
7.	Tamil Nadu	1. Dharmapuri 2. Ramanad 3. North Arcot 4. Thanjavur	16
	Total	26	240

deficiency diseases seen in this situation are: (a) night blindness, (b) xerophalmia, (c) nrutitis, (d) *kwashiorkor*, (e) marasmus, (f) anaemia, (g) mental apathy, (h) scurvy, (i) glossitis, and (f) cirrhosis of the liver.

1.4 Water scarcity results in health problems and leads to waterborne diseases compounding the problems further during drought. Some common water-borne diseases encountered in this situation are: (i) dehydration, (ii) dysentary, (iii) ascariasis and other kinds of worm infestations, (iv) typhoid, and (v) other unspecified diarroheal diseases.

1.5 The Indian Council of Medical Research (ICMR) was requested by the Ministry of Health and Family Welfare (MHFW) to undertake a nutritional survey in the States of Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu during October-December, 1987. The States and the districts covered are shown in Table 43.

1.6 A total of 25,617 persons were examined from 240 villages. Of these 9,666 were pre-school children and 15,951 were adults. During the survey, investigations were carried out on the following: (1) general health condition, (2) food and nutrient consumption, (3) nutritional deficiency signs, (4) growth status, and (5) relief measures. The salient features of the results of this survey were: (1) the drought was extensive and most severe in Gujarat and Rajasthan, (2) there was reduction in food intake particularly of protective foods, vitamins and minerals, (3) reduction in cereals in energy intake was severe in most of the States. The effectiveness of drought relief measures was evident from the energy intake below 500 calories (starvation level) which was only 0.2 per cent as compared to 36 per cent observed during the drought survey in 1967 in Bihar and Andhra Pradesh, and (4) though the supply of goods like cereals was maintained, the intake level of protective foods like vitamins and minerals was lower than in the normal times.

1.7 The observations of the survey were in accordance with the reports received from the State Governments which were tabulated by the Emergency Medical Relief Section of Directorate General of Health Services in MHFW. The details of the survey reports may be seen in Annexure—XXV. It may also be mentioned that the incidence of water-borne diseases was found to be much lower than even in the normal times due to effective preventive measures taken by the State Governments. However, there was a serious rise in cases of respiratory infections due to persistent dry weather resulting in remultiplication of viruses and other organisms.

Policy Initiatives

2.1 Senior officials of the Department of Women and Child Development (DWCD) were included in the central teams visiting States and such officers were briefed about the manner in which the State Governments were to be advised to identify and work out their supplementary nutrition needs and get them included in the recommendations of the central teams to the HLCR. Even when proposals for supplementary nutrition had not been included by State Governments in their original memoranda, the officers of the DWCD worked out the requirements and got them included in the central team's recommendations to the HLCR.

2.2 Pending the receipts of sanction by the State Governments, as an advance measure, instructions were issued to the Secretaries of Women and Child Development Departments in the States alerting them to the need to gear up the state relief machinery to utilise the amounts likely to be sanctioned. For the affected area, not covered by the ICDS, it was specifically mentioned that the implementation of the drought nutrition efforts should be on the same lines as the ongoing Wheat-Based Nutrition (WBN) Programme. In order that full value for the money sanctioned could be derived by the beneficiaries, the States were instructed to obtain the wheat required for the programme from the States quota of the PDS at the issue price of the Food Corporation of India (FCI).

2.3 Consultations with the Central Food Technological Research Institute (CFTRI), Mysore were held to identify cereal based recipes to be used in the States, in addition to those indicated in the ongoing WBN programme. A meeting was held in the DWCD with the Chairman, Food Sciences Division, CFTRI, Mysore and the Technical Adviser (Nutrition), Department of Food. Guidelines were evolved on the basis of 27 CFTRI formulations on nutrition that could be used in the States and these were communicated to the State Secretaries in charge of Women and Child Development for adoption.

2.4 Since special nutrition efforts of this magnitude had been mounted for the first time in the context of drought and these efforts were to be mounted outside the ICDS area where no ready delivery infrastructure existed, instructions were also issued to the State Governments to utilise such existing infrastructure as the creches and *balwadis* in these areas, mostly through non-Government Organisations.

2.5 With a view to involve the voluntary agencies in this mammoth effort, instructions were issued to the Central Social Welfare Board and the national level voluntary organisations like the Indian Council for Child Welfare to enlist the assistance of voluntary organisations in programmes for the children and mothers in their respective project areas. With concerted efforts of this kind, central assistance to the extent of Rs.55.51 crore was got approved by the HLCR and released to the affected States for the drought nutrition programme. About 77.23 lakh children and nursing and expectant mothers benefited under the drought nutrition programme in the affected states.

2.6 A Committee of Secretaries including the Secretary, Women and Child Development, visited most severely drought affected States of Gujarat and Rajasthan. Based on their recommendations, certain SDAAs were identified in these two states where 40 ICDS projects were established at the rate of 20 projects in each State, envisaging 3,388 *anganwadi* centres in Gujarat and 2,872 *anganwadi* centres in Rajasthan. Appropriate instructions were issued to these two States to start the nutrition part of the programme immediately so that sustenance would be provided to the children and pregnant and nursing mothers backed by health support. This endeavour was to base the drought nutrition programme on wheat. In order that the full value of the money could be derived, 47,500 metric tonne of wheat was allocated to the States by the Department of Food so that the States did not have to buy wheat from the open market at higher rates.

2.7 With a view to evolve suitable linkages between the nutrition programme and relief works, instructions were issued to the Relief Commissioners of the States affected by drought to make arrangements for providing temporary creches at the relief work sites wherever a sizeable number of women were employed to take care of their children in the 0-6 year age group. Such steps were immediately taken, for example, by the States of Gujarat, Orissa and Madhya Pradesh. The Government of Gujarat opened 148 such centres at various relief work sites covering nearly 18,000 beneficiaries.

2.8 The surveys conducted in Rajasthan by the Desert Medical Research Centre, Jodhpur of the Indian Council of Medical Research (ICMR) were carefully analysed and, realising that the calories

gap in several parts of the State was of the order of 600 calories and more and postulating a similar situation in Gujarat, a scheme for providing a second supplementary meal to the children below 6 years and expectant and nursing mothers in these two States, in addition to the supplementary nutrition programme already introduced in these areas, was launched on 1st June, 1988 with funds provided from the Prime Minister's Relief Fund. Under the scheme, additional daily feeding (over and above the normal feeding under the ICDS and drought nutrition feeding) during the months of June and July 1988, to 7 lakh beneficiaries in Rajasthan and 4.7 lakh in Gujarat in the SDAAs in 6 districts of Rajasthan (Jaisalmer, Barmer, Jodhpur, Churu, Jalore and Nagaur) and 5 districts of Gujarat (Jamnagar, Banaskantha, Kutch, Mehsana and Surendranagar) was provided.

2.9 It was emphasised by DWCD that supply of spot-cooked food, regular medical checkups, distribution of vitamin A, iron and folic acid tablets, strict supervision by the block level officers and maintenance of separate accounts for the normal feeding and the additional feeding should be ensured under the programme. Additional feedings were organised in the evenings while the normal feeding under the ICDS and drought relief programmes were organised in the morning. The centrally sponsored wheat-based nutrition programme, launched in January 1986, was further strengthened by funds, commodity coverage and supervision points of view and this enlarged the scope to ameliorate the lot of the weaker sections of the society. Additional beneficiaries were targetted primarily in tribal area and backward rural area both in ICDS and non-ICDS blocks where nutritional deficiency was most prevalent amongst pre-school children and expectant and nursing mothers. Under this programme, an amount of Rs.22.04 crore was provided to State Governments including the States affected by natural calamities during 1987-88 for covering 31 lakh beneficiaries. In addition, 65,511 tonne of wheat was also allocated free of cost under the centrally funded and 32,724 tonne of wheat at subsidised rates under State funded components of the WBN programme. As a measure of health support to the victims of drought, a contingency plan was prepared by the MHFW and finalised in a meeting with Health Secretaries and Directors of Health Services of the States.

2.10 For the first time 6 medical colleges, 3 each in Rajasthan and Gujarat, were involved in providing health care facilities at the NREP worksites and also at the primary health centre level. These medical colleges were: (1) Dr. S.N. Medical College, Jodhpur, (2) R.N.T. Medical College, Udaipur, (3) S.P. Medical College, Bikaner, (4) B.J. Medical College, Ahmedabad, (5) Government Medical College, Baroda, and (6) M.P. Shah Medical College, Jamnagar. Involvement of medical colleges in addition to public health infrastructure helped to provide expert medical care facilities directly to the rural population of the drought affected area.

2.11 An amount of Rs.10 lakh was provided to the Government of Gujarat from the Prime Minister's National Relief Fund for a special *Sukhadi* programme alongwith distribution of Vitamin A to control night blindness. The special efforts were felt necessary as the number of cases of night blindness had registered a considerable increase in this area. 21,900 bottles of Vitamin A were distributed additionally in Rajasthan and Gujarat under maternity and child health programme.

2.12 As part of drought relief measures, a new central scheme called 'Operation Health Care Scheme' was started on an experimental basis for the States of Rajasthan and Gujarat. The aims of the Scheme were: (1) doctors and students from the department of preventive and social medicine of the medical colleges would be mobilised to provide preventive and curative medical facilities at primary health centres and sub-centres, and at the worksites; (2) these personnel would provide Vitamin A tablets to prevent night blindness, health education in *anganwadis* and *balwadis,* special care to children, expectant mothers and other people and also conduct health and nutrition surveys; (3) health education at the worksite will be organised once a week; (4) a first-aid box and clean drinking water would be made available at the work site; (5) to explore the feasibility of creche services for children of the workers at the work site; and (6) the GOI would supply free vaccines for coverage of the entire population at the work site. The above scheme covered 16 primary health centres in Rajasthan and 15 primary health centres in Gujarat.

2.13 During the implementation of the supplementary feeding programme, the problems faced were; (i) non-availability of kitchen utensils for the preparation of food at feeding centres, (ii) deployment of inadequate staff for conducting the feeding programme, (iii) lack of coordination between the Health Department and Welfare (Nutrition) Department at District and State level, (iv) lack of supervision where the programme was mounted, (v) non-observance of sanitary and hygienic

conditions recommended by medical experts, (vi) delayed mounting of programmes, and (vii) very slow flow of data regarding number of beneficiaries to be covered and actually covered. These constraints resulted in the late start of the feeding programme in many States and, to some extent in diminishing the impact of the feeding programme. However, in a series of meetings taken with the concerned State officials in Delhi as well as in the State headquarters by the officials of the DWCD who were assigned to supervise the drought relief work in States, these bottlenecks were sought to be eliminated.

2.14 Despite these efforts, information received at Central level was not in accordance with the prescribed formats, due to which difficulties were faced in analysing the information received. For example, information on preventive measures taken by the State of Orissa was mentioned in detail but there was no information about prevalence of diseases including nutritional diseases. Whatever information was received from the States of Gujarat, Maharashtra and Rajasthan was one to one-and a half month late. This delayed information prevented appreciation of the problems in time. For example, the supply of Vitamin A to prevent blindness could have been made much in advance to the States of Rajasthan and Gujarat.

2.15 No programme can be successful unless it is backed up by proper monitoring and reporting systems. Considerable efforts were made in this direction. Weekly progress reports were prescribed for submission to the DWCD. The proforma evolved provided for not only progress of expenditure but also the number of beneficiaries covered. As a measure of abundant precaution, an additional proforma was also evolved calling for information on the total number of beneficiaries to be covered, the specific field agency that would operate the programme and the administrative arrangements for the implementation of the programme. Also included in this proforma was a column for the States to report on the recipes that would be used in the feeding centres run under the drought nutrition programme.

2.16 Senior officers of the DWCD were made responsible for undertaking monitoring and co-ordination of nutrition programmes in the severely drought affected States of Orissa, Rajasthan and Gujarat. These visits brought home the kind of problems and the severity of the incidence of malnutrition noticed in these areas. The MHFW made following monitoring and reporting arrangements: (1) A meeting of all Directors of Health Services of major drought-affected States was held on 31st March 1987 to take stock of drought situation and to discuss details of arrangements made by them including arrangement to get feedback information; (2) 14 major drought affected States were visited by senior officials of the GOI for on the spot assessment of the situation. The States and Union Territories visited were Andhra Pradesh, Gujarat, Haryana, Punjab, Chandigarh, Jammu and Kashmir, Kerala, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Uttar Pradesh, Rajasthan and Tamil Nadu; (3) Regional Directors of Health and Family Welfare posted at State headquarters remained in touch with State Governments; (4) State Governments were requested to send fortnightly reports on action taken; (5) Separate letters were issued to Health Secretary, Government of Kerala to take adequate measures in view of large number of diarrhoeal diseases; and (6) Review of drought measures was under taken twice by the GOI with the Health Secretaries of State Governments on 3rd November, 1987 and 10th June, 1988. A proforma for monitoring the drought nutrition programme was prepared and circulated to all the States for compilation of weekly reports.

Lessons Learnt

3.1 The foremost requirement is to have a cell both at the Central and State levels. These cells need to be equipped with basic data, monitoring network, implementation machinery and co-ordinating functions. As soon as a disaster is suspected to occur on the basis of the monsoon behaviour,the cell should be activated even before action is needed. It is necessary that problems of children and women both in regard to nutritional and health aspects, should not be dealt with in a routine manner but programmes should be evolved on an assessment of a particular situation and answering to that situation.

3.2 Other important lessons that were learnt for future are:-

(i) The need for the preparation of an advance action plan by the State Governments to meet contingencies of drought and updating the same from time to time;

(ii) The programmes of health and nutrition should be implemented together and in time and there should be no time lag in the initiation of the programmes. There should be no phasing in the implementation of the programmes.

(iii) Nutrition programmes and programmes of health should go together so that one reinforces the other. Particularly important are the programmes of immunisation against preventable diseases, prophylaxis against Vitamin A and B deficiencies and de-worming of children;

(iv) Spot feeding should be invariably insisted upon and the food should be such that it can readily be taken by very young children. Ready to eat food for children under one year of age should also be thought of;

(v) The need for the location of an adequate monitoring outfit in each State down to the district headquarters and ensuring that necessary strengthening of these outfits takes place as and when needed;

(vi) Programme of orientation of State and Central personnel should be undertaken on the points of proper implementation of programme for the contingencies of drought, particularly in regard to those that benefit women and children. Monitoring programmes and report collection systems should also be strengthened.

(vii) Training programme for personnel involved in drought relief work should be undertaken and training should have an important component of nutrition and health focussed on women and children;

(viii) A working manual should be kept ready in all States to deal with contingencies for drought and these should be updated from time to time; and

(ix) A focal point should be designated in each State for work on drought relief with specific reference to the health and nutrition aspects. Adequate budget provision should be available to these focal points.

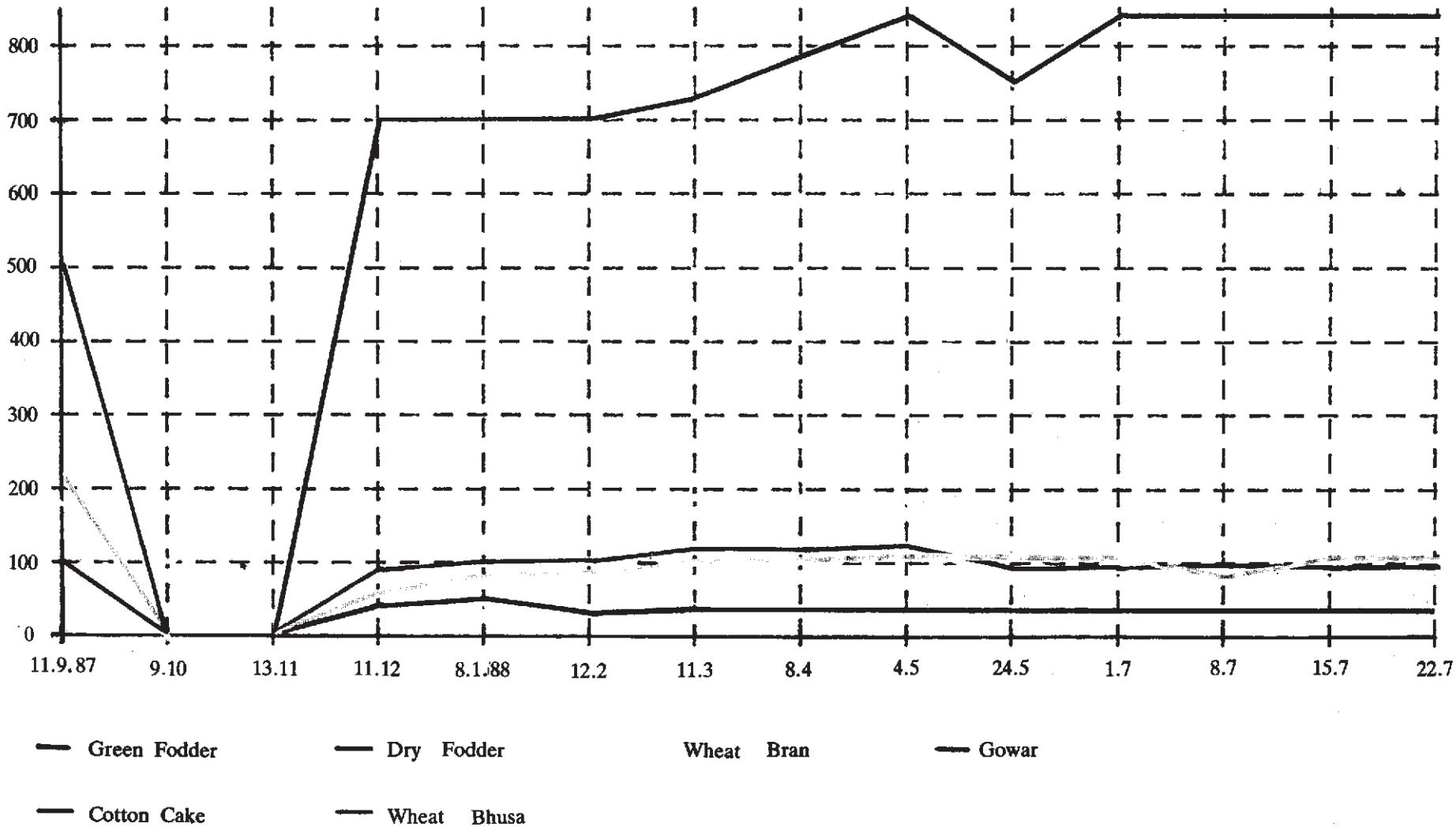


Figure 20: **Weekly Rate of Feed and Fodder Varities in Rajasthan from 11 September 1987 to 22 July 1988.**

12 CATTLE CARE

The bovine population occupies an important place in the economy of the people. The cattle care therefore assumes particular importance in times of drought. This task was rendered singularly arduous during drought of 1987 in the arid western parts of the country which had been subjected to droughts in preceeding years. The measures undertaken by the GOI and the State Governments proved very effective in protecting cattle wealth. Out of a bovine population of 214 million in 17 drought affected States and Union Territories, as many as 120 million were affected by drought to varying degree. The details of cattle population affected in 15 States and 2 Union Territories affected by drought may be seen in Table 44. The impact of drought on cattle population was severe in northern/north-western Rajasthan (Barmer, Jaisalmer, Jhunjhunu, Jodhpur, Jalore, Churu, Nagore, Sikar and Pali districts) and in northern Gujarat (Banaskantha, Surendranagar, Kutch and Saurashtra).

1.2 Owing to shortage of feed and fodder, milk production was adversely affected in all the drought affected States and more acutely in Rajasthan and Gujarat. There was a decrease of 1.5 to 9.5 per cent in the average daily milk procurement in 14 drought affected States under Operation Flood programme during May to October, 1987 as compared to the corresponding period of the previous year as shown in Annexure XXVI. The buffalo population usually calves during the monsoon and it does not reach peak milk production during the drought owing to inadequate nutritional support. The mineral deficiency also leads to shortfalls in breeding cover which in the long run could show adverse impact on milk production.

1.3 In the wake of drought conditions, a significant part of bullock and other draft animal population located in some acute fodder scarcity and water scarcity area migrated to other area. The inadequate nutritional support did tell upon the draft capabilities of these animals. Thus, a decline in the animal power in qualitative and quantitative terms, was felt in the drought affected area.

1.4 No report of death of cattle due to starvation was received. A close watch was maintained by DAC on the development in this regard through a weekly monitoring exercise throughout the drought period. However, animal deaths due to old age, malnutrition diseases and other causes were reported

Table 44 : Bovine Population Affected by Drought, 1987

(lakh)

S.No.	State/Union Territory	Total Bovine Population	Bovine Poulation Affected
1.	Andhra Pradesh	219.0	143.0
2.	Gujarat	114.0	102.0
3.	Haryana	57.0	50.0
4.	Himachal Pradesh	58.0	27.9
5.	Jammmu and Kashmir	29.0	2.3
6.	Karnataka	149.0	55.0*
7.	Kerala	35.0	5.0
8.	Madhya Pradesh	336.0	100.0
9.	Maharashtra	201.0	35.0*
10.	Nagaland	1.6	0.5
11.	Orissa	143.0	55.0*
12.	Punjab	78.0	24.0
13.	Rajasthan	195.0	129.0
14.	Tamil Nadu	136.0	90.0
15.	Uttar Pradesh	419.0	393.0
16.	Chandigarh	0.3	0.2
17.	Delhi	2.3	2.0
	Total	2143.2	1203.7

Note : *Estimated

from drought affected area. The mortality rate in normal times is around 10 to 15 per cent of the population and there was no appreciable increase in this percentage on account of drought conditions. At times there were reports of large scale deaths, which on investigation were found to be not based on facts.

Central Initiatives

2.1 : Guidelines were issued to States as early as 24th July, 1987 for preparing contingency plans for relief to livestock, including establishment of fodder banks, cattle camps, feeding non-conventional fodder and agro-industrial wastes, enrichment of fodder with urea and molasses. Availability of fodder seeds at Central and other fodder farms for both *kharif* and *rabi* seasons was intimated to States alongwith guidelines for special fodder cultivation to be adopted in the wake of drought. Discussions were arranged on television regarding various measures required to be adopted for providing relief to livestock during the drought.

2.2 The Action Plan for Drought Relief (Table 7), envisaged specific measures for the preservation of cattle in the drought affected area of the country. These measures related to augmentation of fodder available in the affected area, distribution of fodder at reasonable prices for the cattle of weaker farmers, monitoring of prices of fodder in the country and provision of feed supplementation for the affected cattle.

2.3 The State Forest Departments were energised to harness forest grass and despatch it to fodder deficit area. Consequently, substantial quantities of forest grass were mobilised for use in the drought affected area as shown in Table 45.

2.4 When the significant fodder shortage was expected in July-August, 1987, the GOI launched a scheme for crash cultivation of fodder in the drought affected area in the States of Gujarat, Haryana, Madhya Pradesh, Orissa, Punjab, Rajasthan and Tamil Nadu and the flood affected State of Bihar.

Table 45: Availability of Forest Grasses as Fodder, 1987-88

(tonne)

S.No.	State	Quantity of Forest Grasses cut	Quantity of Forest Grasses Ready for Delivery	Quantity of Forest Grasses Delivered
1.	Madhya Pradesh	15986.91	7182.14	852.96
2.	Andhra Pradesh	4500.00	4500.00	
3.	Karnataka	10000.00	10000.00	
4.	Punjab	900.00	900.00	
5.	Uttar Pradesh	37277.60	37277.60	37277.60
	Total			38,130.56

Table 46 : Contingency Action Plan for Fodder Production, 1987-88

S.No	State	Amount (Rs in lakh)	Area Targetted (hectare)	Number of Beneficiaries	Fodder Minikits Distributed	Amount Utilised (Rs in lakh)	Area Covered (hectare)
1.	Gujarat	200 00	57,000	1,27,676	1,27,676	200 00	63,838
2.	Haryana	87 50	25,000	1,02,941	1,02,941	87 48	20,588
3.	Madhya Pradesh	87 50	25,000	93,836	4,953 Qtls of seed supplied	57 57	10,869
4.	Orissa	19 50	6,000	39,155	31,155	19 50	NA
5.	Punjab	87.50	25,000	1,45,283	NA	87 48(+)	25,398
6.	Rajasthan	233.00	67,000	N A.	1,90,217	305.72@	55,817
7	Tamil Nadu	87.50	25,000	19,978	N A.	51 55	NA

Note : @Including State Government scheme (involving Rs 194 lakh)
+ Rs 256.88 lakh as cash relief to 2,12,768 beneficiaries for Purchase of fodder
NA · Not Available

An amount of Rs. 8.93 crore for this purpose was sanctioned and released to the States. The targets and achievements in the States under this scheme are as shown in Table 46.

2.5 Towards the end of the South-west monsoon, the country experienced some welcome showers. This give rise to expectation of improvement in fodder availability in the subsequent months beyond October, 1987. Earlier, during the crucial period, August-October, some innovative measures for improving the fodder availability in parts of Gujarat and Rajasthan were undertaken. In Gujarat, the sugarcane in the area controlled by the cooperative sugar factories in south Gujarat was bought, transported and distributed at subsidised rates to sustain the cattle in Saurashtra. A similar measure was also taken in Rajasthan in transporting sugarcane from the eastern parts of the State and neighbouring parts of Madhya Pradesh to western parts of Rajasthan.

2.6 Further, the paddy straw available in Punjab and Haryana at the end of the *kharif* season was also identified. The utilisation of paddy straw available in Punjab and Haryana and modality of its utilisation by Gujarat and Rajasthan were discussed in a meeting held on 12th October, 1987 by the Animal Husbandry Commissioner which was attended by representatives of the State Governments of Gujarat, Rajasthan, Haryana and Punjab as also of dairy cooperatives.

2.7 The problem of transportation was sought to be removed by special arrangement for pressing and baling at the site of procurement. Special teams of officials for procurement of paddy straw were sent by the State Governments to Punjab. NDDB also collected 22,000 tonne of paddy straw from Punjab for distribution in Gujarat. Paddy straw was also mobilised from *terai* region of Uttar Pradesh for distribution to Rajasthan. The Rajasthan Government engaged voluntary agencies and *panchayats* to procure and transport paddy from Punjab. The DAC asked the Compound Livestock Feed Manufacturers' Association (CLFMA) to arrange supply of cattle feed to drought affected States on priority. The facilities provided by railways in the transport of paddy and grass deserves a special mention.

2.8 Similarly at the end of *rabi* season, transportation of wheat *bhusa* to Rajasthan and Gujarat was also undertaken. The Animal Husbandry Commissioner kept a close watch on the availabiltiy of fodder on a continuous basis. The coordination of different agencies engaged in the inter-State movement of fodder was brought about by DAC's intervention on appropriate occasions.

2.9 The Central Government enlarged the scope of Central assistance for subsidising the cost of transportation of fodder to affected area; this subsidy was 75 per cent of the cost of transportation for inter-State movement and 50 per cent for intra-State movement.

2.10 The feed supplementation of livestock in the affected area was an important area in which considerable efforts were made by different GOI agencies. All the sugar mills in the country were advised to save *bagasse* and release it for feeding livestock. About 10 per cent of the molasses production was reserved for manufacture of cattle feed. Molasses used for the manufacture of cattle

Table 47: Allocation of molasses for Cattle Feed and Fodder, 1987

(tonne)

S.No	State	States From Where Allocated				
		Uttar Pradesh	Maharashtra	Haryana	Pondicherry	Total
1.	Gujarat	8000	10000			18000
2	Himachal Pradesh			500		500
3	Jammu and Kashmir			50		50
4.	Karnataka		6000		2000	8000
5	Kerala		6000		2000	8000
6	Madhya Pradesh	15000				15000
7	Punjab			6000		6000
8	Rajasthan	9000		3000		12000
	Total	32000	22000	9550	4000	67550

Note Allocation made by the Department of Chemicals and Petro-Chemicals, Ministry of Industry, New Delhi, vide circular letter No 15021(28)87-Ch II dated 7th September, 1987

feed in the public sector undertakings were exempted from excise duty. Further, 67,550 tonne of molasses was allocated to eight States as shown in Table. 47.

2.11 The cattle feed availability was further sought to be improved by the diversion of damaged foodgrains if found suitable for feed manufacturing. About 99,000 tonne of such foodgrains (including wheat) was identified by FCI for this purpose. The GOI also supplied damaged wheat at a concessional price of Rs. 65 per quintal.

2.12 In view of the critical situation of fodder availability in drought affected area, the States, particularly, Gujarat and Rajasthan, were required to prepare Contingency Fodder Plans for the drought period indicating the requirement, availability and logistics for augmentation in the drought affected area. The States, in turn, estimated this requirement for the entire livestock affected, on the basis of 3 to 5 kg. of fodder per day per animal. This requirement was estimated at 25 million tonne for the entire State and 11.2 million tonne for the crisis area in Rajasthan and 14.8 million tonne for the entire State and 6.6 million tonne for the crisis area in Gujarat. The details may be seen in Annexure XXVII.

2.13 It was subsequently realised that the requirement should be based on the number of cattle camps proposed to be established and the expected off-take of fodder from fodder depots. The quantity supplied by Rajasthan (most of it by transportation from outside and limited quantities from within the State) was 1.1 million tonne during August, 1987 to March, 1988. In case of Gujarat 91,100 tonne of fodder was supplied by the State agencies mainly to card holders and cattle camps. Due to the uncertainties of the fodder situation, the detailed plans of the States were subject to weekly review at the DAC.

2.14 The organisation of cattle camps was a major element of the strategy for preservation of the cattle wealth of the drought affected area, particularly in the arid parts of Gujarat and Rajasthan. Successive droughts in these area had made cattle maintenance difficult. Migration of cattle to more favourably endowed area is resorted to by cattle breeders in such a crisis. In view of the severity of drought, the population of cattle and hardship involved in migration, the GOI gave thrust to the establishment of cattle camps in the affected area. The association of voluntary agencies with this gigantic task was given a lot of emphasis. The GOI extended financial assistance at the rate of Rs. 3 for adult cattle and Rs. 1.5 for calf for the maintenance of cattle in the cattle camps. These norms enhanced to Rs. 4 and Rs. 2 in respect of SDAAs. The number of cattle camps and the cattle in these camps registered a steady increase in the months of October to December 1987, and rose to 2,236 camps and 1.7 million cattle in May 1988. For nearly 5 months, not less than 1600 camps with 1.2 million cattle were maintained. The enormity of the scale of operations can be discerned from Table 48.

2.15 Livestock health situation covering incidence of diseases, prophylactic vaccinations, treatment of cases, drenching against worm/fluke infestation, supply of mineral supplements, etc. was also

Table 48: Cattle in Cattle Camps in Gujarat and Rajasthan 1987-88

S.No.	Week Ending	GUJARAT		RAJASTHAN	
		Number of Cattle Camps	Number of Cattle (lakh)	Number of Cattle Camps	Number of Cattle (lakh)
1.	2.10.1987	240	2.68	105	0.55
2.	9.10.1987	295	3.21	105	0.55
3.	16.10.1987	330	3.94	105	3.00
4.	23.10.1987	363	4.16	175	6.00
5.	30.10.1987	363	4.16	175	6.00
6.	6.11.1987	363	4.16	233	3.06
7.	13.11.1987	492	5.31	233	3.06
8.	20.11.1987	564	5.82	233	3.06
9.	27.11.1987	564	5.82	233	3.06
10.	4.12.1987	726	6.37	378	4.61
11.	11.12.1987	775	6.59	419	5.03
12.	18.12.1987	845	7.03	419	5.03
13.	24.12.1987	845	7.03	419	5.03
14.	1.1.1988	974	7.54	419	5.03
15.	8.1.1988	1015	7.81	603	5.03
16.	15.1.1988	1056	8.05	603	5.03
17.	22.1.1988	1101	8.32	603	5.03
18.	29.1.1988	1136	8.62	603	5.03
19.	5.2.1988	1161	8.68	603	5.03
20.	12.2.1988	1201	9.08	603	5.03
21.	19.2.1988	1245	9.99	603	5.03
22.	26.2.1988	1284	10.21	603	5.03
23.	4.3.1988	1312	10.38	603	5.03
24.	11.3.1988	1334	10.46	603	5.03
25.	18.3.1988	1348	10.51	603	5.03
26.	25.3.1988	1394	10.74	603	5.03
27.	30.3.1988	1431	10.95	603	5.03
28.	8.4.1988	1471	11.22	603	5.03
29.	15.4.1988	1506	11.45	603	5.03
30.	22.4.1988	1506	11.45	603	5.03
31.	25.4.1988	1560	11.81	603	5.03
32.	6.5.1988	1582	11.93	603	5.03
33.	13.5.1988	1577	11.79	603	5.03
34.	20.5.1988	1577	11.79	603	5.03
35.	27.5.1988	1603	12.01	603	5.03
36.	3.6.1988	1655	12.55	603	5.03
37.	10.6.1988	1653	12.54	603	5.03
38.	17.6.1988	1646	12.18	603	5.03
39.	24.6.1988	1559	11.29	603	5.03
40.	1.7.1988	1411	9.97	603	5.03

minitored on weekly basis. The States had set up veterinary aid camps in the vicinity of cattle camps and put mobile veterinary services into operation in the drought affected area. Special care was taken for mineral and vitamin deficiencies and reproductive disorders resulting from such deficiencies. Infertility and sterility camps were also set up. Animals were vaccinated and treated for various clinical and surgical ailments. Disinfectants were sprayed in drinking water reservoirs.

2.16 The DAC was regularly monitoring fodder situation and supply position in the drought affected States covering aspects like (i) establishment of cattle camps and number of animals being taken care of in them; (ii) feed and fodder supply through fodder depots and feeding centres; (iii) animals being given succour through *gaushalas* and *pinjrapoles;* (iv) mobilisation of wheat *bhusa,* paddy straw. etc. from surplus to drought-affected area; (v) augmentation and availability of forest grass and its supply to needy area; (vi) transport arrangements; and (vii) special State efforts for fodder cultivation.

2.17 The progress in implementation of the contingency plan on fodder production was being monitored on a weekly basis. A close watch on feed and fodder prices was also kept at 53 centres spread across the country, from where current prices were monitored alongwith prices prevalent a week ago, a month ago and an year ago. This monitoring was done on a weekly basis. A graphical representation of movement of fodder prices may be seen in Figures 20 and 21.

2.18 The joint teams of animal husbandry and forest officials of the GOI visited various drought affected States for mobilising forest fodder/grass for feeding cattle. The Animal Husbandry Commissioner also visited Gujarat, Rajasthan and other drought affected States for working out monthwise requirements, availability, shortfall and measures for mobilising fodder. Apart from this, one Area Officer each for Gujarat and Rajasthan, was identified in the DAC to make monthly visits to these two States to study the fodder situation regularly. Availability of fodder was also reviewed in

Table 49: Central Assistance Approved for Cattle Conservation under Drought Relief, 1987-88

(Rs in crore)

S No	State/Union Territory	Central Assistance Approved		
		Upto March 1988	April to June/ July 1988	Total
1	Andhra Pradesh	0 64	—	0 64
2	Gujarat	40 07	21 00	61 07
3	Haryana	8 00	—	8 00
4	Himachal Pradesh	1 21	—	1 21
5	Jammu and Kashmir.	1 71	—	1 71
6.	Karnataka	0 20	—	0 20
7	Kerala	2 10	—	2 10
8	Maharashtra	0 30	0 66	0 96
9	Madhya Pradesh	0 25	0 25	0 50
10	Nagaland	0 10	—	0 10
11	Orissa	—	—	—
12	Punjab	6 00	—	6 00
13	Rajasthan	56 01	35 00	91 01
14	Tamil Nadu	—	—	—
15	Uttar Pradesh	2 43	—	2 43
16.	Andaman and Nicobar Islands	0 02	—	0 02
17.	Chandigarh	0 05	—	0 05
18	Delhi	0.10	—	0 10
19.	Pondicherry	0 10	—	0 10
20.	Dadra and Nagar Haveli	—	—	—
21.	Daman and Diu	—	—	—
	Total	119 29	56 91	176 20

the Conference of Relief Commissioners held on 6th January, 1988 in New Delhi. Another meeting was convened on 9th February, 1988 in New Delhi to discuss fodder management in the drought affected area, particularly during, the critical period of March-June, 1988. Relief Commissioners, Chief Conservators of Forests and Directors of Animal Husbandry of the drought affected States attended this meeting, apart from officers of the GOI, the NDDB the ICAR etc. Stress was laid on suitable tie-up between the States of Gujarat and Rajasthan, on the one hand, and the neighbouring States, on the other, with a view to secure maximum amount of fodder and forest grasses. A workshop sponsored by the DAC on Crisis Management of Livestock under drought conditions was organised at Anand, Gujarat on 8-12 February, 1988 in which specialists from the NDDB, SAUs and the State Agriculture and Animal Husbandry Departments participated.

2.19 Substantial Central assistance flowed to the States for measures relating to animal health cover and maintenance of cattle. Central assistance in this regard accounted for nearly 11 per cent of the total Central assistance. The details of Central assistance approved for various States may be seen in Table 49.

State Efforts

3.1 In view of the successive droughts, faced by major parts of Gujarat and Rajasthan and the semi arid conditions in these parts, these two states had to adopt a dynamic management strategy in relation to preservation of cattle wealth.

3.2 In Rajasthan out of population of 494.86 lakh live-stock, 358.77 lakh were affected by drought and 179.41 lakh of these belonged to small and marginal farmers. As regards cattle and buffaloes 141.38 lakh out of a population of 195.01 lakh were affected by drought and 70.69 lakh of affected cattle and buffaloes were owned by small and marrinal farmers and agricultural labourers. The relief operations were mounted for cattle and buffaloes only, as sheep, goats and camels could sustain themselves on crop residues in soil or on *khejri* fodder trees or through migration.

3.3 Cattle camps were organised by voluntary agencies. A total of 5.03 lakh cattle were provided succour in 633 cattle camps. The strength of animals in such camps varied from 100 to 1000. As against GOI's norms of assistance of Rs.4 per adult cattle and Rs.2 per calf in SDAAs and Rs. 3 and Rs.1.5 in other areas, the Government of Rajasthan provided a flat rate of Rs. 4 per cattle irrespective of age group or area. The strength of calves below one year was around 1 per cent of the

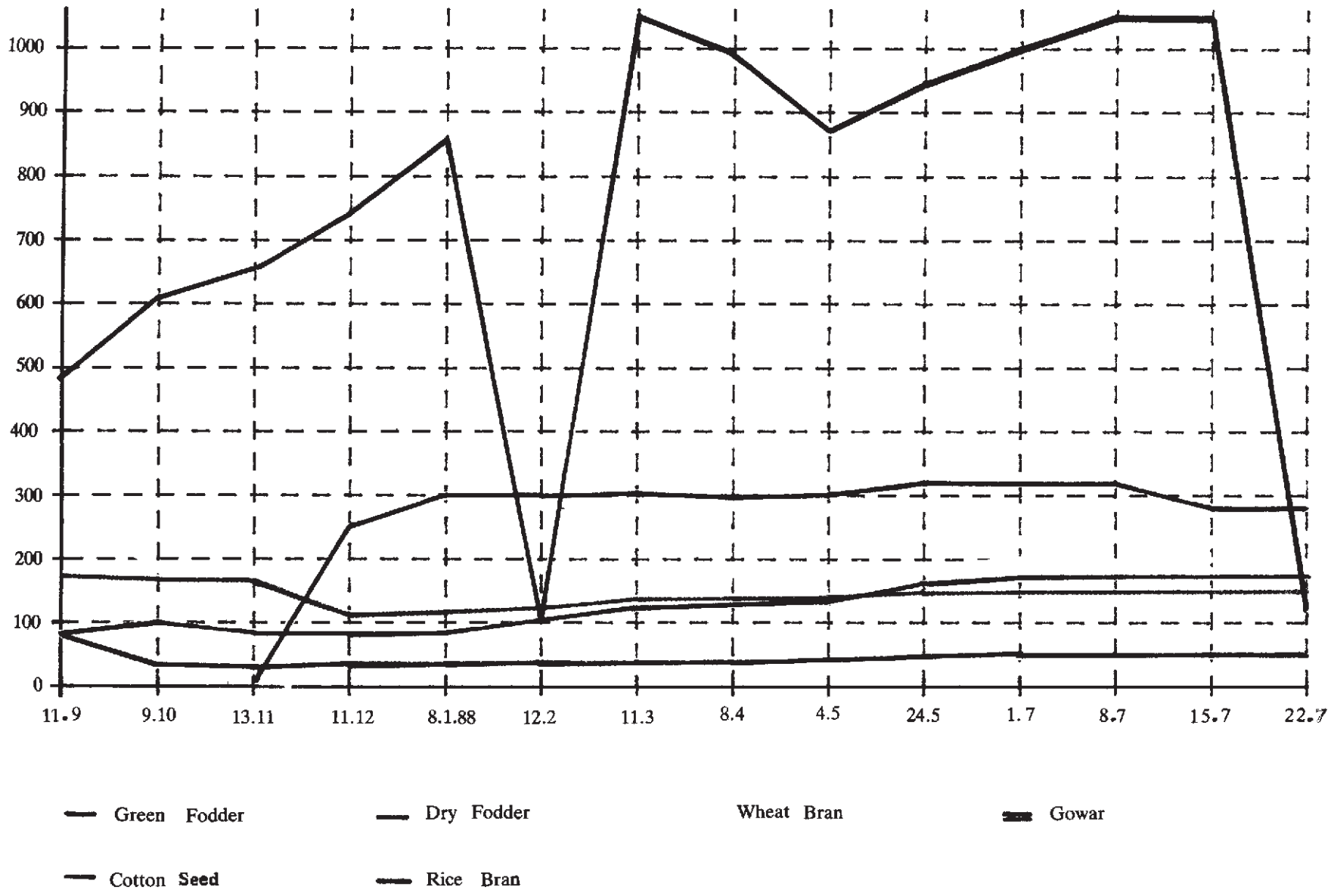


Figure 21: **Weekly Rate of Feed and Fodder Varities in Gujarat from 11 September 1987 to 22 July 1988.**

strength of cattle camps. Heifers were deemed as adult. The ration commodities given at cattle camps included per cattle dry fodder 4-5 kg., cattel feed 1 kg. and greens, if available, 1 kg. Urea molasses blocks were also provided in some camps as licks. The cost of feeding a cattle in cattle camps was Rs.5-6 as against Rs. 4 given by the GOI as subsidy. The mortality in cattle camps was around 8-10 per cent which was very much within the normal mortality levels. The mortality was due to old age, malnutrition and other disorders.

3.4 Whereas the cattle camps were organised by voluntary agencies, the veterinary aid facilities in such camps were provided by the animal husbandry department through redeployment of staff drawn from its regular strength. One stock assistant was attached to each camp and the veterinary assistant surgeon paid frequent visits. Animals were treated for various ailments and vaccinated against rinderpest, foot and mouth disease and *haemorrhegic septiceamia.* Mineral mixture, Vitamin A supplement and anthelmaintics were provided and insecticides sprayed for preventing external pests. There was no epidemic in the camps. Cases were treated for sterility and breeding coverage provided through artificial insemination.

3.5 However some lacunae were noticed in running of the cattle camps run by voluntary agencies. It was frequently noticed that animals in these camps were weak. However, such weak animals were kept in segregation and provided extra feed. There was no independent supervision of the functioning of cattle camps run by the voluntary agencies due to the large scale of operations. It was therefore quite possible that the quantities of feed made available to animals might have been below what were required.

3.6 Fodder depots were run by *Panchayat Samities,* cooperative societies and voluntary agencies for which the State Government advanced interest-free loan varying from Rs. 20,000 to Rs. one lakh to each agency as working capital for maintaining fodder stocks. The State Government provided Rs. 8.34 crore to voluntary agencies and Rs. 3.07 to *Panchayat Samities* for this purpose. A total of 3,422 fodder depots were established. Wheat *bhusa, jowar kutti,* gram *bhusa* and chaffed *ber* fodder, brought from neighbouring States of Madhya Pradesh, Uttar Pradesh and Maharashtra, were also distributed by these depots on 'no-profit-no-loss' basis. Most of the beneficiaries of fodder distribution by these depots were small and marginal farmers and agricultural labourers.

3.7 The State Government in the past fixed rates of transport subsidy in terms of amount per quintal per kilometre. But subsequently flat rates of transportation had been fixed which varied from district to district. For example, in Sikar the rates had been fixed at Rs.40 per quintal for fodder from Maharashtra, Madhya Pradesh and Uttar Pradesh and Rs.35 per quintal from Haryana and Punjab. In Nagaur Rs.40 per quintal was admissible on transportation of fodder from Madhya Pradesh and in Churu Rs.40 per quintal was allowed for transportation from Haryana. In addition to transportation charges, 5 per cent administration charges were given by the Government to the organisers. The State Government enforced a system of concurrent audit for expenditure incurred on transport subsidy, cattle camps, feeding centres, *gaushalas,* etc.

3.8 The sale price of fodder was computed based on the price at destination minus the transport and administration charges. For example, at the time of visit of the central team, the destination price of wheat *bhusa* stock at fodder depot at Nagaur for fodder transported from Ashok Nagar, Guna, Madhya Pradesh was Rs.135 per quintal and the sale price was fixed at Rs.90 after deducting transport charges of Rs.40 per quintal and administration charges of Rs.5 per quintal. The destination price varied from Rs.122 to 136 and the sale price ranged from Rs.67 to 91 per quintal. The sale price was fixed by the district authorities. Sale price upto Rs.90 were fixed by the Tehsildar and price exceeding Rs. 90 by Sub-Divisional Magistrate. The respective sale price at fodder depot Chappar (Churu) for jowar *kutti,* wheat *bhusa* and gram *bhusa* were Rs.100, 70 and 50 per quintal.

3.9 Although purchase prices of fodder were not available, the central team made a comparison of the sale price of wheat *bhusa* at fodder depots in Rajasthan and the rates compiled by the DAC from supply States of Madhya Pradesh and Haryana. A perusal of these rates showed that both the rates were comparable. It was, therefore, concluded that the fodder depots were supplying fodder at 'no profit no-loss' basis.

3 10 The State Government organised 3,016 feeding centres providing succour to 5.48 lakh milch cattle. These were run by Rajasthan Co-operative Dairy Federation (RCDF) Centres and other Government and private agencies. Each animal was provided 2 kg. of feed (costing Rs.4) on 50 per cent subsidy (Rs.2). At some places the subsidised cattle feed was also available to animals kept in

the cattle camps @ 1 kilo feed per animal (Rs.1). At such places the total amount of subsidy worked out to Rs.5. It was felt that the animals in the cattle camps could not thrive on dry fodder only and some quantity of cattle feed was necessary. About 22,000 animals in *gaushalas* were being provided subsidy @ Rs.3 per adult and Rs.1.50 for young cattle. The State Government provided subsidy @ Rs.7 per bull for 6,142 breeding bulls. These bulls were mostly community bulls kept by *panchayats* and they depended in normal times either on grazing or on feeding by the community. Under the drought conditions since neither grazing was available nor was there any chance of feeding by the community, the Government was obliged to maintain these bulls. Veterinary care was arranged through veterinary camps and special facilities were provided by the Animal Husbandry Department in cattle camps. The Government spent Rs.1.46 crore on veterinary care.

3.11 The State Agriculture Department was allotted an amount of Rs.1.25 crore for fodder cultivation and fertilisers were distributed to farmers at a cost of Rs.1.94 crore. Additionally the State utilised Rs.2.33 crore Central aid given as contingency grant for fodder cultivation for covering 67,000 hectare. The central team observed that there was favourable response from small farmers, marginal farmers and agricultural labourers to green fodder cultivation programme. The green fodder produced through Central contingency plan was not for procurement by voluntary agencies for fodder depots or cattle camps but it was meant for consumption by the weaker sections of the society for their own cattle.

3.12 For augmenting drinking water for cattle, the State Government energised wells, constructed lakes and tubewells and wells. The central team visited one cattle drinking water lake at Loha (Churu) which had been constructed primarily to cater to the future needs of cattle fair organised in that village. The State Government arranged migration of several thousands of animal of *Rathi* and other good breeds to Rajasthan canal area for safeguarding their health and production potential. The State Government spent an amount of Rs.54.68 crore during August, 1987 - March 1988 for relief to livestock. The districtwise details are shown in Annexure XXVIII.

4.1 In Gujarat, it was estimated that out of a cattle and buffalo population of 1.14 crore, 1.02 crore was affected by drought. The State established 1,655 cattle camps in which 12.55 lakh animals were tended. Additionally 1.79 lakh animal were also provided relief through 364 *pinjrapoles* and *gaushalas*.

4.2 The State Government set districtwise targets for cultivation of fodder on 4 lakh hectare of land, which was expected to yield 80 lakh tonne of green fodder. Water from tube wells of the State Water Resources Development Corporation as also district *panchayats* was supplied free of cost for growing fodder on 35,000 hectare of land. The State Government also provided water free of cost from reservoirs of the State Irrigation Department whenever possible. A support price of Rs.500 per tonne was fixed for fodder where the cost of cultivation was entirely borne by the cultivator and Rs.250 per tonne where grass was produced by availing of free water. The State exempted cattle feed manufacturing units from power cuts. The State Government also arranged for procurement of sugarcane at a cost of Rs.450 per tonne, one-third of this cost being provided as subsidy. About 23,000 tonne of sugarcane procured from the southern districts of Surat and Valsad, was distributed to fodder deficit area like Kutch. A subsidy to voluntary agencies was given for maintaining cattle in the cattle camps.

4.3 About 33,000 tonne of dry grass and 19,000 tonne of paddy straw were available from within the State (Valsad district) and about 5,600 tonne of grass from the State Forest Department. The NDDB collected 25,000 tonne of dry grass from Punjab for supply to Gujarat. Further availability of fodder from outside the State was estimated at 60,000 tonne from Maharashtra, 2,000 tonne from Madhya Pradesh, 7,000 tonne from Punjab and 5,000 tonne from Dadra and Nagar Haveli. About 38,400 tonne of grass and paddy straw and 8,500 tonne of dry fodder were procured from within the State and from outside respectively. Allotment of grasses made from the forest area of selected districts was of the order of 1,806 tonne, out of the expected availability of 5,600 tonne.

4.4 Under the veterinary care programme, 38.38 lakh animals were vaccinated and 14.91 lakh treated. The GOI scheme for assisting small and marginal farmers for fodder production was implemented through the District Rural Development Agencies (DRDAs), for which 1,07,250

Table 50 Cattle Feed and Fodder Prices in Gujarat, 1988.

S.No.	Fodder	Existing Price (March-April, 1988) (Rs. per quintal)	Per cent Variation from Price an Year Ago
1.	Dry Fodder	130	100
2.	Green Fodder	35-42	59-68
3.	Rice Bran	100-130	57-116
4.	Wheat Bran	178	11
5.	*Gowar*	1100	174

Note: Data are based on prices collected from Patan, Surat, Broach and Anand in Gujarat State.

minikits were distributed. Each minikit was expected to cover approximately an area of 0.5 hectare. In the forest area of the State, 128 hectare were covered under fodder cultivation and another 52 hectare treated with fodder augmentation measures. Although about one crore cattle were affected by drought the State's requirement covered supply mainly for fodder card holders and cattle camps. The number of such card holders was 6 lakh and cattle camps 1,899 with 12.86 lakh animals in them. A large number of animals migrated to Gir forest areas. The prices of feed and fodder obtained in March-April, 1988 in the State with per cent variation from earlier year are shown in Table 50.

5. In Madhya Pradesh, the fodder situation was not of great concern owing to rainfall during September-October, 1987. The State forest authorities cut 15,987 tonne of forest grass, of which 7,182 tonne was baled. From this quantity, 853 tonne was delivered, including 369 tonne lifted by Rajasthan, to whom an allotment of 5,000 tonne was made by Madhya Pradesh. Similar allotment made to Gujarat amounted to 2,000 tonne. Regarding the Central Government's contigency plan for fodder production in drought hit area, the State could utilise only Rs. 57.57 lakh out of the sanctioned amount of Rs. 87.5 lakh. This covered an area of 10,869 hectare, output being 45,685 tonne of green fodder.

6. In Uttar Pradesh 27,587 hectare was covered by fodder cultivation. The State sanctioned Rs. 30 lakh for purchase of fodder and Rs. 3.35 lakh for its transportation. 1,800 hectare was covered under the fodder augmentation programme in forests. 37,278 tonne of forest fodder was cut, baled and consumed within the State. Drinking water shortage for cattle was felt in the Bundelkhand region of the State during April-June, 1988.

7. In Haryana, no fodder shortage was anticipated. The State made plans to save as much wheat *bhusa* as possible at the time of future harvests by preferring to use human labour instead of machine labour for harvesting, and thus had expected to mop up additionally about 17,500 tonne of wheat *bhusa*. It was also proposed to collect one lakh tonne of gram *bhusa*. The State fully utilised the Central assistance of Rs. 87.5 lakh provided for fodder production under the contingency plan, and distributed 1,02,941 fodder minikits to an equal number of beneficiaries for cultivating 20,588 hectare. This provided 5.15 lakh tonne of green fodder.

8. In Punjab, no fodder shortage was anticipated. The State Forest Department cut and baled 900 tonne of fodder grass, which was made available for supply to outside area. The use of urea molasses bricks as also enriched fodder was being popularised in the State. Under the Central contingency plan, the State, like Haryana, utilised the entire amount of Rs. 87.5 lakh and 25,398 hectare had been thus cultivated additionally for fodder through 1,45,283 identified beneficiaries.

9. In Orissa, under the Central contingency plan for fodder production, an amount of Rs.19.5 lakh was released for raising fodder crops on 6,000 hectare.

10. In Maharashtra 61,400 tonne fodder was earmarked for drought-affected area and 2,500 fodder minikits were distributed. Farmers were advised to feed chaffed fodder to their cattle.

11. No fodder shortage was anticipated in the other drought affected States. In Andhra Pradesh, 4,500 tonne of baled forest fodder was kept at the disposal of State Animal Husbandry Department, and in Karnataka 10,000 tonne of forest fodder was kept ready for delivery.

12. The drought of 1987 affected vast area of the country. However, the severely affected States were Rajasthan and Gujarat which experienced drought during the preceding three years as well. Therefore, massive efforts were mounted in these two States to meet the drought situation, especially for tending to the livestock. The timely measures taken by the DAC and executed by the concerned States averted a catastrophe and helped in maintaining the health status and production potential of the livestock. The mortality was contained within normal limits. The drought was managed by Rajasthan and Gujarat mainly through organising cattle camps and fodder depots. The strategy for mopping in the two States differed. Whereas Gujarat mounted massive efforts for cultivation of fodder and harvesting the unripe sugarcane, Rajasthan laid stress on mobilisation of wheat *bhusa* and other fodder from neighbouring States. Caravans of trucks loaded with fodder were common sight in Rajasthan during the difficult period. The official effort alone would not have sufficed. The role played by voluntary agencies in arranging cattle camps and supplying fodder was laudable. The participation of these agencies, however, require streamlining by the official agencies by way of better monitoring of their activities and modalities for procuring and supplying fodder.

13 ENVIRONMENTAL CONSERVATION

The climate of the earth is determined by the rates at which land and ocean surfaces of the earth and its atmosphere absorb, re-distribute and dispose off solar radiation. Climatic changes are induced by a number of natural phenomena over which man has no control. However, man's intervention is beginning to play a significant role in inducing the climatic changes. According to one theory, an increase in land's reflectivity of solar radiation such as occurs when land is denuded of vegetation leads to a decrease in net incoming radiation and an increase in the radiative cooling of the air. The resultant suppression of the cumulus convection and the decrease in its associated rainfall further reduces plant cover, raises *albedo* and amplifies the effect. Verification of this effect is extremely difficult and so is the availability of irrefutable evidence for climatic changes on account of the 'green house effect'. However, the increasing carbon dioxide content and other gases produced by industry and deforestation are causing concern to a section of the scientific community, who foresee general warming up of the climate and increasing severity of future droughts on this account though societal and governmental action is still waiting for some more locations/specific and unimpeachable evidence of the global warming.

1.2 Any change in the rainfall or in the temperature caused by any factor has serious implications especially in the context of hydrological balance, leading to serious consequences like soil erosion, lowering of water table, resultant shortage of drinking water and food production, which are concomitants of any drought situation. Normally, nature governs its moisture content by the cover of soil and vegetation, which stores up ground water. This sponge effect is present in area covered with grass and is most prominent in dense forests with abundant ground vegetation such as tropical land forests. The self-propitiating interaction between vegetation, soil and water described as evapotranspiration, affects humidity, temperature and cloud formation in a region. The soil, water and vegetation have proved to be superior to any other method of preventing floods as well as droughts. The direct effect of soil erosion caused by deforestation is the inability of the land to retain ground water which accentuates the vulnerability of the region to drought. Indirect effect of soil erosion such as reduction in the crop output is also costly and extremely difficult to rectify. Besides reducing long term

Table 51: Water Requirement and Productivity of Irrigated Crops

S.No	Crop	Water (mm)	Productivity (kg/ha/mm)
1	Rice	• 950	1.72
2	Wheat	400	—
3	*Ragi*	250	4 65
4	*Jowar*	250	4 67
5	Maize	200	—
6	Sugarcane	1250	—

productivity, land erosion also leads to silting of reservoirs and increased turbidity and sediment deposition and pollution in down stream rivers. These can have detrimental effect on irrigation and electricity generation.

Soil Water Drought

2.1 Soil water drought is casued on account of undue interference in disturbing moisture conserving capacity of the soil. Soil can lose its effective moisture conserving capacity through a complex and diverse process and the consequent land aridisation can be described as soil water drought. Availability of water in the soil is essential pre-condition for plant growth. What could be a drought condition for paddy could as well be a condition for excess moisture for dry crops like *bajra* or *jowar*. Hence, the choice of crops in India had evolved according to the variation of climatological and soil conditions. Table 51 shows the water requirement of some common crops and their productivity with respect to water input. It is notewothy that when water use is to be optimised, the indigenous dry crops prove very high yielding. Under extreme conditions of soil water drought, however, no plant will be able to survive and the condition could be described as desertification.

2.2 All soils do not have the same resistance to drying and will have different needs for water inputs. Organic matter inputs increase the water holding capacity and hence soils rich in organic content do not dry up quickly. A 2 to 5 times increase in the water retention in the soil and a 15 to 20 per cent reduction in evaporation has been observed with the addition of manure and organic fertilizer. In India black soils occuring south of Vindhya mountains and the Malwa plateau and many areas of Maharashtra, Karnataka, etc. have highwater holding capacity and are resistant to drought. Cotton has been grown in these soils alongwith *jowar, bajra* and *wheat.*

2.3 The high moisture retention in the black soils allows cultivation of crops like chillies and onions without irrigation while they are normally irrigated in the lighter soils. In the heavier black soil, water depletion is extremely slow and drought occurs slowly and much later than in lighter soils. Thus, there is no clear cut meteorological description of crop failure from drought. It depends on the nature of soil, the nature of organic inputs as well as the nature of crops. As a response to this diverse requirements of soil-crop combination, land and water use has evolved indigenously in India. The decreased organic matter production destroys the only effective means of drought control and insurance in drought prone regions where organic matter addition to the soil is a significant measure for water conservation. Large doses of organic matter have traditionally been added to the soil in the Deccan which, increase retention of moisture and reduce run off. The success of sustainable agriculture depends on the management of the soil moisture reservoir for optimising crop production.

Ground Water Drought

3.1 Owing to the peculiar temporal distribution of rainfall, coupled with depletion of forest cover, the run off of water is very high, and ground water recharge is limited. With the introduction of new technology, private exploitation of ground water has increased. There are also powerful adverse external effects, especially when over-exploitation by farmers who can afford modern water extraction equipments leads to unequal sharing of a scarce resource among potential users. Since ground water satisfies a variety of needs apart from crop production, the cost of a decline in water table to the society may include the increased time and expense of finding water for drinking, washing, etc. Sustained withdrawal of groundwater at a rate substantially greater than the natural recharge rate can produce a number of undesirable side effects on environment such as drying up of neighbouring lakes

Table 52: Land Use Pattern in India.

S No.	Land Use	Area (million hectare)	Percentage of Total Area
1	Agriculture (Cultivable land)	154 70	47 0
2	Forests	75 18	22 8
3	Permanent Pastures and other Grazing Lands	12 15	3.7
4	Land under Cultivable Tree Crops and Groves	3 91	1.3
5	Cultivable Wasteland	16 64	5 1
6.	Land under other Non-Agricultural Uses	17.53	5 3
7.	Barren and Wasteland	24 60	7 5
8.	Area for which no returns exist	24 09	7 3
	Total	328 80	100 0

and ponds, underground streams, etc. Since underground water is a common property resource, its unrestricted exploitation is likely to result in inefficient use and inequitable distribution.

Land Use Pattern

4.1 Land, comprising soil, water and associated plants and animals involving total ecosystem, is the most important resource available in the country. Figures worked out by the Forest Survey of India reveal the land-use pattern as shown in Table 52. The forests of the country are rich in variety with 16 major forest types comprising 221 minor types. The vegetation varies from tropical rain forests in Andaman and Nicobar Islands in the south to dry alpine forests high up in the Himalayas in the north. Between these two extremes lie the forest types like semi-evergreens, the deciduous forests, littoral and swamp forests, subtropical pine forests and montane temperate forests. Over 45,000 species of plants occur in the country. The vascular flora, which forms the conspicuous vegetal cover, itself comprises about 15,000 species.

4.2 In 1986-87 the officially recorded forest area in the country was 75.18 million hectare which works out to 22.8 per cent of the total geographical area of the country. The Forest Survey of India estimates forest cover over 62.4 million hectare area, which works out to 19.7 per cent of the total geographical area of the country. This estimation is based on visual interpretation of *Landsat* (land satelittle) imageries for the period 1981-83. Of the actual forest cover only 35.77 million hectare area has more than 40 per cent crown density which implies that only 10.88 per cent of the country's total geographical area has adequate forest cover.

National Forest Policy

5.1 Impact of forests on climate and site conditions has been much debated without arriving at consensus. There are different theories/models which try to explain the role played by forest canopy in interception of precipitation and subsequent losses through evaporation and transpiration. These models also tend to infer that forest canopy helps in reducing the runoff and recharging the atmospheric moisture. On the other hand there are other micro-level studies which indicate definite positive effect, some of which can be summarised as follows: (1) infiltration of water into the soil is increased; (2) runoff is reduced as well as regulated; (3) soil-moisture is conserved by vegetation and litter; (4) percolation of water through soil in 'open' is rapid without being used while under plantation this rate of percolation is very much checked by interception of forest canopy and absorption of water by roots, etc.; (5) air and soil temperature are moderated by raising the morning temperatures and lowering up the afternoon temperatures; and (6) bare ground is heated more rapidly than the ground under forest cover.

5.2 Presence of humus, leaf litter and roots in forest floor improves soil-sturcture making it more conducive to infiltration. According to one calculation, the soils of India's forest area—if they had good forest on them—have the capacity to store more than all the rainwater that falls in an average year on a temporary basis and more than half of it on a prolonged basis. Clear cutting a forest can increase peak run off from higher intensity storms by 10 to 20 per cent by reducing interception and soil moisture storage. Investigation carried out in India and elsewhere indicates that deforestation of catchments could lead to floods.

5.3 Apart from moisture conservation, forests help in controlling soil erosion. Trees work as wind brakes and reduce shifting of sand and dust. Transportation of silt and other fine soil-particles poses

problems by way of silting of water—bodies, reservoirs, etc. It is estimated that of the total soil eroded every year about 29 per cent goes to the seas, 10 per cent gets deposited in dams reducing their storage capacity by 1 to 2 per cent every year and about 61 per cent gets transported from one place to another resulting in silting of river beds.

5.4 Importance of forests for sustenance of various life-support systems, for example, the perennial river systems and productive agricultural lands, was recognised in the National Forest Policy of 1952. It considered the following as paramount needs of the country: (i) checking the denudation in mountainous regions, on which depends the perennial water supply of river system whose basis constitute the fertile core of the country; (ii) checking the erosion progressing space along the treeless banks of the great rivers leading to ravine formations and on vast stretches of undulating waste-lands depriving the adjoining fields of their fertility; (iii) checking the invasion of sea-sands on coastal tracts, and the shifting of sand dunes, more particularly in the Rajputana desert; and (iv) establishment of tree-lands, wherever possible for the amelioration of physical and climatic conditions promoting the general well-being of the people.

5.5 Keeping the above aspects in view, the Forest Policy of 1952 suggested following measures:

1. *Protection forests.*—'Protection forests' denote forests found, or required, on hill slopes, river banks, sea-shores, or other erodable localities. In such sites the need for forest cover is dictated by purely protective physical considerations, such as prevention of erosion, conservation of moisture, and control of rushing torrents and floods. The role of such forests in saving the soil from being washed away, and when maintained in catchment area, in the prevention of floods and maintenance of stream-flow, cannot be over-emphasised. On flat country with loose sandy soil, especially under dry conditions, forests, whether natural or artificial, perform an essential function in minimising wind erosion, fixing the soil and preventing the formation of sand-dunes, and mitigating the dessication of agricultural crops leeward of the tree cover. The National Forest Policy requires, therefore, an immediate and speedy programme for the reconditioning of mountainous regions, river valleys, and coastal lands by establishing protective forest over larger area, and preserving the existing ones. The primary object of management of such forests should be to utilise in full their protective influence on the soil the water regime, and the physical and climatic factors of the locality; and the interest to be thus protected should far outweigh those which it may be necessary to restrict. The scientific management of such protection forests, wherever possible should include the production of exploitation of timber within the limits of safety.
2. *Reconditioning of hills and dales.*—The denudation of hill sides with serious repercussions on the fertility of the land, and the growing erosion along the banks of rivers of which the Yamuna, the Chambal, the Mahi, the Narmada, the Kosi, and the Damodar are examples, constitute the major considerations demanding immediate attention.

3 The immobilization of the desert of Rajputana.—Attention also needs to be drawn here to the Rajputana desert more particularly to the fixation of the shifting sand dunes. Strong winds that develop in this region during the summer, transport vast quantities of sand and salt from the sea and Rann of Kutch, whipping the desert into terrific dust-storms, the fury of which is felt throughout the north-western India. The desert has spread through the ages causing the 'westering' of the Indus and the 'northering' of the Sutlej, meeting an obstruction of sort only along its eastern confines in the Aravallies. The immobilization of the desert and protection of the remaining fertile belts inside it constitutes one of the planks of the National Forest Policy.

5.6 The National Forest Policy 1988 considers environmental stability and maintenance of ecological balance as the principal aim of forest policy. The following have been defined as the four most important objectives:—

1. Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country;

Table 53 : Planwise Details of Afforestation

S.No.	Five-Year Plan Period	Physical		Financial	
		Area Afforested (lakh hectare)	Cumulative Afforestation (lakh hectare)	Expenditure on Afforestation (Rs. in crore)	Cumulative Expenditure on Afforestation (Rs. in crore)
1.	First (1951-56)	0.52	0.52	1.28	1 28
2.	Second (1956-61)	3.11	3.63	6.86	8 14
3.	Third (1961-66)	5.83	9.46	21 13	29.27
4.	Annual Plans (1966-69)	4.53	13.99	23.02	52.29
5.	Fourth (1969-74)	7.14	21.13	44.34	96.63
6.	Fifth (1974-79)	12.21	33.34	107.28	203.91
7.	Annual Plan (1979-80)	2.22	35.56	37.10	241.01
8.	Sixth (1980-85)	46.50	82.06	926.01	1167.02
9.	Seventh (1985-90) (upto 1987-88)	50.40	132.46	1319.65	2486.67

2. Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country;
3. Checking soil erosion and denudation in the catchment area of rivers, lakes, reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for the retardation of siltation of reservoirs; and
4. Checking the extension of sand dunes in the desert areas of Rajasthan and along the coastal tract.

5.7 A minimum of one-third of the total land area of the country under forest or tree-cover has been set as the national goal. In the hills and in mountainous regions, such cover is expected to be two-third of the area for preventing erosion, land-degradation and ensuring the stability of the fragile eco-systems. Functionally, 10 million hectare of forest cover are managed as "protection forest" for ecological stability, 16 million hectare for production of timber for industries, commerce, defence and railways; 25 million hectare as social forests to meet the demand of firewood and fodder and 13 million hectare of the forest cover for national parks and wildlife sanctuaries.

5.8 Most of the forest areas are worked according to an approved working plan, which is a written document containing set of detailed prescriptions for every unit of land, called compartment. Such plans are drawn after detailed inventory of the growing stock and regeneration and keeping in view the site conditions. Working plans are revised after 10 to 15 years based on review of past practices. The working plan aim at ensuring continuity in forestry practices, limiting annual harvest to the accruing increment and securing adequate natural regeneration. About 78 per cent of the officially recorded forest area in the country is covered by working plans. Conservation of biological diversity and protective roles of forests are considered of paramount importance while prescribing treatments in the working plans. Often forestry practices are rather extensive and silvicultural prescriptions are based on single stem systems.

Afforestation and Forest Development

6.1 Plantation forestry was introduced in India in 1842 when teak plantations were raised in Malabar. However, these continued to be taken up in isolated pockets and at a modest scale. Even under the Five Year Plans rate of afforestation was not very significant till 1980 though every successive Plan saw steadily improved targets and achievements. The total area afforested from 1950 to 1980 was 3.5 million hectare giving an average of 0.11 million hectare per year. Planwise details are shown in Table 53.

6.2 In 1980 the GOI incorporated 'afforestation-tree planting' as one of the items of the revised 20-Point Programme. Outlay in forestry sector was increased during the Sixth Five Year Plan with

finances of forest department being supplemented by agriculture department, rural development department, and externally aided social forestry projects in 15 states. This helped in increasing the rate of afforestation. There was substantial improvement in achievement during Sixth Plan with afforestation over 4.65 million hectare. During this period an average of 0.93 million hectare per year of afforestation as compared to 0.11 million hectare per year during 1951-1980 was achieved.

6.3 Tree-planting and afforestation efforts were further intensified during the Seventh Five Year Plan with the setting up of the National Wastelands Development Board (NWDB) in 1985. The details of afforestation and tree plantation undertaken during the Seventh Five Year Plan (1985-90) so far may be seen in· Annexure-XXIX. . The principal aim of NWDB is to reclaim wastelands in the country through a massive programme of afforestation and tree-planting. The resolve has been further strengthened by the new forestry policy which stipulates a massive needbased and time-bound programme of afforestation and tree-planting, with particular emphasis on fuelwood and fodder development, on all degraded and denuded lands in the country, whether it is forest or non-forest land.

Ecology and Droughts

7.1 Naturally evolving vegetation, intensively adopted cropping practices and water management techniques have all evolved over the centuries to cope with the rainfall variations and maximise conservation of water so that adequate water is available on the surface, in the sub-soil and as ground water, to maintain plant, animal and human life on a sustainable basis in drought prone area. If adequate steps are not taken to maintain this delicate balance, the temporary phenomenon of meteorological drought may turn into the permanent phenomenon of desertification undermining the biological productivity of soil.

7.2 The overall development of the country over the years has contributed to reducing the vulnerability of the population to droughts. However, development inconsistent with sound ecological principles may increase the vulnerability. Regulated development based on sound ecological principles would immensely help in reducing the vulnerability of the people on a sustainable basis.

8. The successive recent droughts in the country have increased the awareness of people towards role of ecology in general and forestry in particular, in environmental conservation. The drought of 1987 brought home the fact that environmental degradation aggravated by successive droughts may lead to irreversible process of desertification. The efforts towards progressive drought proofing and support to ecology made during the drought of 1987 were harbinger of societal awareness in this direction.

One notable feature of Indian agriculture has been the advances made in the last few decades through sustained research. These efforts provided a spectrum of technological options which facilitated a set of policy initiatives to combat the severe drought of 1987. Keeping in view the inherent potential of growing technology, foodgrain production targets were worked out for *kharif* and *rabi* of 1987-88. The intrinsic capacity of technology rendered it feasible to minimise the fall in the production during *kharif* 1987 and achieve a higher *rabi* production even in the face of the drought. The Indian Council of Agricultural Research (ICAR) through its All India Coordinated Research Projects and Institutes and through the cooperation of State Agricultural Universities developed several valuable technological options responsive to varied cropping situations and production systems to put the required dynamics into production strategies and thus enable the country to tide over the difficult situation.

1.2 Besides foodgrains, cereals, pulses, oilseeds and horticultural crops, technological packages had also been evolved for development of forage resources during the drought of 1987. This drought caused considerable problems in raising fodder crops successfully due to late onset of monsoon. Contingency fodder production projects during the *rabi* season were recommended envisaging early planting of fodder crops and fodder production in non-conventional area. Packages were also evolved for fodder production in the temperate and tropical grass lands/forests and new projects were suggested for efficient utilisation of crops residues. Herbage based rations with essential nutrient ingredients were recommended for livestock in the fodder scarcity areas.

1.3 Besides the development of technologies for higher agricultural and fodder production, science and technology helped in combating the drought of 1987 and for evolving more effective stategies for the future. The programmes and projects undertaken during the drought of 1987 are described below.

2. *Cloud Seeding Programme:* Warm cloud modification experiments were carried out by Indian Institute of Tropical Meteorology (IITM), Pune in Maharshtra during the past 11 years (1973, 1974, 1976, 1979-86). Formulation of cloud seeding programme envisaged undertaking cloud seeding

operations in 2 to 3 states initially. The Institute's allocations for the Seventh Five Year Plan for weather modification work was also to be used for the programme.

3.1 *All-India Coordinated Project on Water Management, Health and Sanitation:* The Department of Science and Technology is implementing a scheme entitled "Science and Technology for Women" which is aimed at improving the life of women through the application of science and technology. In view of the fact that the country was facing drought conditions and recognising that water and sanitation were major problems faced by women, an All India Coordinated Project was initiated on water management, health and sanitation which looked into the crucial problem of water, its conservation, purification, storage and other related aspects of hygiene and sanitation.

3.2 Four regional coordinators were indentified who held meetings with voluntary organisations with a view to formulating projects for their respective regions. An advisory body rendered advice regarding the overall coordination and evaluation of the programmes and for evolving an strategy for the management of water resources for domestic purpose and for issues relating to health and sanitation as also for identifying the science and technology efforts necessary for putting them into action. The advisory body met and recommended that a software package for conducting training programmes relating to water management, health and sanitation practices should be prepared and its cost worked out so that training programmes can be initiated by different voluntary organisations. Besides this, projects were also funded to develop and standardise the techniques for harvesting rain water, for re-cycling waste water and for purifying and storing water for drinking purpose in rural area.

4.1 *Identification of Hydrogeology as a Thrust Area:* The Department of Science and Technology (DST) identified several thrust area through a series of seminars about eight years ago for intensive support of research and design (R & D) through the Science and Engineering Research Council (SERC). Hydrogeology was identified at that time as a thrust area of research.

4.2 During the last decade and half, the concepts and understanding of hydrogeology have under gone change. Hydrogeology is not considered any more as a resource science. It has been redefined as a "process science." Instead of considering the available ground water as a resource, most of the studies are now being done based on the concept of the total underground "reservoir space" as the resource. This concept is very relevant and important to a country like ours where the rainfall occurs in a peaked monsoon precipitation. In order to invite specific research proposals in this important area, the DST identified hydrogeology as a thrust area of research under the SERC.

5 *Automation of Weather Data Collection:* Conceding the need for providing automation in the existing data collection system of rain gauges, snow gauges, etc., it was felt necessary to prepare a feasibility report on this aspect. Therefore, the DST approved a programme for establishing mini-weather stations, including automation of rain and snow gauges. Under this programme, it is contemplated to have telemetered network of mini-weather stations collecting on-line data from different regions of the country in consultation with the India Metereology Department (IMD).

6.1 *Ground Water Exploration using NME based Hydroscope:* Water prospecting was one of the major area identified for collaboration in the Indo-USSR science and technology cooperation agreement. In pursuance of this, the DST signed an *aide memoire* on 23rd June, 1987 with the Institute of Chemical Kinetics and Combustion, Novosibirek. The *aide memoire* envisaged demonstration in India of the NME based Hydroscope developed in the Soviet Union and joint venture in producing this equipment. The hydroscope is an instrument which is claimed to have good success in detecting ground water to a depth of about 50 to 100 metre without having to drill bare holes. The computer software developed by the Soviet scientists is capable of projecting the depth of water bearing zones and their effective porosity.

6.2 An Indian team comprising the Mission Director and representatives of CGWB, National Geophysical Research Institute and DST visited Novosibirek in September, 1987. Following their discussions, a Soviet team visited India during December, 1987 to January, 1988. The hydroscope was field-tested in different geological conditions. About three cities per day were covered for water prospecting using this equipment. From the experience gained during this demonstration programme, it was observed that the instrument is highly sensitive to EM disturbances. It was also not able to locate water available in solution channels in limestone aquifers. Its value is also limited in Deccan trap areas. The ambient temperature for operation should be ideally less than 30° celsius.

6.3 At many of these sites where the instrument was tested, the recorded water bearing capacity of the formations has been too low. Ramanathapuram in Tamil Nadu recorded a zone at 45 metre with an effective porosity of 25 per cent. From the preliminary results obtained so far, it can be surmised that the instrument is still in a developmental stage and there is good scope for R & D work between some of the Indian Institutes and the USSR.

7.1 *Setting up of National Agricultural Drought Assessment and Monitoring System* (NADAMS): The National Remote Sensing Agency (NRSA), Department of space, Hyderabad, has established a districtwise drought assessment and monitoring system for providing an early warning of an emerging drought situation. The NADAMS is based on an analysis of both vegetation index map and greenness map as well as vegetable index statistics produced under the Remote Sensing Application Mission on Drought sponsored by the DAC.

7.2 *Utilisation of National Remote Sensing Drought Management System (NRDMS) for Mitigation*: For systematic and scientific management of drought it is essential that the phenomenon of drought is viewed in a systems context wherein the close inter-play of physical events and social responses can be studied. It is, therefore, intended that a drought assessment and response system (DARS) should be developed which will be operational even during the normal times and act as an early warning/triggering mechanism for drought mitigation. The principal objectives of NRDMS would be:

(a) to provide timely and systematic data on drought related parameters;

(b) to establish criteria for start up and shut down of various assessment and response activities by official agencies;

(c) to outline a system that ensures information flow and defines duties and responsibilities of various agencies; and

(d) to continuously upgrade the methods of assessing impact of drought and response system.

7.3 The proposed system will include data on physical environment and socio-economic parameters and data on geo-coordinates. The data on physical environment will encompass soil characteristics, cropping pattern, land holdings, area cultivated, fodder resources, ground water acquifers, surface water resources, meteorological data, etc. The socio-economic data will include demographic information, health, nutritional status, prices, foodgrains, seed availabity, infrastructure, migration etc. A small group has been formed for working.out the modalities for utilising NRDMS for drought mitigation.

8 *Improved Technique of Medium Range Weather Foreacasting:* The GOI approved the project for the establishment of a National Centre for Medium Weather Forecasting and Development of agrometeorological Services. The supercomputer has been procured and installed. It is expected that this system will be operationalised soon and a nucleus of scientists positioned to develop the medium range weather forecasting system. It would take about 3 to 5 years after the installation of supercomputer and the numerical weather prediction model to issue medium range weather forcasts on operational basis for a period of validity of more than 3 days.

9.1 *All India Integrated Project on Arid Zone Research:* The project is an inter-institutional collaborative programme adopting multidisciplinary approaches to enhance the productivity of land, man and animal in the arid regions. The Project Advisory and Monitoring Committee approved nine projects under the programme from various R & D institutions which are as follows: (1) Monitoring desertification and establishment on natural resources data base for selected northern districts; (2) Natural resources data management system in arid lands of southern India; (3) Studies on dune topography and dynamics of dune vegetation in Indian deserts; (4) A study of consumer system and exploitation of vegetation by man in some districts of Rajasthan; (5) Microclimate modification studies in arid zone of Punjab; (6) A study of growth and water use simulation submodels in pearl millet; (7) Restoration of Aravalli range of mountains in the arid zone of Rajasthan; (8) Quaternary geology, geomorphology and environment dynamics of the arid frontier in Rajasthan, and (9) Assessment of spread of sandy desert through Aravalli gap.

9.2 A programme on the studies on the environmental impact of Indira Gandhi Canal Project and greening of Aravallis is being evolved. A programme on cold arid zone is under consideration in consultation with concerned Ministries, State Governments and other R & D institutions.

10 *Integrated Weather Service for Agricultural Operation and Planning:* IMD is issuing forecast for the agriculturists from 9 advisory centres. With the establishment of additional agrometeorological field units (AMFUs) in a phased manner the service will be available from 127 centres. Each AMFU will cover 3 to 4 districts corresponding approximately to a homogenous climatic zone. It is expected that the implementation of this project will help in improving agricultural production through use of weather based agricultural practices.

11 *Crop Weather Relationship:* Three Evapotranspiration stations at Hebbal, Anand and Rahuri have been upgraded for crop weather relationship studies. Two more evapotranspiration stations are proposed to be upgraded during 1988-89.

12 *Evapotranspiration Observatories:* Four evapotranspiration stations at Tirupathi, Dantiwada, Durgapur and Bhopal have been established during 1987-88. These stations will be commissioned during the year 1988-89.

13 *Soil Moisture Observations:* Four soil moisture stations are already in operation. Eleven more soil moisture stations were to be established during 1987-88.

14 *Monsoon Activity Centre:* A nucleus has been set up at the IMD headquarters in New Delhi.

15 Besides, programmes/projects on long range dynamic forecasting, districtwise rainfall summary, world climate programme and limited area modelling programmes have been evolved by the IMD and are under various stages of approval/implementation.

15 ROLE OF VOLUNTARY ORGANISATIONS

The role of voluntary organisations in drought is to help people to overcome the difficulties posed by drought by providing welfare and relief services according to the specific needs of the people, to work as ears and eyes of the people and also act as an intermediary between the people and the Government to aviod duplication, to improve proper distribution of scarce resources and to organise vigilance groups for prevention of misuse of resources. Voluntary organisations can also initiate innovative measures and take action against drought which can help in its mitigation through creation of awareness and preparedness amongst the people, propagation of water harvesting techniques and maitnenance of assets and promotion of spirit of self-confidence to deal effectively with the situation.

1.2 Action programmes to be taken up by the voluntary organisations should be based on understanding of the causes and overall destructive effect of drought on the people and the area and the existing governmental programmes. Organisational capabilities and availability of resouces should also be taken into consideration while planning and initiating the programmes. Involvement of local people and their organisations should form the key to the approach. The programme can be broadly divided into two categories, namely, relief and developmental, which could be individually or simultaneously undertaken to reduce the impact of drought.

1.3 The relief programmes undertaken by voluntary agencies are basically designed to sustain life and reduce the sufferings of the people. A list of some of the activities which are undertaken under drought relief programmes are: (i) making people aware of different relief activities initiated both by government and non-government agencies and help them avail of these facilities; (ii) supply of drinking water for human beings and animals; (iii) generation of employment opportunities in the drought affected villages; (iv) opening and running of fair price shops; (v) opening of free feeding centres and distribution of nutritional foods and vitamins to prevent malnutrition; (vi) adoption of families of drought affected areas; (vii) organisation and running of first aid centres, health camps and immunisation camps; (viii) Opening of cattle camps; and (ix) Organising supply of fodder free or on subsidized rates.

1.4 The development programmes are aimed at creating durable assets which would help in facing calamities like drought in the long run. These programmes are beneficial to the weaker sections of society. These programmes are labour intensive and provide opportunities of new employment. The programmes would result in creation of community assets which offer timely help in facing drought. The development work should also include following:

(i) Increasing awareness of the people with regard to afforestation and plantation of trees, proper and scientific use of water and other sources of energy and building awareness against indiscriminate felling of trees. The voluntary organisations should cultivate an understanding amongst the people that the drought may be a recurring phenomenon and they should prepare themselves to minimise its impact. This may include cultivation of drought- resistant and durable varieties of crops and maintenance of traditional methods of irrigation;

(ii) Voluntary organisations working in area not affected by drought may produce fodder and supply to drought affected area to save cattle and other livestock; and

(iii) Community assets should be created during the drought period which may include, (a) afforestation, social forestry and land reclamation and levelling, (b) construction and repair of wells, tanks, reservoirs and ponds, (c) deepening of existing wells, water tanks to increase water reservoir capacity, (d) creation of minor irrigation facilities, small earthen dams for soil conservation (e) conducting soil surveys for land shaping and soil conservation projects (f) building, and (g) repair of roads.

Voluntary Action

2.1 The efforts of voluntary organisations in drought affected States of Rajasthan, Gujarat, Andhra Pradesh, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and Kerala were mobilised in a significant manner to combat drought situation. The yeoman's service rendered by voluntary agencies in the States of Gujarat and Rajasthan deserves particular mention.

2.2 Gujarat has a rich tradition of voluntary action for providing relief in times of natural calamities. The voluntary agencies work shoulder to shoulder with the State Government to mitigate the distress amongst the affected population. The State Government also extended several facilities to the voluntary agencies to enable them to carry out relief activities smoothly and speedily. Some of these facilities are detailed below:

(1) The State Level Relief Committee was formed under the chairmanship of Chief Minister for securing and coordinating voluntary efforts for relief. This Committee included representatives of leading voluntary agencies to advise on relief operations.

(2) The State Government set up a coordination committee of voluntary agencies headed by the Revenue Minister to specifically coordinate various relief activities of voluntary agencies to combat drought. A non-official of high standing was appointed as the executive chairman of this committee.

(3) A separate post of Director, Voluntary Agencies, was created exclusively to ensure that the efforts of the voluntary agencies were focussed on areas where they were needed most.

(4) Maintenance subsidy was being paid at the rate of Rs. 3.50 per cattle per day to the voluntary agencies running cattle camps.

(5) Subsidy was being paid to the *pinjrapoles* and *gaushalas* at the rate of Rs. 2.25 per cattle per day. This rate was increased to Rs. 3 per cattle per day from 1st January, 1988.

(6) Free veterinary services were provided to the cattle maintained in the cattle camps, *pinjrapoles* and *gaushalas*.

(7) Subsidy equivalent to the concessional railway freight was paid to voluntary agencies bringing grass by railway from outside the State for distribution in the affected area.

(8) Subsidy at the rate of Rs. 1.93 per kilometre or at the rate of Rs. 2.13 per kilometre depending upon the carrying capacity of the trucks, was paid to the voluntary agencies for transportation of fodder by road by the voluntary agencies for distribution in the affected area.

(9) Subsidy at the rate of 50 per cent of the cost of skimmed milk powder subject to a maximum

of Rs. 20 per kg. of skimmed milk powder was paid to the voluntary agencies distributing butter milk to the labourers and others in the area.

(10) Subsidy at the rate of 33-1/3 per cent of the cost of sugarcane was paid to the voluntary agencies in respect of distribution of sugarcane for the cattle of the affected area.

(11) Subsidy at the rate of 32 paise per tonne per kilometre was paid in respect of transporation of sugarcane for distribution of sugarcane in the affected area.

(12) Interest-free loans were provided to the voluntary agencies from the Chief Minister's Relief Fund. In 1987-88 interest-free loans amounting to Rs. 3.60 crore were granted to 30 voluntary agencies.

(13) The maximum limit of admitting only 3 cattle per agriculturist family in the cattle camps was removed. As a result any number of cattle belonging to agriculturists of the affected area were entitled to be admitted into the cattle camps. Similarly, the maximum limit of admitting upto 10 cattle per *maldhari* was also removed.

(14) It was decided to give maintenance subsidy for cattle which were abandoned by their owners and which were then being maintained in the cattle camps.

(15) Arrangements were made to provide molasses to the voluntary agencies manufacturing cattle feed for the cattle in their camp.

(16) Arrangements were made to supply damaged wheat at subsidised rates from FCI godowns to the voluntary agencies running cattle camps through subsidy at the rate of 40 paise per kg.

(17) CAPART gave interest-free loans for sinking of tubewells for irrigation purpose to the *gaushalas* and *pinjrapoles* of the affected areas.

(18) With a view to enable the voluntary agencies running cattle camps in more than 2 districts to get maintenance subsidy promptly, arrangements were made to make payment to them directly from the office of the Director of Voluntary Agencies, Ahmedabad.

2.3 The main problem in 1987-88 was that of saving the cattle from starvation. The voluntary agencies therefore set up cattle camps on a very large scale. Most of the cattle camps which were started by the voluntary agencies in 1986-87 were continued by them in 1987-88. Many more cattle camps were also started by several voluntary agencies for the cattle of Kutch, Rajkot, Junagadh, Surendranagar, Bhavnagar, Ahmedabad and Jamnagar and other affected area. 1655 cattle camps were in existence at the end of May 1988 and 12.55 lakh cattle were being maintained there.

2.4 In the past cattle camps were being run by the voluntary agencies for about 4 to 6 months. But in 1987-88, these cattle camps were run for about 10 months i.e. till the end of July 1988. The details of cattle camps set up by the voluntary agencies may be seen in Table 54.

2.5 Moreover about 1.60 lakh cattle were maintained by 343 *gaushalas* and *pinjrapoles* in the affected area. Approximately 30 lakh tonne of dry and green fodder was utilised by the voluntary agencies on these cattle camps. Total expenditure incurred by the voluntary agencies for maintenance of these cattle is estimated at Rs. 195 crore out of which Government subsidy (including transport subsidy) is estimated at Rs. 155 crore and expenditure incurred by voluntary agencies from their funds is estimated at Rs. 40 crore.

2.6 Apart from running cattle camps voluntary agencies carried out other relief activities like: (1) running of free feeding centre, distribution of fodder, cattle feed, etc., (2) distribution of foodgrains; (3) running of free/subsidised kitchens; (4) distribution of buttermilk; (5) deepening the wells of farmers for agricultural purpose; (6) sinking of tubewells for drinking water purpose; (7) growing of green foodder/encouraging farmers to do so by providing them seeds, fertilisers,. etc.; (8) distribution of drinking water by tankers; (9) construction of water troughs; and (10) distrubition of medicines, vitamin tablets, clothes, etc.

3.1 In Rajasthan voluntary agencies were involved in a big way to procure fodder from neighbouring States and distribute it in the scarcity districts of Rajasthan on a no-profit no-loss basis. The District Collectors were directed to motivate the voluntary organisations to play a leading role in this measure. As many as 3,536 fodder depots were opened by these voluntary agencies in Rajasthan

Table 54: Cattle Camps set up by Voluntary Agencies in Gujarat, 1987-88

S.No.	Voluntary Agency	Number of Cattle Camps	Cattle Population	Districts Covered
1.	Bhansali Trust, Radhanpur	213	1,67,000	Banaskantha, Sabarkantha, Mehsana, Bharuch Panchmahal, Bhavnagar, Surendranagar, Kutch and Ahmedabad.
2.	Gujarat Rahat Samiti, Ahmedabad.	128	1,30,000	Kheda, Rajkot, Banaskantha, Jamnagar, Mehsana, Bhavnagar and Kutch.
3.	Sankat Nivaran Society, Ahmedabad.	143	94,000	Ahmedabad, Mehsana, Sabarkantha, Banaskantha, Bhavnagar and Surendranagar.
4.	Gujarat Mahajan Pinjrapole Federation, Surendranagar	71	70,000	Ahmedabad, Rajkot, Amreli, Surendranagar, Junagadh and Kutch.
5.	Rajkot Jilla Dushkal Rahat Trust, Rajkot.	4	45,000	Rajkot.
6.	Madan Mohanji Haveli Trust, Junagadh.	128	35,000	Junagadh and Rajkot.
7.	Jilla Sankat Nivaran Samiti, Surendranagar	29	34,000	Surendranagar and Surat.
8.	Jilla Rahat Samiti, Surendranagar	30	32,000	Surendranagar
9.	Sarva Jiva Sangh, Kutch	42	30,000	Kutch and Bulsar.
10.	District Cooperative Milk Producers' Union, Surendranagar.	44	30,000	Surendranagar.
11.	Jambusar Taluka Cooperative Purchase and Sales Union, Jambusar.	28	30,000	Bharuch.
12.	Vardhman Seva Kendra Bombay, and Akhil Bhartiya Hinsa Nivaran Sangh, Ahmedabad.	NA	19,000	Ahmedabad.
13.	Sorath Seva Samiti, Kutch, and Junagadh.	17	17,000	Junagadh.
14.	Sardar Vallabhabhai Patel Kelvani Mandal Trust, Dhasa Junction, District Bhavnagar.	NA	12,000	Bhavnagar.
15.	Ajmela Trust, Gondal	1	12,000	Rajkot.
16.	Jetpur Rahat Jetpur.	3	11,000	Rajkot.
17.	Sitaram Seva Trust, Ahmedabad.	2	10,400	Ahmedabad.
18.	Sapakda Mahajan, Sapakda, Surendranagar	18	10,000	Surendranagar.

Note: NA = Not Available.

and 1.87 lakh quintal of fodder was distributed by these agencies after procuring it from Punjab. The working capital for these operations was made available to these agencies in the form of interest-free loans by the State Government. Rs. 7.70 crore was sanctioned and advanced to these voluntary

agencies by the Collectors. Besides, the Collectors also advanced money through District Rural Development Agencies of their districts to the voluntary agencies.

3.2 These volunatary agencies were allowed to charge administrative charge at the rate of Rs. 5 per quintal for the fodder transported. This amount of administrative charge was included in the sale price of the fodder. The total amount of transport subsidy paid to these agencies during the drought of 1987 was Rs. 92 crore. As many as 639 cattle camps were opened by the voluntary agencies benefiting more than 5.10 lakh abandoned and handicapped cattle. Subsidy was paid at the rate of Rs. 4 per cattle per day.

Support by CAPART

4.1 CAPART was actively involved in mobilising and supporting voluntary agencies for participation in programme for drinking water, fodder cultivation, transportation and cattle camps in order to provide immediate relief as well as to formulate and take up long term projects for better water managtement, afforestation and water conservation for dought proofing. 59 projects for creating drinking water facilities in drought affected area at a cost of Rs. 1.93 crore was provided. CAPART also provided limited assistance for creating infrastructural facilities like cattle sheds and augmentation of water supply for cattle to the *pinjrapoles* and *gaushalas* of Gujarat and Rajasthan.

4.2 To provide support to drought affected cattle the GOI decided that FCI would reserve all the degraded wheat fit for utilisation as cattle feed and make it available to voluntary organisations engaged in catle camps. The degraded wheat was made available at a reduced price of Rs. 65 per quintal. FCI allocated about 7,000 tonne of wheat to voluntary organisations. Similarly, organisations engaged in manufacture of cattle feed were allocated molasses. At the instance of CAPART a number of voluntary organisations in Maharashtra produced fodder for supply to voluntary organsisations for cattle camps in Gujarat and Rajasthan. About 37,000 tonne of *jowar* fodder was supplied by the voluntary organisations to Gujarat and Rajasthan. CAPART assisted the efforts of the voluntary sector by providing interest-free loans.

Lessons Learnt

5.1 The voluntary action can povide important support to government programmes to face drought if properly coordinated and managed. On the basis of experience of the voluntary organisations in drought management following lessons can be learnt.

5.2 Drought relief and management should be a joint effort mainly of small groups/organisations working in the drought affected States. State level committees were set up in most of the States to coordinate the work of the voluntary agencies. Gujarat Government set up a coordination committee of voluntary agencies headed by Revenue Minister to specifically coordinate the various relief activities of voluntary agencies to combat drought. A non-official of high standing was appointed as the Chairman of the Committee. A separate post of Director, Voluntary Agencies was created exclusively to ensure that the efforts of the voluntary agencies were coordinated and made use of in area where drought relief was needed most. It was observed that the presence of Director as a coordinating officer was very useful in management of voluntary efforts in Gujarat.

5.3 Long term development efforts should be of such nature that these build the capacity to successfully cope with drought. The development programmes should be organised on area or water shed basis. Proper planning should be done based on socio-economic and technical survey of the area. Training of the voluntary workers should be an integral part of the implemantation of the action programme. All efforts should be made to organise the beneficiaries into groups to monitor implementation of the programmes. There should be no duplication of efforts between the government and the voluntary agencies The efforts should be coordinated and based on the understanding and the appreciation of each other's roles.

5.4 The benefit of the programmes (relief as well as development work) should reach the poor. Efforts should be made to ensure that the creation of assets should, as far as possible, help the most vulnerable sections of the society. There should be a close monitoring, evaluation and follow-up of the programmes. Committees with representatives of drought affected people should be set up wherever programmes are initiated and the responsibility of the monitoring should be assigned to such committees.

16 MEDIA SUPPORT

In the wake of drought of 1987, all the media units of the Ministry of Information and Broadcasting (MIB) mounted information campaigns in different parts of the country with the strategy of achieving the following communication goals: (a) to create an awareness among the masses about the seriousness of the drought situation; (b) to publicise the various relief measures undertaken by the Central agencies, State agencies and voluntary organisations; (c) to sustain the morale of the people and strengthen their fortitude to face and overcome the natural calamity; (d) to hold the price line and discourage hoarding; and (e) to increase production of *rabi* and summer crops.

Radio

All the stations of All India Radio (AIR) broadcast a large number of programmes in close consultation with concerned State Government departments. The total number of programmes put out by AIR from July 1987 to mid-August 1988 was 10,692 in a variety of formats. The thrust in the intial publicity drive was to ensure that the people were made aware of the various steps undertaken by Government and programmes sanctioned, to ensure full public participation in the Government programmes to prevent the ill effects of drought on socio-economic conditions and to ensure that there was no unnecessary panic reaction resulting in hoarding, price rise, etc. AIR stations mounted special programmes with close frequency in coopertion with the State Governments on creating awareness about the country's capability to supply and transport the essential commodities at very short notice to offset any shortage, about the need of poeple's participation and cooperation in implementing the crash schemes of Government to streamline the distribution system of essential commodities, on the need for retention of confidence in meeting the challenge of drought and avoid panic and loss of confidence.

2.2 Simultaneously the special audience programmes for rural women, industrial workers, youth, etc. were reorganised by the stations to inform on the following in relation to the drought situation: (1) selection of crops and seeds, fodder, vegetables and fruits for cultivation in drought-prone areas; (2) supply of essential commodities like edible oils, milk powder, pulses, sugar, diesel and kerosene; (3) anti-hoarding of essential commodities; (4) distribution system of essential commodities; (5) economic use of drinking water and urban water supply; (6) employment generation; and (7) public health including mother and child health.

2.3 In the second phase of the publicity drive, a comprehensive broadcast strategy was drawn on the basis of the reports and feedback obtained form the stations to meet the challenge of drought as well as flood lashing the major part of the country. Due consideration was given to the recommendations of the DAC. The broadcast strategy in the affected area aimed at the following directions.

1. For Rural/Farming Community

(a) Measures to save standing *kharif* crops;
(b) Selection of alternative short duration drought resistant crops;
(c) Protection of vegetables and fruits from the impact of drought/flood;
(d) Community action towards the supply and disribution of fodder;
(e) Growing of short-duration drought resistant fodder;
(f) Cultivation of pre-*rabi* pulses and oil-seeds as cash crops;
(g) Management of cattle including their health care in drought/flood affected area;
(h) Goat and sheep rearing in the situation of scarce availability of feed and water;
(i) Organisation and maintenance of cattle camps;
(j) Water management: drip irrigation, conservation and effective utilisation of irrigation water, and management of lift irrigation;
(k) Provision of irrigation water through implementation of various Government schemes;
(l) Government initiative towards supply of diesel and electricity; and
(m) Distribution and utilisation of credit and other agricultural inputs.

II. For General Audience

(a) Assuring sufficient stocks of the essential commodities;
(b) Supply of essential commodities through efficient and effective PDS;
(c) Government initiative towards distribution of milk, sugar, etc. through fair price shops;
(d) Provision of drinking water, Government's initiative in putting bore wells and supply through water tankers;
(e) Economic and austere use of water; and
(f) Public health: prevention of jaundice, malaria, bronchial and intestinal diseases; prevention of malnutrition; care of children and mother, and consumption of milk substitutes.

III. Price Line and Relief Measures

1. Price and Anti-Hoarding

(a) Steps by the Government to prevent hoarding;
(b) Government's initiative towards preventing price rise;
(c) People's participation in austerity measures;
(d) Prevention of panic in the society in drought/flood affected area;

2. Relief

(a) Arrangement and provison of drought/flood relief;
(b) Employment generation programmes of State Governments; and
(c) Credit distribution and management.

IV. Increase Production of Pre-*Rabi* and *Rabi* Crops

1. Pre-*Rabi* Crops

(a) Selection of short duration and cash crops for pre-*rabi* sowing;
(b) Selection of high-yielding varieties;
(c) Optimum plant population through proper seed rate;
(d) Use of quality seeds;
(e) Balanced fertilization for quick growth; and
(f) Need based plant protection.

2. *Rabi* Crops

(a) *Rabi* and summer crop planning relevant to drought/flood affected area;
(b) Selection of high-yielding varieties;
(c) Timely sowing with optimum seed rate;
(d) Application of irrigation to match the needs of critical stages of crop;
(e) Increased use of fertilizers;
(f) Substitution of high water consuming crops by the crops that need less water with particular reference to oilseeds and pulse crops;
(g) Provision of pre-sowing irrigation in case of crops grown under residual soil moisture;
(h) Advance sowing of *rabi-jowar;*
(i) Substitution of non-irrigated wheat by safflower and gram below the Vindhya belt;
(j) Completion of sowing of mustard by mid-November;
(k) Cultivation of sunflower as contingent crop in south India;
(l) Increased plant population of summer *mung* and summer groundnut;
(m) Cultivaton of low water-duty crops (oilseeds and pulses) in the tail-end area of the canals;
(n) Adoption of seed production techniques in the summer months under protective irrigation conditions; and
(o) Special practices for increasing overall yield of wheat, *rabi jowar,* pulses and oilseeds in the drought/flood affected area.

V. Communication Strategy for Increased Production of *Rabi* and Summer Crops.

(a) Programme schedules should be based on calender of farm operations prepared by the State Directorates of Agriculture;
(b) Programme schedules should be cleared by subject committees and rural programme advisory committees attached to AIR stations.
(c) Hold frequent meetings of rural programme advisory committees for evolving suitable programmes, time of broadcasts, frequency and mode of broadcasts;
(d) Regular announcements on the availability of agricultural inputs;
(e) Announcements regarding release of irrigation water from river valley projects;
(f) Frequent announcements about the schedule of electric supply;
(g) Broadcast of location-specific messages;
(h) Use of languages and dialects commonly understood and spoken in the listening zone;
(i) Avoid inconsistency in the messages through periodic evaluation of the programmes and their impact in monthly workshops and fortnightly training programmes attended by AIR personnel and personnel of field extension agencies of the State Governments;
(j) Broadcast success stories and outstanding achievements of the progressive farmers;
(k) Regular participation of Field Radio Officer in the review meetings convened by the State Agriculture Secretaries /Agriculture Production Commissioners;
(l) Inform non-farm population about the *rabi* crop production campaign to promote public confidence and to help maintain the price line;
(m) Initiate community action towards procurement and distribution of agricultural inputs; ensuring distribution of irrigation water amicably; preparing community seed beds; applying plant protection measures, and supervising operation of labourers.

2.4 AIR stations were asked to send to the Directorate General, All India Radio weekly reports on the programmes broadcast by them on drought and flood situations according to the communication strategy laid out and conveyed to the stations. Compiled weekly reports were sent to DAC as well as MIB.

Television

3.1 Television being a very effective media of information and mass communication, *Doordarshan* (DD) took up the challenge of facing the drought by evolving an appropriate communication strategy.

Table 55: Programmes telecast by Doordarshan Kendras, 1987-88.

S No	Name of *Doordarshan Kendra*	Number of Programmes in Various Formats	Number of News Items	Duration	
				Hours	Minutes
1.	Ahmedabad	35	—	6	28
2.	Bangalore	11	—	0	30
3.	Bombay	17	—	7	00
4.	Calcutta	12	—	2	26
5.	Cuttack	26	—	4	15
6.	Gauhati	11	6	2	05
7.	Gorakhpur	10	—	2	08
8.	Hyderabad	24	31	2	00
9.	Jaipur	90	—	15	50
10.	Jalandhar	13	—	2	37
11	Lucknow	68	—	7	04
12.	Mardras	28	—	5	00
13.	Nagpur	7	5	4	00
14	New Delhi	122	342	20	44
15.	Rajkot	164	—	19	32
16.	Ranchi	67	—	4	19
17.	Srinagar	14	—	3	11
18.	Trivandrum	27	10	4	28
	Total	746	394	113	37

The first and foremost effort of DD was to create an awareness among the masses about the seriousness of the drought situation by disseminating information. A large number of visuals on drought from the different parts of the affected areas were mounted in a sustained manner to give the viewers an actual feel of the situation . The aim was to create a sense of participation among the viewers for facing the situation boldly without getting scared.

3.2 Various relief measures to face the drought were undertaken by the Central and State governments. Private and voluntary organisations/agencies also came up in a big way. Their efforts were publicised by DD to create a sense of confidence among the people. All the 18 programme originating *kendras* of DD including New Delhi were geared to chalk out special programme plans to telecast suitable programmes to fight out the evil effects of the drought. DD *Kendra,* Delhi being the nerve centre of the organisation, revamped its programmes both on local and national channels to accommodate special talks. Prime Minister's call to involve development agencies in drought relief work was highlighted in news bulletins, besides his letter to all the State Chief Ministers. Relief measures, commendable work done by the social workers, and roles played by the individuals and voluntary organisations in this context were highlighted in the form of news stories, clippings, documentaries, etc. Delhi station itself telecast a large number of programmes in various formats right from August 1987 upto the middle of June, 1988. The details of the programmes telecast by DD in 1987-88 are shown in Table 55.

3.3 The Directorate General, DD provided guidelines to all the 18 programme originating *Kendras* to chalk out appropriate special programmes in the following area:

I. Cropping Pattern:

(a) Contingencies for alternate/new cropping pattern; and (b) Short duration varieties as substitutes.

II. Fodder for Cattle:

(a) Care of animals in the drought prone area; (b) Alternative sources of fodder, e.g. bamboo, molasses, etc.; and (c) Control of diseases among animals.

III. Water Management:

(a) Economy in water use; (b) Supply of drinking water; (c) Urban water supply; (d) Preventing water evaporation in tanks/reservoirs; and (e) Proper use of water resources for irrigation.

IV. Power and Diesel:

(a) Increased power supply to tube wells and pumping sets; (b) Proper maintenance of pumping sets to achieve maximum efficiency; and (c) Regular supply of diesel in the rural area for irrigation.

V. Efforts of various Government Agencies;

(a) Impart information on various Government schemes and relief measures undertaken; (b) Employment generation in drought affected area; and (c) Encourage relief work undertaken by voluntary agencies.

VI. Health:

(a) Measures undertaken to prevent diseases; (b) Nutrition for women and children; and (c) Control of diseases among children; (d) Pre-natal care.

VII. Essential Commodities and Distribution:

(a) Steps taken by Government to provide vegetables, fruits, edible oils, sugar and milk powder, etc.; and (b) Evils of hoarding.

VIII. Rural Advisory Committees:

Special meetings of the rural advisory committees were convened to revamp agricultural programmes. Heads of all *kendras* personally got in touch with the heads of nodal agencies.

3.4 The Delhi *kendra* of *Doordarshan* being the nerve centre revamped its programmes both on local and national channels to accommodate special talks. Prime Minister's call to involve development agencies in drought relief work was highlighted in news bulletins besides his letter to all the State Chief Ministers. Relief measures and commendable work done by individuals and voluntary organisations were highlighted in the form of news stories, clippings, documentaries, etc. News programmes regularly took up reporting on the drought situation and the steps taken to povide relief. Staff and stringer cameras were deployed in the affected area to do special reportage on the drought stories. The Delhi *kendra* telecast a large number of programmes in various formats from August 1987 to June 1988 as detailed under:

1. News stories/reportage on drought (342 programmes);
2. Talks, discussions, interviews, features and documentaries in **'Krishi Darshan''** on crop patterns, dry farming, water-management, cattle feeds, and procurement of fodder, etc. (80 programmes);
3. ***Sukha Rahat*** : A weekly programme on drought relief, generation of employment, maintenance of price-line, and bank-loans, etc. (22 programmes);
4. ***Nirman*** : Development activities such as tree plantation, forest conservation, control of pollution, and cleaning of Ganga, etc. (10 programmes);
5. ***Vikas Ki Ore*** : Basically envisaged to cover 20-Point Programme, it was oriented in the context of drought situation to include new irrigation methods, and development of waste lands, etc. (6 programmes); and
6. **Focus** : In this series attention was focussed on drought and problems relating to it. (4 programmes).

Press

4. The Press Information Bureau (PIB) arranged publicity for the drought relief measures and posted the press with the position of drought in different parts of the country. The Minister of State (Agriculture) briefed the press every week during the monsoon and post-monsoon months of 1987. Press briefings were also arranged by PIB for senior officers of the concerned Ministries. Based on reports/comments appearing in the regional press, senior officers were apprised of state of implementation of different relief programmes. Main area of attention was Central drought assistance to the States, steps to minimise agricultural loss, measures for maximising *Rabi* production through popularisation of dryland production technologies, Government's efforts to ensure drinking water in rural area, fodder procurement and supply in deficit area, close monitoring of the price situation, and curbing of hoarding and blackmarketing in essential items. The feature unit of PIB put out special articles on the subject.

Advertising and Visual Publicity

5. Prime Minister's speech entitled *"Sukhe ki Chunoti Ka Vishwas aur Dhridatha ke saath Mukabla"* was brought out in Hindi in October 1987 by the Directorate of Advertising and Visual Publicity (DAVP) as a pamphlet for wide distribution in the rural area. 30-second radio special in English and in Hindi on *Rahat Patra* was broadcast over primary channels of AIR. The total number of such broadcasts was 63 between 25th December 1987 to 25th February 1988. The DAVP also produced one 20-second video spot in English and in Hindi on *Rahat Patra* for telecast in the national network.

Films

6. The Films Division (FD) released two reelers (colour) on different parts of the country on 8th May, 1988. The FD also released one reeler (colour) on relief measures undertaken in Rajasthan on 26th June, 1988 and two reelers (colour) on drought conditions in different parts of the country on 26th June, 1988.

Song and Drama

7. The Song and Drama Division issued instructions to all the field officers of the Division as well as to all the registered private drama troupes to include the messages relating to measures on drought in their programmes which were conveyed in the form of dialogues, speeches and commentaries in between programme items through inter-personal communication with the members of the audience.

Field Publicity

8. All the 257 field publicity units of the Directorate of Field Publicity organised intensive programmes throughout the country at the grassroots level. In pursuance of the decisions taken at the regional conference on agriculture for *rabi* compaign in 1987-88 to meet the drought situation, instructions were issued to Regional as well as Field Offices to undertake necessary publicity among the farming community to maximise food production in *rabi* crops so as to compensate for the losses in the last *kharif* crop caused by the persistent drought. Functioning on the ground at the grass-roots level, the field publicity units were urged to sensitise and motivate the farming community in the country through exhortations in their direct contact progammes with them. The multi-faceted oral communication strategy targetted to the farmers within the frame-work of DAC's guidelines aimed at driving home to them the need for taking concrete/urgent steps to overcome the drought conditions affecting them. The methodology adopted by the field publicity units was:

(a)To maintain a constant touch with State agriculture departments and relief organisations, on the one hand, and the farmers, on the other;

(b)To involve all the voluntary and social welfare organisations in the information drive;

(c)To distribute all the available literature on the subject in local languages;

(d)To extensively screen suitable films like "Breakthrough in Agriculture", "Rainfed Farm Practices", and "Food", etc.,

(e)To issue "Talking Points" to all the field publicity officers on the measures to meet the challenge of drought; and

(f)To provide regular inter-face between farmers and State agricultural departments.

9. Regarding coverage of drought situation by foreign media agencies, Secretary, Department of Agriculture and Co-operation (DAC), acted as the focal point. He was required to provide brief on the precise magnitude of the drought and the relief measures carried out by the GOI and State Governments. Ministry of External Affairs was to have a close liaison with the Secretary, DAC in this regard. In the States, the Chief Secretaries were required to nominate a senior officer as nodal point who suitably briefed the foreign media agencies as and when contacted by them.

10. The MIB and its media units played a crucial and complementary role in combating the drought situation. The media units in collaboration with various Ministries of the GOI and State Governments acted in unison in facing the challenge. The content, reach and sweep of the programmes were suitably re-oriented to meet the requirements of rural people. The multi-media publicity campaign mounted by the MIB in a sustained manner sought to provide not only concrete information but also to instil a spirit of hope among the farming community in the country.

The drought of 1987 witnessed the development of a comprehensive approach and an integrated strategy for drought management in the country. From a somewhat passive response to preventing starvation, the country moved substantially towards building up a more positive set of initiatives. Drought as a creeping disaster was found to have been examplified in all its aspects by the conditions created by the failure of the south-west monsoon in 1987. The country emerged from this drought with minimal set back to its economic development. In no small measure, the optimistic environment at the beginning of monsoon in 1988 was due to the success of the disaster management strategies adopted by the GOI and the State Governments during one of the worst drought periods in recent history.

2. Over the years, since independence, relief administration has been recognised as the primary responsibility of the States and the role of the GOI has been one of supplementing the State efforts. Consequently, extreme diversities have been noticed in thequality of relief rendered in different States in the wake of natural calamities. The drought of 1987 was very wide in its sweep and 15 States and 6 Union Territories were significantly affected by the failure of the south-west monsoon. The drought came to be perceived as a national calamity. In line with the concept of welfare state, it was natural for the GOI to actively address itself to the alleviation of the distress in different States. From a national viewpoint, Statewise disparities in the type and extent of relief were not acceptable. A change in the approach of both of the GOI and the State Governments to administration of relief was, therefore. suggested by the situation. Consequently, the GOI decided to play a more positive role in helping the States to render timely and appropriate relief to the affected population. The formation of the

(a) CCD headed by the Prime Minister for laying down policies, guielines and identifying responses.

(b) COS for monitoring and implementation of drought relief programmes and ensuring coordination between the Central departments and agencies, and

(c) CMG in the nodal DAC for interacting with the State Governments and different implementing agencies to identify cmerging crisis and suggest appropriate measures.

gave a concrete shape to this new thinking and approach. The deliberations in these fora and the decisions flowing therefrom gave rise to a new concept of drought management in place of the hitherto dominant concern of drought relief.

Response

3.1 Disaster preparedness is a crucial step in a society's ability to not only meet the challenge of the disaster but also to emerge from the crisis with the least set-back to its socio-economic fabric. The strategy in such a situation calls for a set of short-term responses as well as long-term perspectives. The drought management of 1987 was accordingly characterised by early response and dynamic decision-making in relating to emerging situations. When the clouds of the south-west monsoon were

not to be sighted as late as July, 1987, it was realised that the country might have to face severe drought conditions in the days to come. The reconnaissance visits of the Area Officers of the DAC at this point of time also pointed to a possible extensive adverse impact on agriculture in the face of the delayed monsoon.

3.2 The CCD finalised an Action Plan in early August, 1987. This Action Plan envisaged a series of contingency measures to be taken by the State and the GOI agencies in relation to agriculture, irrigation, drinking water, health, power and essential commodities. Specific mandates were given to GOI agencies for a continued follow-up. The major concerns at that time were saving of agricultural crops, provision of drinking water, provision of fodder, availability of power and diesel, and utilisation of available irrigation water. The concept of a water budget for the reservoirs and other irrigation sources was advocated to take care of the needs of human beings, animals and crops over as long a period as necessary. A Contingency Agricultural Plan was recommended to the States for optimum utilisation of precipitation through shift in crops and appropriate agronomic operations. The priority accorded to the agricultural sector in the supply of power and diesel also helped in meeting the water requirements of crops during the crucial periods of growth.

Policy Initiatives.

4.1 The corner stone of a sound and effective drought management policy is to ensure dynamism in responding to the changing situation. This was very much in evidence in the GOI's stage-by-stage response to the drought of 1987. When the *kharif* crops in the drought affected States were initially affected, the GOI commenced the Contigency Agricultural Plan for implementation. In October, 1987 when it became evident that the effect of drought would persist over a longer period and provision of relief to affected population was to be properly and effectively planned and executed, employment generation became a major concern of the States and the GOI.

4.2 When relief measures for a longer period were recognised as inevitable, it was necessary to ensure that these did not suffer for want of resources at the operational level. A mandate from the Prime Minister laid down a strict time-frame for deciding the quantum of financial assistance to be provided to States. The earlier approach was to send out central teams on receipt of memoranda from States and decide on the quantum of Central assistance in a meeting of the HLCR on the basis of the central team's report. This implied that the process for carrying out drought relief operations would only commence in the months of November/December when the States would be submitting memoranda on the basis of detalied estimates of crop failure and formal declaration of scarcity/ drought.

4.3 In the drought of 1987, the GOI took early initiatives by way of evolving an action plan to minimise crop loss, plan for contingency crops, conserving water in storage reservoirs, providing ways and means assistance and strengthening of the PDS. The States responded to the GOI's keenness to ease resource constraint in the implementation of relief measures by early submission of memoranda in August/September, 1987. The GOI was very prompt in finalising its decisions on the quantum of assistance before the end of October, 1987. This step ensured the timely availability of much needed resources to the States to plan and execute relief measures in an effective way.

4.4 Due to the absence of precipitation in most parts of Gujarat and Rajasthan, the fodder situation became acute by September, 1987 itself. This called for innovative measures in ensuring that the cattle wealth of the States was not destroyed due to lack of fodder. The States were advised to open cattle camps, where the cattle of the weaker sections of society could be taken care of, to arrange for the movement of fodder to the needy area and to encourage migration of cattle to places, where they could be maintained during the drought period. The GOI also provided subsidies for the transportation of fodder. Substantial fodder was procured and transported to the States of Rajasthan and Gujarat. The GOI's involvement extended to coordinating the activities of procurement and movement of fodder by railway from States with surpluses like Punjab, Madhya Pradesh and Maharashtra. The GOI's emphasis on the involvement of voluntary agencies ensured their association with the maintenance of cattle camps to a significant extent in the States of Gujarat and Rajasthan. Subsidies for the maintenance of cattle in these camps were extended by the GOI.

4.5 The developing acute drinking water shortage in the month of August was addressed by the GOI in a resolute manner. Ways and Means advances to the State Governments for taking up works of provision of drinking water in the affected area was sanctioned in August itself. The GOI's

financial help extended to the augmentation of physical resources like rigs, geo-electrical and hydro-fracturing equipments. This went a long way in considerably improving water availability in the rural area. The water supply situation in the cities of Udaipur, Ajmer, Jodhpur and Jaipur, of Rajasthan and Rajkot and Jamnagar, of Gujarat was very acute and the situation called for substantial measures for augmentation. Special Central assistance was extended for this purpose to these cities for meeting the situation.

4.6 The developing severity of drought called for steps to ensure availability of food to vulnerable sections of society. This requirement was met effectively through a crash programme of strengthening of PDS, commissioning mobile fair price shops and uninterrupted movement and supply of foodgrains to the drought affected area. The problems of coordination between FCI, railway authorities and the States were monitored on a day-to-day basis. The adverse impact of limited food availability caused by erosion in income was relieved through distribution of foodgrains in lieu of a part of the wages. The diversity in the system of payment of grains as part of wages in the different States gave rise to a uniform policy throughout the country in respect of employment on relief works. The special needs of very severely affected population were taken particular care of in an attempt to enforce uniformity. In the SDAAs of Gujarat and Rajasthan, an enhanced quantum of foodgrains was permitted as part of wages.

4.7 In the efforts to maintain the price line, apart from regulatory measures, substantial reliance was placed on augmentation of availability of essential commodities through imports and regulated releases from the buffer stocks. The GOI took an unprecedented step in extending subsidies for cultivation of vegetables in the vicinity of metropolitan area and other urban area to make up for the loss of production of vegetables due to drought.

4.8 The compelling need for applying resources to their most productive use in times of scarcity permeated the thinking of the relief administration throughout the country. This awareness led to the allocation of financial resources to some innovative schemes and programmes. The fodder shortage in some area was relieved by providing financial assistance for cultivation of fodder crops by using the available moisture in these area. Special assistance was extended to the States for speeding ,up projects, which could be completed to provide water during the drought period. At the field level, non-conventional types of fodder were introduced. To tide over the crisis, Gujarat and Rajasthan resorted to feeding sugarcane to cattle.

Assessment

5.1 The impact assessment and assessment the logistics of administration of relief constitute two of the problem area in the provision of drought relief. Inappropriate methods in this regard may lead to widespread discontent, feeling of injustice and waste. The major determinant of effectiveness in relief is the ability of the administration to provide adequate and timely relief to the deserving and needy. It is, therefore, necessary to have a proper assessment of the level of deprivation and suffering and the extent of succour needed by different sections of the society. The changing socio-economic milieu of the society has a significant bearing on the perception of the needs of different area.

5.2 The GOI was faced frequently with the criticism that relief in some States was not reaching the area actually affected by the drought, while substantial relief measures were being taken up in area comparatively better placed. Complaints were also received that no or negligible relief was being given to extremely vulnerable sections and in certain chronically improverished area, mainly because the affected area was remote or the population was less articulate in projecting its hardships and needs. The GOI impressed upon the States in the meeting of Chief Ministers, addressed by the Prime Minister, and in official meetings about the need for evolving objective and realistic criteria for determining the quantum of assistance required for particular area and/or by particular section of the society. A major concern in the provision of relief was to ensure its adequacy in terms of employment generation and supplementary nutrition. This concern led to the GOI announcing special financial assistance to the States of Gujarat, Rajasthan and Orissa to ensure that the special needs of certain disadvantaged sections of the society were adequately taken care of.

5.3 The problem of assessment was very pronounced in the estimation of the employment needs of different area. Employment generation in a period of drought is the basic means of providing income and purchasing power to those sections of society whose normal means of subsistence have been impaired by drought conditions. Relief works are essentially meant for meeting this need. Therefore,

proper surveys about the profiles of population relying on activities which are likely to be disrupted by drought conditions, would have to be undertaken periodically and they should form the basis for the estimation of their employment generation needs.

5.4 The relief measures highlighted the shift in the pattern of dependence of different sections of rural population on farm income. Even in the case of small and marginal farmers, the dependence on farm income had gone down significantly over the years. Mere arithmetical approach to the estimation of employment generation having regard to the pattern of land-owning and landlessness, results in over-estimation. The estimates of State Governments over the years have consistently been belied by the number of people actually reporting for work, the proportion varying from area to area and State to State. The crucial factors, having an impact on the society's inclination to seek relief employment, relate to the state of economic development, preference for particular type of work, effectivencess of the society in finding its own avenue for supplementing incomes and the opportunities elsewhere. The estimates furnished by the State Governments have continued to ignore, by and large, these crucial factors. Consequently, the assessment of the central team formed the basis for ensuring an element of accuracy in the estimates for employment generation.

5.5 Employment on relief works and PDS of essential commodities provide succour to vulnerable section of drought affected population to meet its nutritional requirements. The sense of dignity preserved by these arrangements was perceived as a preferred alternative to free feeding programmes or gratuitous relief. Therefore, the usefulness of the employment generation works was a major concern of the GOI in the drought relief works.

5.6 States were frequently advised to take up relief works leading to the creation of durable assets, preferably contributing to the productivity of the society. Traditionally the States' projects for generation of employment have centred round intensifying earthwork related activities like NREP, RLEGP works, irrigation works, road works, digging of village tanks, etc. In the SDAAs, however, where such productive works could not be identified, the need for innovative forms of employment of the drought affected population had been continuously felt. While the economic development of such area may provide solution over a long term, the short-term planning must aim at generation of subsidiary skills in population, exposed to frequent droughts so that different avenues of employment, employing such skills, could provide an answer to the difficulty of ending earthwork related to employment works. In the event of extreme paucity of useful works, participation in nation building activities like adult education programme, social awareness programme etc. may also be mooted as basis for placing purchasing power in the hands of the weaker sections. Relief administration cannot be a static reactive concept but has to be dynamic with reference to the development of society and continously re-oriented. These aspects require careful consideration.

5.7 An issue, which agitates the concerned sections of the society in time of drought, is the level of wages realised by them on relief works. There have been cases wherein it was reported that the wages paid to workers on relief works were low. The employers have reservations on paying full wages prevalent in the area on the ground that the wages are essentially in the nature of relief and not full compensation for the output. The workers on relief works, on the other hand, claim full compensation on the ground that irrespective of the fact that the work was in the nature of relief, they should be paid full wages prevalent in the area for the work done. The relief employment requires labour from a person rendered weak by falling nutritional levels in times of drought. The wages cannot be dissociated from output lest relief employment degenerates into gratuitous relief. Therefore wage for relief work has been treated as class by itself.

Logistics

6.1 The problem of logistics impeded the performance of some States in the organisation of relief works, in maintaining nutritional levels of some area and management of PDS. In the case of some States these deficiencies were very pronounced. Many States could make adjustments in the administrative set up and procedures to meet the special needs of drought relief administration. The response to emerging situation and the averting of major crisis directly varied in proportion to the ability of the State administration of different programmes. The GOI departments could gear up appropriate logistic support to the implementation of the Action Plan including those items which were complementary to the States' own efforts. The need for proper planning of the logistics of executing an effective plan for relief measure was noticed in the case of some States. The execution of employment generation works, the speed of completion of drinking water programmes and

effectiveness of special nutrition programmes could have been substantially better in these States, if only the kinetics of implementation had received greater attention.

6.2 A closer monitoring of the implementation of relief programmes in the States was an important ingredient in the drought management strategy of the GOI. The DAC kept very close liaison with the States and interacted at appropriate levels for information on the progress of implementation of relief measures. The reports monitored by the DAC concerned employment generation, nutrition and animal care activities and the expenditure on items, for which specific central assistance was extended. Initially, except for some States like Gujarat and Rajasthan, reports from States were not very-regular. However, by the time the relief measures in the States picked up momentum, most of the States geared up their machinery to furnish information to the DAC and interacted continually on specific issues without any appreciable loss of time. In promptness and accuracy of information relating to relief measures Gujarat excelled; the management information system introduced by the State for monitoring relief measures could provide an answer to the difficulty experienced by other States in ensuring a regular flow of up to date information to the State and National headquarters.

6.3 The importance of non-official input in the monitoring of relief operations cannot be minimised in a democratic set up as is obtaining in India. The public satisfaction with relief measures depends, to a large extent, on its perception about the responsiveness of the administration in relation to the quantum and quality of relief measures. The bodies of public representatives functioning at various levels as a result of democratic decentralisation in the country project and articulate the needs of a society to the implementing agencies. The GOI laid great emphasis on the proper functioning of relief coordination committees consisting of public representative at the State, district and sub-district levels. These innovative steps helped the GOI in getting apprised of the difficulties faced by different sections in different parts of the country.

Funding

7.1 The year 1987-88 witnessed a watershed in the quantum of central assistance for drought relief. The ceilings of expenditure approved in 1987-88 was Rs. 1472.10 crore for drought relief. This was more than the total assistance for the preceding two years of the Seventh Five Year Plan (1985-90). The increasing expenditure on drought relief programmes has brought into sharp focus the need for greater vigilance in the choice of works under the programmes. Nearly 57 per cent of the central assistance went to employment generation works. Absence of proper planning and dovetailing with well formulated perspective plans in some States led to the undertaking of non-productive works to some extent. The choice of works in many cases were found to be *ad hoc* and mainly designed to meet the need for employment generation without any consideration of its contribution to the drought proofing of the area or the productivity of the society.

7.2 A large number of works in some States were found to have been left incomplete only to be taken up at the time of subsequent scarcity mainly with the purpose of generating employment. In a few States, the percentage of works left incomplete at the end of relief was noticed to be as high as 50 per cent. A solution to this problem can be found only by a detailed investigation and assessment of the potentialities in particular area and formulating a shelf of projects, and micro level plans for ensuring that only works, which are perceived to be needed by the society are taken up. The Governments of Gujarat and Rajasthan were advised to work out micro level plans in respect of SDAAs of these States on a pilot basis. The result of this exercise will provide a pointer to the type of solution in respect of SDAAs of the country.

7.3 In evolving a long-term perspective, specially in relation to mitigating the impact of drought in SDAAs, the following policy issues need to be looked into:

(a) Restricting growth of population in SDAAs;

(b) Encouraging migration from SDAAs through incentives of allotment of land, etc.; and

(c) Maximising labour content in on-going development schemes.

7.4 In the light of the substantial investment in drought relief programmes, the States would have to envisage a proper long term strategy for making this investment re-inforce the economic development of the vulnerable area and making them more resilient to the adverse climatic conditions. The measures would involve a detailed inventory of physical resources and exploitation of avenues for employing the population in the area in making productive use of these resources through

formation of appropriate skills. These objectives can be served only if the flow of financial resources can be linked more closely with the States' own plans and commitment for the improvement of the vulnerable area. The GOI announced additional Central assistance for speeding up completion of selected irrigation projects in the drought affected area in some States mainly with a view to give recognition to such commitments to a long-term strategy for building up resilience to drought conditions. It has been felt that current scheme of flow of Central assistance is not designed to promoting greater awareness and commitment on the part of the States to sound disaster preparedness. Therefore, inspite of a record flow of Central assistance in 1987-88, some States felt that resources were inadequate for meeting the challenge of drought. The experience of the drought of 1987 should, therefore, act as a catalyst for the development of a sound national policy and perspective and the best strategy for ensuring resources for drought preparedness and relief management to be adopted by the country.

Agricultural Production

8.1 The most significant aspect of the management of the drought of 1987 has been the food security and the significant success in minimising the adverse impact of drought on the agricultural production. The substantial food stocks of the GOI were utilised for controlling the price line through regular releases through the PDS and supplementing the real income of the vulnerable sections through distribution of foodgrains as part of wages. This food security was built over a period of years because of substantial surpluses in wheat production. It was, therefore, of paramount importance to ensure that the drought conditions in 1987 did not cause very sharp fall in the agricultural production. The Contingency Agricultural Plan was very actively pursued and closely monitored through a system of visits by Area Officers in the DAC.

8.2 A close watch was kept on the need and the availability of seeds of different crops in different area. The availability of fertilisers, diesel, and power was closely monitored. All efforts were made to use the moisture available in the different parts of the country to the fullest extent. The providential rains towards the close of south-west monsoon followed by a good north-east monsoon, were fully utilised to motivate farmers to take up the most appropriate crops for cultivation in different parts of the country and maximise agricultural production in *rabi* 1987-88. These measures helped in restricting the fall in agriculture production to about 3.5 per cent from the production level of 143.41 million tonne achieved in 1986-87 despite the poor winter rains of 1987-88. The agricultural production strategy during drought of 1987 has demonstrated that proper management of the economic and physical resources can ensure food security in the country.

Relief Administration

9.1 As a part of the on-going efforts to obtain a regular feed back on the nature and quality of the relief programmes, the National Advisory Council on 20-Point Programme Implementation gave priority attention to those points in the 20-Point Programme which had a bearing on the drought affecting many States. The field visits were undertaken by a team consisting of Prof. C.H. Hanumantha Rao, Shri Sanjeet Roy and Shri R.K. Mahajan to Gujarat and Rajasthan during October,1987. The recommendations based on the impressions, gathered by the team in the course of the field visits and on intensive discussions in the Council were presented by the team to the GOI. These were considered by the GOI and conveyed to the States for follow up action as well. A summary of the recommendations of the Advisory Council may be seen in Annexure-XXX.

9.2 Throughout the drought period the GOI followed an open policy in relation to dissemination of information relating to drought and relief measures.The people were kept in the picture through National, State and field level advisory committees and programmes on the television, radio and press. The public response to such information dissemination immensely helped in identifying the deficiencies in the implementation of the relief programmes and the needs of vulnerable area in the country. Besides the corrective measures to redress the sufferings of the affected population, new policy initiatives were also taken in response to public views and aspirations. It was only on account of the grit and fortitude of the Indian people and a responsive administration that the country could very successfully face one of the worst droughts of the century with least privation and minimum ill effect on the economy. In the process India has gained very valuable experience which enhances its capability to face a crippling natural disaster like drought with greater resilience and confidence in future.

ANNEXURES

Annexure - I

Significant Dry Spells, 1985

S.No.	State/ Union Territory	Meteorological Sub-Division	Weeks	Duration	Number of Dry Spells
1.	Andhra Pradesh	Telangana	6	15 August to 25 September	1
		Rayalaseema	5	13 June to 17 July	1
2.	Bihar	Bihar Plains	4	1 June to 26 June	1
3.	Gujarat	Gujarat Region	4	13 June to 10 July	2
			8	8 August to 30 September	
		Saurashtra and Kutch	6	6 June to 17 July	2
			8	8 August to 30 September	
4.	Haryana, Chandigarh and Delhi	Haryana, Chandigarh and Delhi	6	8 August to 18 September	1
5.	Karnataka	Coastal Karnataka	5	27 June to 31 July	2
			7	15 August to 30 September	
		South Interior Karnataka	4	4 July to 31 July	2
			5	15 August to 18 September	
6.	Kerala	Kerala	5	22 August to 25 September	1
7.	Madhya Pradesh	West Madhya Pradesh	6	13 June to 24 July	2
			4	22 August to 18 September	
8.	Maharashtra	Madhya Maharashtra	6	15 August to 25 September	1
		Marathwada	4	20 June to 17 July	2
			7	1 August to 18 September	
		Vidarbha	7	15 August to 30 September	1
9.	Punjab	Punjab	6	8 August to 18 September	1
10.	Rajasthan	West Rajasthan	4	13 June to 10 July	2
			6	8 August to 18 September	
		East Rajasthan	4	13 June to 10 July	2
			4	22 August to 18 September	
11.	West Bengal	Sub-Himalayan West Bengal and Sikkim	4	6 June to 3 July	1

Note: The dry spells relate to the duration of 4 weeks or more during south-west monsoon (June to September), 1985.

Annexure - II

Significant Dry Spells, 1986

S.No.	State/ Union Territory	Meteorological Sub-Division	Weeks	Duration	Number of Dry Spells
1.	Andaman and Nicobar Islands	Andaman and Nicobar Islands	6	1 June to 9 July	2
			4	14 August to 10 September	
2.	Andhra Pradesh	Telangana	5	21 August to 24 September	1
3.	Arunachal Pradesh	Arunachal Pradesh	4	19 June to 16 July	1
4.	Assam and Meghalaya	Assam and Meghalaya	4	1 June to 25 June	2
			7	3 July to 20 August	
5.	Bihar	Bihar Plateau	10	3 July to 10 September	1
		Bihar Plains	4	1 June to 25 June	1
6.	Gujarat	Gujarat Region	6	14 August to 24 Septmeber	1
		Saurashtra and Kutch	6	26 June to 6 August	2
			6	14 August to 24 September	
7.	Haryana, Chandigarh and Delhi	Haryana, Chandigarh and Delhi	4	3 July to 30 July	2
			5	21 August to 24 September	
8.	Himachal Pradesh	Himachal Pradesh	6	14 August to 24 September	1
9.	Jammu and Kashmir	Jammu and Kashmir	5	21 August to 24 September	1
10.	Karnataka	Coastal Karnataka	5	14 August to 17 September	1
		North Interior Karnataka	5	14 August to 17 September	1
		South Interior Karnataka	4	14 August to 17 September	1
11.	Kerala	Kerala	4	14 August to 10 September	1
12.	Lakshadweep	Lakshadweep	4	14 August to 10 September	1
13.	Madhya Pradesh	West Madhya Pradesh	5	21 August to 24 Semptember	1
14.	Maharashtra	Konkan and Goa	6	14 August to 24 September	1
		Madhya Maharashtra	4	14 August to 17 September	
		Marathwada	4	19 June to 9 July	2
			5	14 August to 17 September	
		Vidarbha	5	21 August to 24 September	1
15.	Nagaland, Manipur, Mizoram and Tripura	Nagaland, Manipur, Mizoram and Tripura	7	1 June to 16 July	2
			4	31 July to 27 August	
16.	Orissa	Orissa	4	7 August to 3 September	2
			5	21 August to 24 September	
17.	Punjab	Punjab	5	21 August to 24 September	1
18.	Rajasthan	West Rajasthan	4	26 June to 23 July	2
			5	14 August to 17 September	
		East Rajasthan	4	26 June to 23 July	1
19.	Tamil Nadu and Pondicherry	Tamil Nadu and Pondicherry	6	19 June to 30 July	1

1.	2.	3	4	5.	6.
20.	Uttar Pradesh	East Uttar Pradesh	4	24 July to 20 August	1
		Plains of West Uttar Pradesh	4	17 July to 13 August	2
			4	28 August to 24 September	
		Hills of west Uttar Pradesh	7	7 August to 21 September	1
21.	West Bengal	Gangetic West Bengal	4	7 August to 3 September	1

Note: The dry spells relate to the duration of 4 weeks or more during south-west monsoon (June to September), 1986.

Annexure-III
Statewise Damage Due to Drought of 1987

(Provisional)

(As on 1.3.1988)

S.No.	State/Union Territory	Total Number of Districts	Number of Districts Affected	Number of Villages Affected	Population Affected (lakh)	Cropped Area Affected (lakh ha)	Cattle Population Affected (lakh)
1.	Andhra Pradesh	23	18	5,351@	272.90	34.00	141.08
2.	Gujarat	19	17	14.832	215.14	73 81	110.23
3.	Haryana	12	12	6,351	94 00	13,97	40.00
4.	Himachal Pradesh	12	12	15,277	35.70	4.21	27.93
5.	Jammu and Kashmir	14	12	3,394	25.00	3.70	33.75
6.	Kerala	14	14	1,450	254.50	9.82	5.99
7.	Karnataka	20	18	16,059	110.50	37.80	71.73
8.	Maharashtra	31	9	4,797	41.91	17.28	20.04
9.	Madhya Pradesh	45	21	24,291	130.00	17.80	253.03
10.	Nagaland	7	7	792	2 50	0.68	N.R.
11.	Orissa	13	8	25,000	106.00	23.77	178.67
12.	Rajasthan	27	27	32,270	262.69	237.63	352.45
13.	Punjab	12	11	N.R.	N R	4.96*	10.00
14.	Tamil Nadu	20	14	6,251	455.95	3.01	108.00
15.	Uttar Pradesh	57	55	98,868	840.44	102.28	325.00
16.	Andaman and Nicobar Islands	2	2	180	0.53	0.16	0.19
17.	Chandigarh	1	1	21	0.31	0.02	
18.	Dadra and Nagar Haveli	1	1	71	1.03	0.22	0.66
19.	Daman and Diu	2	2	27	N.R.	0.02	N.R.
20.	Delhi	1	1	229	4.81	0.75	2.16
21.	Pondicherry	1	1	26	0.28	0.11	0.20
	Total	335	263	2,55,837	2854.19	586.00	1681.11

Note: Based on memoranda for drought relief received from the States/Union Territories.
@ Facing Drinking Water Problem; * Area Unsown; N.R : Not reported

Annexure-IV

Severely Drought Affected Areas (SDAAs) in Gujarat and Rajasthan

(Copy of the GOI Letter No: 2-50 / 87-SR dated 10th March 1988)

No. 2-50/87-SR
Government of India
Ministry of Agriculture
Department of Agriculture and Cooperation
Krishi Bhavan, New Delhi
Dated, the 10th March, 1988

To

1 The Chief Secretary
Government of Gujarat,
Gandhinagar.

2. The Chief Secretary
Government of Rajasthan
Jaipur.

Subject: Central assistance for meeting the expenditure necessitated by drought during 1987-88 and 1988-89—list of Severely Drought Affected Areas (SDAAs).

Sir,

I am directed to invite the attention of the State Government to the footnote under para 1 of Ministry of Finance letter No. 43(10)PFI/87, dated 21st/23rd December, 1987 on the above mentioned subject and to say that in consultation with your State Government, it has been decided to treat the areas given in the annexure as SDAAs. It is requested that the ceilings of expenditure earmarked for different relief measures in SDAAs in the sanction letter mentioned above, may be utilised in these areas.

Yours faithfully
A.R. Subbiah
Under Secretary to the Government of India

Annexure to GOI Letter No: 2-50 / 87-SR dated 10th March 1988

Severely Drought Affected Areas
(Gujarat)

S.No.	Name of the District	Blocks identified as SDAAs	Blocks not identified as SDAAs
1.	Kutch	1. Abdase 2. Anjar 3. Bhachav 4. Bhuj 5. Lakhpat (Dayapur) 6. Mandvi 7. Mundra 8. Nalhatram 9. Rapat	Nil
2.	Jamnagar	1. Bhanvad 2. Dhrol 3. Jamhodpur 4. Jamnagar 5. Jodiya 6. Kalavad 7. Kalyanpur 8. Khambhaliya 9. Lalpur 10. Okhamandal	Nil
3.	Banaskantha	1. Danera 2. Deodar 3. Kankare (Shihori) 4. Palanpur-I 5. Palanpur-II 6. Radhanpur 7. Santalpur (Varahi) 8. Tharad 9. Vav	Danta Deosa Vadgam
4.	Surendernagar (part)	1. Dasada 2. Dhrangadhara 3. Sayla 4. Lakhtar	Wadhvan Halvad Limbdi Chotila Muli
5.	Mehsana (part)	1. Sami 2. Harij 3. Patam 4. Chanasma	Kadi Kheralu Sidhpur Mehsana Kalol Visnagar Vijapur
	Total	36 blocks	

(Continued)

Severely Drought Affected Areas
(Rajasthan)

1.	Jalore	1. Ahore 2. Bhinmal 3. Jalore 4. Jaswantpur 5. Ranipara 6. Sanchore 7. Sayala	Nil
2.	Jaisalmer	1. Jaisalmer 2. Sam 3. Sanwara	Nil
3.	Barmer	1. Baitu 2. Balotara 3. Barmer 4. Chohatan 5. Dhorimansa 6. Sheo 7. Sindhari 8. Siwana	Nil
4.	Churu (part)	1. Churu 2. Dungargarh 3. Sardashahar 4. Ratangarh 5. Sujangarh	Rajgarh Taranagar
5.	Jodhpur (part)	1. Balesar 2. Bap 3. Luni 4. Osian 5. Phalandi 6. Sheroath	Bilara Bhopalgarh Mandor
6.	Nagaur (part)	1. Desdwana 2. Jayal 3. Ladnu 4. Makrana 5. Mundwa 6. Nagaur 7. Parbatsar 8. Degnaa	Riyan Kuchaman Metta
	Total	37 blocks	

Annexure-V

Central Ministers Designated for Drought Assistance

S.No.	Name of the Minister	Name of the State
1.	Shri Bhajan Lal, Minister of Environment and Forests.	Gujarat
2.	Shri V.P. Sathe, Minister of Energy.	Uttar Pradesh
3.	Shri M. Arunachalam, Minister of State, Industry.	Kerala, Tamil Nadu, Andhra Pradesh, Andaman and Nicobar Islands and Pondicherry.
4.	Shri Sukh Ram, Minister of State (Independent Charge) Minister of Food and Civil Supplies.	Karnataka and Maharashtra.
5.	Shri Jagdish Tytler, Minister of State, Civil Aviation.	Rajasthan.
6.	Shri Dalbir Singh, Minister of State, Urban Development.	Delhi, Punjab, Haryana, Himachal Pradesh and Jammu and Kashmir
7.	Shri Z.R. Ansari, Minister of State, Environment and Forests.	Madhya Pradesh and Orissa.
8.	Smt. Margaret Alva, Minister of State, Youth Affairs, Sports, Women and Child Development.	Nagaland and Mizoram.
9.	Shri Rajesh Pilot, Minister of State, Surface Transport.	Arunachal Pradesh and Sikkim.

Annexure-VI

Committee of Secretaries on Drought (COS)

1. Shri B. G. Deshmukh, Cabinet Secretary (Chairman)
2. Shri C. Srinivasa Sastry, Secretary, Department of Agriculture and Co-operation
3. Shri V. C. Pande, Secretary, Department of Rural Development.
4. Shri K. C. Pandeya, Secretary, Department of Civil Supplies.
5. Shri S. Venkitaramanan, Finance Secretary, Ministry of Finance.
6. Shri R. R. Gupta, Secretary, Department of Expenditure.
7. Shri T. U. Vijayashekharan, Secretary, Department of Food.
8. Shri J. S. Baijal, Secretary, Planning Commission,
9. Shri Naresh Chandra, Secretary, Ministry of Water Resources.
10. Dr. V. Gowariker, Secretary, Department of Science and Technology.
11. Shri D. M. Sukthankar, Secretary, Ministry of Urban Development.
12. Shri G. V. Ramakrishna, Secretary, Ministry of Petroleum and Natural Gas.
13. Shri M. M. Kohli, Secretary, Department of Power.
14. Shri T. N. Seshan, Secretary, Department of Environment, Forests and Wildlife.
15. Shri Badal Roy, Secretary, Ministry of Labour.
16. Shri S. S. Varma, Secretary, Ministry of Welfare.
17. Shri S. S. Dhanoa, Secretary, Ministry of Health and Family Welfare.
18. Shri Prem Kumar, Secretary, Ministry of Commerce,
19. Dr. Bimal Jalan, Secretary, Department of Banking and Chief Economic Adviser.
20. Miss Roma Mazumdar, Secretary, Department of Women and Child Development.

Annexure-VII

Crisis Management Group (CMG)

1 Shri S. V. Giri, Additional Secretary Department of Agriculture and Co-operation. (Chairman)

2. Dr. T. V. Sampath, Agriculture Commissioner, Department of Agriculture and Co-operation.

3. Dr. A. K. Chatterjee Animal Husbandry Commissioner, Department of Agriculture and Co-operation.

4. Shri B. Narashiman, Joint Secretary, Department of Agriculture and Co-operation

5. Shri G. Ranga Rao, Joint Secretary, Department of Agriculture and Co-operation.

6 Dr S. P. Singh, OSD (Crops), Department of Agriculture and Co-operation.

7 Shri S C. Kackatwana, Director (Public Relations), Department of Agriculture and Cooperation.

8. Shri G. Ghosh, Joint Secretary, Department of Rural Development

9. Shri M. D. Asthana, Joint Secretary, Department of Rural Development

10 Shri Arvind Varma, Joint Secretary, Ministry of Petroleum and Natural Gas.

11 Shri V. K. Khanna, Joint Secretary, Department of Power.

12. Shri R. R. Bhatia, Director (BP), Department of Food.

13 Dr G. S. Mandal, Director, India Meteorological Department.

14. Shri Anurag Mishra, Director TT(F), Ministry of Railways.

15 Dr P. N. Kaul, Economic Adviser, Department of Civil Suplies

16 Shri Narayan Singh, DIGF(RT), Department of Environment and Forests.

Annexure - VIII

List of Nodal Officers Nominated by Different Ministries/Departments

1. Shri G. Ranga Rao, Joint Secretary (Fertilisers and Seeds), Department of Agriculture and Co-operation

2. Shri S. Som, Joint Secretary, (Credit and Co-operation), Department of Agriculture and Co-operation

3. Shri L.R.K. Prasad, Joint Secretary (Agricultural Census and Dairy Development), Department of Agriculture and Co-operation

4. Dr. C.K. George, Joint Commissioner (Horticulture), Department of Agriculture and Co-operation

5. Shri R.K. Anand, Joint Secretary, Department of Fertilisers

6. Shri Narayan Singh, Deputy Inspector General of Forest (RT), Ministry of Environment and Forests

7. Shri G. Ghosh, Joint Secretary, Department of Rural Development

8. Shri V. Venugopalan, Adviser, Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development

9. Shri Shyamal Ghosh, Joint Secretary, Department of Chemicals

10. Shri G.V. Rao, Joint Commissioner, Ministry of Water Resources

11. Shri V.K. Khanna, Joint Secretary, Department of Power

12. Shri K.M. Sahni, Joint Secretary (D & R), Department of Food

13. Dr. P.N. Kaul, Economic Adviser, Department of Civil Supplies

14. Shri B.K. Chaturvedi, Joint Secretary, Ministry of Commerce

15. Shri Arvind Verma, Joint Secretary (Marketing), Ministry of Petroleum and Natural Gas

16. Shri B.B. Shrivastava, Director (TTM), Ministry of Railways

17. Dr. B.K. Verma, Director (EMR), Ministry of Health and Family Welfare

18. Shri K.R. Venugopal, Joint Secretary, Department of Women and Child Development

19. Dr. J.P. Singh, Joint Secretary, Ministry of Finance

20. Shri K.S. Baidwan, Joint Secretary, Ministry of Information and Broadcasting

21. Shri Shiv Sharma, Additional Director General, *Doordarshan*

22. Shri A.M. Bhola, Director (Flood Control Coordination), Central Water Commission

Annexure-IX

Proforma for Daily Report on Relief Works and Cattle Camps

To

Control Room;
Department of Agriculture and Co-operation,
Krishi Bhawan
New Delhi - 110 001

PROFORMA

State / Union Territory	Date as on	Relief works		Cattle Camp		Remarks
		Numbers	Labour Employed (lakh)	Numbers	Cattle heads (lakhs)	

Annexure-X

Proforma for Status of Memoranda for Central Assistance Drought, 1987

Proforma (All Dates in Calander Year 1988)

(As on)
(Rs in Crore)

S. No.	State and Date of Receipt of Memorandum	Calamity	Date of Central Team's			Date of HLCR		Amount Released/Date			Assistance	Remarks
			Constitution	Visit	Report	Meeting	Issue of Minutes	M M.	W&M	Sought	Approved / Date	

Note. M.M. Margin Money; W & M Ways and Means Advance

Annexure-III

Status Report on Drought Relief Operations

Proforma

Week ending

State:

1. **District Worst Affected:**
2. **Assistance for Drought Relief during 1987-88:**
   Date of receipt of the latest memorandum:
   Total amount of assistance sought. (Rs. in crore)
   Date of last visit of Central Team.
   Amount of assistance approved. (Rs. in crore)
   Amount of assistance released. (Rs. in crore)
   Any proposal pending in Finance Ministry
   (if so details may be given)
3. **Allotment and lifting of Food-Grains under PDS for the latest month**

(thousand tonne)

Month	Allotment		Lifting	
	Wheat	Rice	Wheat	Rice

4. **Foodgrains for NREP, RLEGP and Drought Relief for 1987-88**

(thousand tonne)

	Released	Utilised	Month of Report
NREP			
RLEGP			
DROUGHT RELIEF			

5. **Drought Relief Works (Position on)**
   Number of works in progress

   Labourers (in lakh)

6. **Position of Drinking water**

   Number of villages affected as per latest report
   Allotment made for ARWSP (Rs. in crore)
   Expenditure under ARWSP (Rs. in crore)
   Special allocation made (Rs. in crore)
   Total number of rigs available in the State.

7. **Availability of Diesel**

   Monthly quota of diesel for the State (in kilo litre)
   Quantity lifted during the last month (in kilo litre)

8. **Cattle Camps**

   Number of Cattle Camps in existence
   Number of heads of cattle in the camps

9. **Fodder Position (in brief indicating availability and prices)**

10. **Present Power Position (in brief)**

Annexure-XII

Advance Central Assistance Released to States for Drinking Water Supply, 1987-88

(Rs. in Crore)

S No.	State	First Instalment				Second Instalment				Total			
		Rural	Urban	Drilling Rigs and Acces-sories	Total	Rural	Urban	Drilling Rigs and Acces-sories	Total	Rural	Urban	Drilling Rigs and Acces-sories	Grand Total
1.	Andhra Pradesh	0.00	0.00	0.43	0.43	3.00	1.00	0.00	4.00	3.00	1.00	0.43	4.43
2	Gujarat	8.00	3.00	1.66	12.66	0.00	0.00	0.00	0.00	8.00	3.00	1.66	12.66
3	Haryana	2.00	1.00	0.70	3.70	0.00	0.00	0.00	0.00	2.00	1.00	0.70	3.70
4	Himachal Pradesh	0.00	0.00	0.00	0.00	1.50	0.00	0.00	1.50	1.50	0.00	0.00	1.50
5	Jammu and Kashmir	0.00	0.00	0.30	0.30	1.50	0.50	0.00	2.00	1.50	0.50	0.30	2.30
6	Karnataka	0.00	0.00	0.33	0.33	2.50	0.50	0.00	3.00	2.50	0.50	0.33	3.33
7	Kerala	0.00	0.00	0.23	0.23	1.00	0.50	0.00	1.50	1.00	0.50	0.23	1.73
8	Madhya Pradesh	4.00	2.00	2.17	8.17	0.00	0.00	0.00	0.00	4.00	2.00	2.17	8.17
9	Maharashtra	2.00	0.00	1.72	3.72	0.00	0.00	0.00	0.00	2.00	0.00	1.72	3.78
10	Nagaland	0.00	0.00	0.00	0.03	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
11	Orissa	1.40	0.00	0.43	1.83	0.00	0.00	1.20	1.20	1.40	0.00	1.63	3.03
12.	Punjab	1.50	0.50	0.70	2.70	0.00	0.00	0.00	0.00	1.50	0.50	0.70	2.70
13	Rajasthan	13.00	8.00	2.73	23.73	0.00	0.00	0.00	0.00	13.00	8.00	2.73	23.73
14	Tamil Nadu	1.50	2.50	1.45	5.45	0.00	0.00	0.00	0.00	1.50	2.50	1.45	5.45
15	Uttar Pradesh	3.00	2.00	0.53	5.53	4.50	0.50	0.00	5.00	7.50	2.50	0.53	0.53
	Total	36.40	19.00	13.38	68.78	15.00	3.00	1.20	19.20	51.40	22.00	14.58	37.98
	Percentage	52.922	27.624	19.453	100.000	78.125	15.625	6.250	100.000	58.422	25.006	16.572	100.000

Annexure-XIII

Contingency Crop Plans Suggested to the States

I. ANDHRA PRADESH

1. Red Soil Region (Hyderabad Region)

Area : Hyderabad, Rangareddy, Nalgonda, parts of Medak, Karimnagar and Warangal districts.

Suggested Alternate Crop Strategies :

Rainfall Situation	Suggested Crops and Varieties
1. Up to Mid-July :	Sorghum-CSH 5, CSH 9, CSH 6, Castor-Aruna, GAUCH 1, R 63, Bhagya Sowbhagya, Bajra-Vijay Composite Pigeonpea-Hy. 2, Hy. 4.
2. Mid-July to Mid-August:	Ragi-PR 202/Sunflower-Mordin
3. Mid-August to Mid-September:	Cowpea—C.152 Italian millet—IS 71, Horsegram
4 Mid-September to Mid-October:	Horsegram

2. Red Soil Region (Anantapur Region)

Area : Anantapur, Kurnool and Chittoor districts.

Suggested Alternate Crop Strategies:

1. Up to Mid-July :	Sorghum-CSH 9, CSH 5, Pigeonpea-PDM 1, LRG 36, Castor-Aruna, Bhagya, Sowbhagha, Mesta-11/395, Cowpea-K11, Groundnut-K1, K 3, TMV 2, K 2
2. Mid July to Mid August:	Bajra-MBH 110, Italian millet- I Se 377, Sunflower, Cowpea-K11.
3. Mid-August to Mid-September:	Bajra, Cowpea-K11, Horsegram—Anantapur Local, BGM.

3. Black Soil Region :

Area : Parts of Adilabad.

Suggested Alternate Crop Strategies :

1. Up to Mid-July :	Pearl millet-BJ-104, Greengram-Kopergaon, T-44, ML-Blackgram & Pant U-19, Pant U-30, Cowpea-C-152, M-1, Sorghum-CSH-5, CSH-9, CSH-1, CSH-6, CSV-11, Cotton-DHY-286, SRT-1, Groundnut-JL-24, SB-1, Pigeonpea-C-11, Visakha-1, Sunflower, Mordin, EC-68414, Surya.
2. Mid-July to Mid-August:	Cowpea-C-152, H-1, Sorghum-CSH-9.
3. Mid-August to Mid-September:	Safflower-N-7, Bhima
4. Mid-September to Mid-October:	Safflower Gram

II. BIHAR

1. Red Soil Region

Area : The entire plateau of Chhotanagpur and Santhal parganas, parts of Rohtas, Gaya, Jamsi in Mongyr districts and Banka sub-division of Bhagalpur district.

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varieties*

1. June to Mid-July:	Mesta-AS 7, Pigeonpea-BR 65, BR 183, Lakshmi, Ragi-A 404, PR 202, IF 723, Godavari, Sorghum-CSH 5, CSH 6, Maize-Ganga Safed 2, Ganga-9, Suwan 1, Groundnut-AK 12-24, BG 1, BG 2, Greengram-Sunaina, PDM 11, Blackgram-Pant U 19, Pant U 30. Soybean-Bragg, Birsa Soybean-1, PK 262, PK 327, PK 308, PK 416 Rice-Bala, Brown Gora, 23-19, Kiran, IEI 7579, Poorna, Abha, Kharif Potato.
2. Mid-August:	Transplant ragi (Godavari)
3. Mid-September.	Toria-BR 23, Assam selection.
4. Mid-October:	Safflower-APRR 1, APRR 3, A 1, A 300. Linseed-T 397, LC 267, DR 6-5 Lentil IBR 25, Rajan Pant 406, Pant 639, K 75 Lens 4076.
5. Mid-November	Wheat-C 306, HP 1258, HC 203, Kalyan Sona.

III. GUJARAT

Alluvial Region (Dantiwada region)

Area : Kaira, Gandhinagar Mehsana and Sabarkantha districts and parts of Ahmedabad, Banaskantha and Baroda districts.

Suggested Alternate Crop Strategies

Rainfall situation	*Suggested crops and varieties*
1. June to Mid-July:	Bajra-BJ 104/BK 560, Sorghum-CSH 5, CSH 6, GJ 35, GJ 37. Ragi Pigeonpea Castor-GAUCH-1 Clusterbean-Halcsan, Kutch 8, HFG 75. Greengram-Gujarat 1, PDM 11, PDM 54.
2. Mid-August:	Transplant *Bajra* or *Ragi* Castor, Sunflower.
3. Mid-September:	Tobacco-Gujarat 4.
4. Mid-October:	Tobacco-BEED 1/HORSEGRAM
5. Mid-November:	

Black Soil Region

Area: Rajkot, Surendranagar, Jamnagar, parts of Junagarh and Bhavnagar and Amreli districts

Suggested Alternate Crop Strategies.

Rainfall situation	*Suggested Crops and Varietes*
1. June to mid-July.	Sorghum-CSH 6, CSH 5, GJ 37 Bajra-CJ 104, CHB 27. Groundnut-J 11, GAUG 1, GG 2 JL 24, GAUG 10 Castor-GAUGH 1, GAUG 1 Cotton-GAU, Cot. 10, CJ 73, G Cot. 12, G. Cot 13, V 797 Sesamum-Gujarat 1, Purva 1, Mrug 1, Patan 64. Greengram-Gujarat 1, BL 131 Blackgram-Pant U 19, Pant-U 30 Cluster bean-Malosun, HFG 75.
2. Mid-August :	Cotton Castor Sesamum

IV. MADHYA PRADESH

Alluvial Region

Area: Sidhi, Rewa, Shahdol and Panna districts and north-eastern parts of Jabalpur and Damoh districts and southern parts of Tikamgarh and Chattarpur district.

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varieties* :
1. June to Mid-July·	Rice-DR 92, IR 28, JR 15-55-2. Cauvery. IET 7564, IET 7613, IET 7614, Low land rice Jaya, Ratna. Greengram-ML 5, ML 131, PDM 54. Pigeonpea-

	T 21, Sagar, DL 74 Groundnut-Joyti, J 11 Jawahar Minphalli HOS2, JL 24, M 13. Sesamum-N 62-34, KN 96-1. Blackgram-Pant U 19, Pant U 30, Mash 48. Soybean-Durga, JS-2, Gaurav, Ankur, MACS 13.
2 Mid-August.	Early varieties of rice, transplanted (Dihulla). Pigeonpea-Bahar, T 17, J 71-37 Groundnut.
3. Mid-September	Minor millets
4. Mid-October·	Wheat-C 306, Narmada 4, Sujata, Mukta, Narmada 112 Hyb. 65, Maghdoot (d),D 9-30-1 (d), JV 12(d), MP 175. Safflower-JSF 1. Barley-Karan 20. Linseed-T 397, R 157, Pusa 2, Jawahar 7, Jawahar 17, Jawahar 552, JLS (J-1). Gram-BG 240, Pink 2, Narsimhapur Bold, Radbey, JG 350. Lentil-L 830, L 4162, IARI.
5. Mid-November:	Wheat-C 306, Lok 1, R 4 (in Bandh area) Barley.

Black Soil Region

Area: Indore, Ratlam, Ujjain, Dewas, Dhar, Khargaon, Khandwa and parts of Sehor district.

Suggested alternate crop strategies :

Rainfall situation	*Suggested crops and varieties*
1. June to Mid-July·	Maize-Ganga 5, Deccan 103, Ganga 8 Sorghum; CSH 5, CSH 6, CSH 9, SPV 235 Groundnut-AK-12-24,, Jyothi. Soyabean-Bragg, Durga, Gaurav, JS-2, Ankur, Pigeonpea-HY-6, Khargaon-2, AS 71-37, No. 148.
2. Mid-August:	Sunflower-JSN-1.
3.Mid-September	Safflower-JSF-1
4. Mid-October:	Gram:Ujjain-21, Ujjain-24, BG-240, JG-315
5.Mid-November:	Wheat-Meghdoot (d), Narmada-4 Narmada-112, C-166 Sujata, Mukta, Hyb. 65, A-9--30-1 (d), JU 1 2

V. MAHARASHTRA

Black Soil Region Solapur region)

Area. Solapur, Osmanabad, Ahmednagar, parts of Nasik, Pune, Satara and Sangli districts

Suggested alternate crop strategies:

Rainfall situation	*Suggested crops and varieties*
1. June to Mid-July:	Bajra-BK 560, MEH 110, WCC 75, ICMS 7703, Pigeonpea- No 148, Visakha 1, Greengram S-8, J-781, ML 131, ML 367, Blackgram-Pant U 19 Pant U-30, Cowpea-K-11, Kidneybean, Horsegram-K42, D40-1, Groundnut-M 13, TMV 10, SB 1, JL 24, Sesamum-D7, 11-1.
2. Mid-August·	Italian millet-Arjuna, Pigeonpea- No 148, Kidney bean, Horsegram Castor-Aruna, Girija.
3. Mid-September.	Sunflower-EC 68814, Mordan, Surya BSH, Sorghum-CSH 6, Italian millet-Arjuna, Greengram, Blackgram
4. Mid-October:	Sorhum-M 35-1 CSV 86, Swati, SPV 504, CSH BR, Safflower- Bhima, Gram-N 59, Chafa, BDN 9-3.
5.Mid-November:	Sorghum (fodder), Gram, Safflower.

Black soil region (Southern Maharashtra)

Area. Southern parts of black soil areas of Maharashtra.

Suggested alternate crop strategies :

1. June to Mid-July·	Greengram-PS 16. PDM 54, Blackgram-Karagaon 3, Pigeonpea-C-28. PT 221, Bajra-BJ 104, Castor
2. Mid-August.	Italian millet. Cotton-Sayodhan, Laksmmi, GS 23.
3. Mid-September.	Sorghum-M 35-1, 5-4-1-, SPH 218.
4.Mid-October:	Sorghum-M 35-1, 5-4-1, SPH 218, Safflower-A1, A 300, Gram.
5. Mid-November:	

Black Soil Region (Akola Region)

Area: Akola, parts of Amaravathi, Wardha, Yeotmal, Parbhani, Buldhana, and east and west Khandesh districts.

Suggested alternate crop strategies :

1. June to Mid-July:	Pearl millet-BJ-104, Greengram-Kopergaon, T-44, Blackbgram-Plant U-19, Pant U-30 Cowpea-C152-, M-1 Sorghum-CSH-5, CSV-9, CSH-1, CSH-6, CSV-11 Cotton-DHY-286, SRT-1 Groundnut-JL 24, 58-1 Pigeonpea-C-11, Visakha-1 Sunflower-Morden, EC 68414m Surya
2. Mid-August	Copea-C-152, M-1, Sorghum-CSH-9
3. Mid September	Safflower-N-7, Bihma
4. Mid-October	
5. Mid November	

VI. ORISSA

Red Soil Region

Area : Uplands and medium lands of Balasore, Cuttack, Puri and Ganjam districts.

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varietes*
1 June to Mid-July:	Pigeonpea-Kaube, Upas 120, BR 65 T 21 Mesta-AMV 1 As 7 Maize-A 51-54, Jawarhar, Diara 3, Ganga 5. Groundnut M 13, Jowar, Kisan, AK 12-24. Ragi-PR 717, Godangi 6 Rice-Pankaj, Savitri, Pratap, Jajati, IR 36, YET 7617, Jaya, Ratna, Parijat, DR 92, Jagannath, CPM 13, 3241, Masuri. Sorghum-CSH 6, Swarna. Cowpea-FS 68, C 152, C 120, C 170. Blackgram-B 12-4, Pant U 19, Pant U 30 Greengram-Kopergaon, K 851, PS 16, PDM 11
2. Mid-August	Transplant Ragi.
3.Mid-September:	Pigeonpea-65. Horsegram-DGI 2, DG 7, DS 2-2.
4. Mid-October:	Horsegram in deep red shallow soils

VII. RAJASTHAN

Area:	Udaipur (except hilly area), Chittorgarh, Bhilwara and parts of Ajmer, Banswara and Dungarpur districts.

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varietes*
1. June to Mid-July:	Sorghum—CSH-5, CSH-7, SPV-245. Maize—Ganga 5, Ganga 2 Pigeonpea—GI-3, T-15-15, Visakha—1 Cowpea—C-152.
2. Mid-August:	Greengram—ML-5, PDM-11 ML-131. Blackgram—Pant U-19, Pant U30
3. Mid-September:	Greengram Blackgram Cowpea
4. Mid-October.	Gram—O-235, Dohad, GAG146, RS-93. Safflower—A-1, JSP-1 Mustard-Durgamai, T-56. Barley—RD-1, RD-31. Wheat—Narmada-4, N-112, 0-306, Sujata, Mukta, Hyb 65, Meghdoot (d) A9-30-1(d) JU-12(d), MP-175

Desertic Region

Area:	Jalore, Jhunjhunu, Sikar, Churu, Jodhpur, parts of Nagaur, ali and Barmer districts

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varietes*
1. June to Mid-July:	Bajra—BJ-104 Greengram—S-9, PL-131, S-8. Cowpea—K-11, HPC 42-1 (fodder type), FS-68. Clusterbean—Durgapura Safed, HFG 75, 270/12, UF 277. Mothbean—T 2, T 18, JM 254, Jwala, Tadia Badami, Castor—Aruna, GAUCHI Sesamum-T 13, T 25, Pratap, C 50 Vegetables—round gourd
2. Mid-August	Greengram—S 9 Cowpea—K 11. Sunflower DC 68414, Morden, Castor Clusterbean Mothbean. Transplating of bajra (20-25 days old).

VIII. TAMIL NADU

Black Soil Region

Area: Madurai, Ramanathapuram and Tirunelveli districts.

Suggested alternate crop strategies

Rainfall situation	*Suggested crops and varieties*
1. June to Mid-July:	—
2. Mid-August:	—
3. Mid-September:	Sorghum—Koilpatti Tall, K 5 K 7. Bajra—Co. 6, K2. Italian millet—K2. Cotton, Chillies Pigeonpea-Co 1. Medium duration pulse varieties Flowers and vegetables.
4. Mid-October:	Gram-Co 1, Co 1. Safflower Italian millet. *Panicum miliaceum* Greengram—Co 1, Co 4. Blackgram—Co 1, Co3 Cowpea—Co 1, Co3, Co4.

IX. UTTAR PRADESH

Sub Mountain Region

Area: Parts of Dehra Dun, Tehri Garhwal, Pithoragarh. Nainital, Saharanpur, Bijnore and Pilibhit districts.

Suggested alternate crop strategies:

Rain fall situation	*Suggested crops and varieties*
1. June to Mid-July:	Maize-Ganga 2, Ganga 5, Vikram. Rice-DR 92. CR 142-3-2, Soyabean-Bragg, Shilajeet, Punjab-1
3. Mid-August:	Grow community rice nursery and transplant.
3. Mid-September:	Maize-Satta Toria.
4. Mid-October:	Toria, Wheat-PK 262, PK 327, PK 308, PK 416, Sonalika, VL-421, HS 86, HB 208. Barley—PL 56, P 142.
5. Mid-November:	Gram—C-235, H 208, T 3, Radhey

Alluvia Region: (Varanasi Region)

Area: Varanasi, Mirzapur, Jaunpur, Ghazipur and Ballia districts.

Suggested alternate crop strategies

1. June to Mid-July:	Upland rice—Cauvery, Akashi, Ratna, IET 7261, Maize-Ganga 5, Ganga Safed 2 Ganga , Bajra-bk 560,Black-gram-Pant U 19, Pant U 30, Greengram-K851, T44, PDM11, ML 131, ML 367, Sesamum- T 13, T 4, T 12, Redgram-T 21, DL 74, Bahar .
2. Mid-August:	Short duration rice, bajra, blackgram, greengram, fodder crops of sorghum, bajra and maize.
3. Mid-October:	Gram-C235, H75-35, GNG 146, Radhey, K 850, JG 315, T1, T3, Barley-Ratna, DL 3, K 125 Wheat-C 306, K 65, K 8027, Malaviya 12. Lentil—T 36, Pant 606, Pant 639 Mustard—T 59, Sekhar Linseed—T 397, Heera, Pusa 2, Garima, Neelam, Muhta, Sweta, Subra, Safflower—T 65.
4. Mid-November:	Wheat and Mustard.

Alluvia in Region (Agra Region)

Area: Agra, Aligarh, Mathura, Etah and Mainpuri districts.

Suggested alternate crops strategies

1. June to Mid-July:	Bajra—BK 560 Blackgram—Pant U19, Pant U30. Greengram—T 44, ML5, ML131, ML 367, Pant Mung 1, Pant Mung 2, Pigeonpea-T21, DL74, Sagar, T 7, Bahar Groundnut-T 64, Chandra, Kaushal. Chitra Clusterbean-DP Safed, HFG 75 Cowpea—C-152.
2. Mid-August:	Bajra, greengram and blackgram
3. Mid-October.	Mustard RJ 16, T 59 Barley Ratna Gram C 235, H 75 35, GNG 46, Radhe, K 850, JG 315 Safflower A 1, T 64, M 630 Lentil L9-12, PL 234 Taramira TMH 1.

Red Soil Region:

Areas: Jhansi, Hamirpur, Banda, Lalitpur and Jalaun districts.

Suggested alternate crop strategies

1. June to Mid-July:	Sorghum CSH 5, CSH 6, CSV 9, CSV 11, Pigeonpea UPAS 120, DL 71, Sagar Bahar, T 1. Soyabean-Ankhr, J 231. Groundnut-Chandra, Kaushal, Chitra Maize-Diara 3, D 765.
2. Mid-August:	Soybean Blackgram—T 9, Bajra—NBH110, WOC 75, Sorghum for fodder-PC 6, J6, Cowpea—FS 68, HPC 42-1.
3. Mid-October:	Gram-BG 240, BG 209, Radhe, K 816, BGM 417 Safflower-A91, T65. Mustard-T59.

X. WEST BENGAL

Red Soil Region:

Area: Purulia and Bankura districts.

Suggested alternate crop strategies:

Rainfall situation	*Suggested crops and varieties*
1. June to mid-July:	Mesta-AS 7, Pigeonpea-BR 65, BR 183, Lahshmi, Ragi-A 904, PR 202, IF 723, Godavari, Sorghum-CSH 5, CSH 6 Maize—Ganga Safed 2, Ganga 9, Suwan, 1 Groundnut—AK 12-24, BG 1, BG 2, Greengram-Suniana, PDM11, Blackgram-Pant U 19, Pant U 30, Soybean-Bragg, Birsas Soybean-1, PK 262, PK 327, 308, PK 416 Rice-Bala, Brown Gora, 23-19, Kiran, IET 7579, Poorna, Abha Kharif Potato
2. Mid-August:	Transplant Ragi (Godavari)
3. Mid-September:	Toria—BR 23, Assam Selection
4. Mid-October:	Safflower-APRR 1, APRR 3, A 1, A 300. Linseed—T 397, LC 267, DR 6-5, Lentil—BR 25, Rajan, Pant 406, Pant 639, K 75, Lens 4076.
5. Mid-November:	Wheat—C 306, HP 1258, HC 203, Kalyan Sona.

Annexure–XIV
Additional Outlay for Irrigation Projects during Drought of 1987

(Rs in crore)

	State/Project	Plan Outlay 1987-88	Additional outlay	Additional Potential (th. ha.)	District Benefited
	I. ANDHRA PRADESH				
A.	**Major Project**				
	Canal work of				Nellore and
	1. Somasila Project	8.00	2.00	1.00	Cuddapah
	2. Nagarjuna Sagar Project	13.00	3 00	3.00	Nalgonda
B.	**Medium Projects**				
	1. Pulivendula	1.00	1 00	0.50	Cuddapah
	2. Swarna	0.15	0.50	0.25	Adilabad
	3. Raiwada	0.90	1.00	0.50	Vishakhapatnam
	4. Jhanjhavati	1.25	1.75	0.75	Vizianagaram
	5. Madduvlasa	1.00	1 75	0 75	Vizianagaram
	6 Vengalasayalasagaram	1 40	1 75	0 75	Vizianagaram
	7. Cheyyaru	2.00	1 75	0.50	Cuddapah
	Total (A + B)	28.70	14 50	8.00	
C.	**Minor Irrigation Tanks** Canal works of minor irrigation tanks in drought affected districts	N.A.	7.50	4.50	Preferably districts other than covered above.
	Total (A + B + C)	28 70	22.00	12.50	
	II. GUJARAT				
A.	**Major Projects**				
	Earth Work of Canals				
	Sabarmati Project	4.50	1 94	2.000	
B.	**Medium Irrigation Projects**				
	1. Kutch District (6 projects)	1.10	1 04	1.720	
	2. Saurashtra (7 schemes)	2.83	4 71	6.837	
	3. Gujarat Region (6 schemes)	5.89	2.06	2.460	
	4 Modernisation of Projects (4 schemes)	7.46	2.30	2.300	
C.	**Minor Irrigation Projects** Earth Work of Minor Irrigation Tanks in Advance Stage of Completion				
	1. Saurashtra	2.51	11 00	8 153	
	2. Kutch	0.26	1.75	1.655	
	3. Gujarat	1.49	5 20	4.244	
	Grand Total (A + B + C)	26.04	30 00	29.369	

Continued...

III. HARYANA

A.	**Major Projects**				
	1. J.L.N Lift Irrigation	8 00	1 00	1.00	Bhiwani, Rohtak and Mohindergarh
	2. Gurgaon Canal	0.40	0.50	0.50	Gurgaon
	3. Loharu Lift Irrigation	1.50	0.50	0.50	Bhiwani, Hissar and Mohindergarh
	Total (A)	9.90	2.00	2.00	

IV. HIMACHAL PRADESH

A.	**Major Prroject**			
	Balh Valley Scheme	0 01	0.005	0.50
C.	**Minor Irrigation**	NA	0.006	0 50
	Minor Irrigation Incomplete Schemes			
	Total (A + C)	0.01	0 01	1 00

V. JAMMU AND KASHMIR

B.	**Medium Schemes**			
	1. Ans Irrigation Project	0.75	1.00	0.05
	2. Kastigarh Canal	0.45	0 35	—
	3. Koil Lift Scheme	1.20	1 00	0.25
	4. Shiva Canal	—	0.50	—
	5. Modernization of Old Canal	0 84	—	0 60
	Total (B)	3.24	2.85	0 90
C.	**Minor Irrigation**			
	Remodelling/Modernisation of Khuls			
	(a) Jammu	—	0.40	0 40
	(b) Kashmir	—	1.15	1.10
	Other Minor Irrigation Works			
	(a) Jammu	—	0.50	0.25
	(b) Kashmir	—	1 50	0.75
	Total (C)	—	3.55	2.50
	Total (B + C)	3.24	6 40	3 40

VI. KARNATAKA

A.	**Major Projects**				
	1 Ghatprabha Stage III	14.00	3.00	1.50	Belgaum, Bijapur
	2. Malaprabha	18.00	7 00	3.00	Belgaum, Bijapur and Dharwad
	Total (A)	32.00	10.00	4.50	

Continued....

B.	**Medium Projects**				
	1 Manchanbale	1.00	1.50	0.50	Bangalore
	2. Upper Mullamari	1.00	1.50	0.50	Bidar and Gulbarga
	3. Amarja	1 25	2.00	0.50	Gulbarga
	4. Chulkinala	0.50	2.00	0.50	Gulbarga
	Total (B)	3.75	7.00	2.00	
	Total (A + B)	35.75	17.00	6.50	
C.	**Minor Irrigation**				
	1. Tank Projects (10 numbers)	N.A.	8.00	4.50	Selected Drought Affected Districts
	Total (A + B + C)	35.75	25.00	11.00	

VII. KERALA

A.	**Major Project**				
	Chimoni	3.20	1.50	0.50	Trichur
	Total (A)	3.20	1.50	0.50	
B.	**Medium Project**				
	Karpuzha	0.50	2.00	1.00	Wynad
	Total (B)	0.50	2 00	1.00	
C.	**Minor Irrigation**				
	Earth Work of Small Storages	N.A	2.00	1.00	Selected Drought Affected Districts
	Total (A+B+C)	3.70	5.50	2.50	

VIII. MADHYA PRADESH

A.	**Major Projects**				
	1 Extension of Doab Canal and its minors of Sixth Sindh Phase-II	2.52			
	2. Chingred Distributries and Minors of LBC of Kodar Project	1.10	5 07	3.58	Gwalior, Raipur and Chhatarpur.
	3 Canal System of JONK project	1.40			
	4. Canal System of Bariyarpur LBC	2.50			
B.	**Medium Projects**				Raipur, Ratlam and Shivpuri
	1. Canal System of Balar project	0 36			
	2. Canal System of Dholawad project	1.40		1.94	
	3. Canal System of Paronch Project	0.064	1.07		
	Total (A+B)	9.344	6.14	5 52	
C.	**Minor Irrigation:** Earth Work for 128 Minor Irrigation Schemes	3.22	20 86	18.19	
	Total (A+B+C)	12.654	27.00	23.71	

Continued...

IX. MAHARASHTRA

A&B	**Major and Medium Projects**				
	1. Kerwa	0.60	2.00	2.00	Nasik
	2. Upper Godawari	2.80	2.00	2.00	Nasik
	3. Purad	0 10	1.00	1.00	Nasik
	4. Kukadi	15 63	2.00	1.50	Ahmednagar and
	5. Waghur	0.55	2.00	2.00	Solapur
	6. Bhima	17 00	5.00	2.00	Jalgaon
	7. Upper Tapi Stage I	4.50	2.00	1.00	Pune and Solapur
	8. Chaskaman	0.10	2.00		Jalgaon
	9. Upper Pravai	0.22	2.00		Pune
					Ahmednagar
	Total (A+B)	41.50	20.00	11.50	
C.	**Minor Irrigation**				
	Surface Tank Schemes	N.A.	6.00	3.00	
	Total (A+B+C)	41.50	26.00	14.50	

X. NAGALAND

C.	**Minor Irrigation**				
	Diversion Schemes	N.A.	0 50	0.50	
	Total (C)		0.50	0.50	

XI. ORISSA

A.	**Major Projects**				
	1 Upper Kolab Irrigation Scheme	8.00	3.00	0.50	Koraput
	2. Upper Indravati Irrigation Scheme	16.00	1.00		Kalahandi:
	3 Anandpur Barrage	1.00	0.50	2.00	Keonjhar
	Total (A)	25.00	4.50	2.50	
B.	**Medium Projects**				
	1. Badanala	5.00	0.80	0.12	Koraput
	2 Harehar Jora	4 00	0.50	0.15	Bolangir
	3. Pilla Salki	*	0.70	0.30	Phulbani
	4. Daha	*	0.44	0.044	Ganjam
	5. Dumorbahal	*	0.51	0.040	Kalahandi
	6. Remal	*	0.11	0 210	Keonjhar.
	7. Sarafgarh	*	0.48	0 045	Sundargarh
	8. Talasara	*	0.05	0.010	Sambalpur
	9. Jhor Bandha	*	0.25	0 078	Sambalpur
	10 Gohira	*	0.77	0.100	Puri
	11. Kaunsia	*	0.69	0 30	Keonjhar
	12. Ramal Extension	*	0.50		
	13. Baghua Stage II (Gunjam)	0.10	0.40	3.00	Ganjam
	14 Bhaskal	0.50	0.35	1.00	Koraput
	15. Birupa Genguti	*	0.50	0.50	Cuttak
	16. Ghodahad Extension	0.07	0.11	1.21	Ganjam
	17. Modernisation of Rushi Kulya Irrigation	0.10	0.15	0.10	Ganjam
	18. Extension of Upper Suktal Canal System	0.31	0.12	0.10	Bolangir
	Total (A+B)	35.08	7.43	4.51	
C.	**Minor Irrigation**	9.81	10.07	6.00	Selected drought affected districts
	Total (A+B+C)	44.89	22.00	13.01	

Note: *Budget provision to be made at the rate of Rs. 1 lakh for each scheme in the revised estimates.

Continued...

XII. RAJASTHAN

A.	**Major Projects**			
	1. Jakham Project	4 00	0 60	1 00 Udaipur
	2. Mahi Bajaj Sagar	20.00	5 00	2 00 Banswara
	3 Indira Gandhi Nahar Project	58.00	20 00	10 00 Sri Ganganagar, Churu, Bikaner, Jodhpur, Baroda and Jaiselmer
	Total (A)	82 00	25 60	13 00
B.	**Medium Projects**			
	1. Som Kamala Amba	5 00	1 70	1 00 Dungarpur
	2. Som Kajdar	1.80	0 40	1 22 Udaipur
	3 Paswan Lift	0 45	0 50	0 50 Kota
	4 Meja Modernisation	0.50	0 20	0.01 Bhilwara
	5. Gurgaon Canal	0.27	0.60	2.00 Bharatpur
	6 Morel Modernisation	0 20	0 20	0 25 Jaipur
	7. Galwa Modernisation	0.15	0 15	0 16 Tonk
	8. Gambhiri Modernisation	0 50	0 20	0 06 Chittorgarh
	9 Harish Chandra Sagar	0 35	0 25	0 20 Kota and Jhalawar
	10 Sawan Bhadon	1 50	0 25	0 10 Kota
	Sub-Total	10 72	4 45	5 50
	Modernisation Projects:			
	1 Alnia Modernisation	0 05	0 20	0.10 Kota
	2 Peswar Modernisation	0 05	0.12	0 08 Kota
	3. Parwati Modernisation	0 05	0 18	0 10 Kota
	Total (B)	10 87	4 95	5 78
	Total (A+B)	92 87	30 55	18 78
C.	**Minor Irrigation**			
	Earth Work Completion of 61 Minor Irrigation Works	4.42	6 95	6 53 Bundi, Jhalawar, Kota, Banswara, Bhilwara, Udaipur, Jaipur, Alwar, Tonk, Sawai Madhopur, Dholpur Bharatpur, Ajmer, Sirohi, Jodhpur and Pali
	Total (A+B+C)	97.29	37.50	25 31

XIII. TAMIL NADU

B.	**Medium Projects**			
	1. Kodagnar	2 20	0 60	0.30 Madurai and Tiruchi
	2. Orthulpalayam	4 00	1.40	0 50 Periyar and Tiruchi
	Total (B)	6.20	2.00	0.80
C.	**Minor Irrigation**			
	Tank Projects in Advance Stage of Completion	N.A.	1.00	0.50 Selected Drought Affected Districts
	Total (B+C)	6 20	3.00	1 30

Continued...

XIV. UTTAR PRADESH

A+B	Major and Medium Irrigation				
	1. Sarda Sahayak	4.00	4.50	6.00	Faizabad, Sultanpur, Jaunpur, Azamgarh, Gazipur, Pratapgarh, Ballia, Varanasi, Allahabad, Barabanki and Rae Bareilly
	2. Madhya Ganga Canal	3.00	3.00	4.00	Aligarh, Bulandshahr, Ghaziabad, Meerut, and Bijnor
	3. Eastern Ganga Canal	3.00	3.00	4.50	Bijnor
	4. Narainpur Pump Canal	1.00	0.35	0.30	Varanasi
	5. Deobali Pump Canal	1.00	0.35	0.30	Ghazipur
	6. Chittaurgarh Reservoir	2.00	0.82	0.50	Gonda
	7. Zamania Pump Canal	1.20	0.20	0.30	Ghazipur
	8. Gyanpur Pump Canal	0.70	1.50	0.50	Mirzapur
	9. Maudeha Dam	1.75	0.50	. .	Hamirpur
	10. Rajghat Canal	1.75	1.75	. .	Lalitpur, Jalaon, and Jhansi
	11. Rajghat Canal	1.00	1.10	0.50	Etah
	12. Kishanpur Pump Canal	1.00	0.35	0.30	Allahabad
	13. Saryu Nahar Pariyojna	3.60	3.60	. .	Bahraich
	Sub-Total	25.00	21.02	17.20	
	14. Sajnam Dam	. .	0.30	0.04	Lalitpur
	15. Shahzad Dam	. .	0.30	1.00	Lalitpur
	16. Patharai Dam	. .	0.65	. .	Jhansi
	17. Raising Meja Dam	. .	1.00	1.00	Mirzapur
	18. Saryu Pump Canal	. .	0.23	2.00	Bahraich
	Sub-Total	. .	2.48	4.04	
	Total (A+B)	25.00	23.50	21.24	
C.	**Minor Irrigation**				
	1. *Bundhies*	4.00	2.50	2.30	Mirzapur
	2. Hill Channels	. .	2.00	0.50	Dehar Dun, Uttarkashi, Tehri, Pauri, Chamoli and Nainital
	Total (C)	4.00	4.50	2.80	
	Total (A+B+C)	29.00	28.00	24.04	

Annexure-XV
Monthwise Employment Generation under NREP, 1987-88

(lakh manday)

S. No.	State / Union Territory	July 1987	August 1987	September 1987	October 1987	November 1987	December 1987	January 1988	February 1988	March 1988	April 1988	May 1988	June 1988	July 1988
1.	Andhra Pradesh	16.75	17.01	34.03	21.84	17.86	17.64	17.89	29.09	71.82	5.99	10.43	20.35	17.93
2.	Gujarat	8.36	8.63	13.66	8.73	9.80	12.28	13.41	17.59	38.19	10.79	20.25	22.02	12.40
3.	Haryana	0.85	3.18	2.90	3.26	1.38	1.55	1.19	1.25	5.87	0.56	0.45	1.96	1.05
4.	Himachal Pradesh	1.02	1.44	1.84	1.80	1.64	1.92	1.73	2.44	6.99	0.60	1.35	1.55	1.29
5.	Jammu and Kashmir	2.36	3.30	1.96	1.64	2.65	5.37	4.81	5.46	7.41	1.31	0.22	0.57	0.60
6.	Karnataka	7.35	14.12	16.84	15.38	14.01	13.71	18.85	36.48	83.30	5.38	5.38	17.19	10.09
7.	Kerala	4.70	5.10	13.91	4.40	4.15	18.93	4.56	4.96	25.24	1.90	8.03	20.29	5.63
8.	Madhya Pradesh	42.31	60.38	26.67	29.93	22.89	40.59	18.56	34.19	150.16	20.26	21.78	46.71	40.01
9.	Maharashtra	14.32	15.30	28.98	11.85	18.27	28.58	23.27	28.71	75.63	2.72	7.33	15.52	12.01
10.	Nagaland	0.20	0.20	0.30	0.20	0.10	0.30	0.60	1.12	1.09	0.20	0.30	0.25	0.24
11.	Orissa	13.80	19.55	22.47	14.99	21.96	20.35	18.12	13.95	51.46	3.92	8.81	12.48	17.36
12.	Punjab	1.28	1.06	4.91	0.44	0.54	0.31	2.71	2.78	2.85	0.15	0.12	2.54	0.21
13.	Rajasthan	17.09	13.13	15.00	11.88	12.05	24.07	19.50	31.64	60.58	47.37	39.08	37.80	12.74
14.	Tamil Nadu	11.69	20.80	64.38	24.46	31.65	31.81	29.40	29.25	65.01	4.03	17.31	91.64	41.96
15.	Uttar Pradesh	27.49	41.29	44.07	47.98	66.47	55.94	56.39	54.36	100.20	10.44	13.34	28.46	31.10
16.	Pondicherry	0.38	0.56	0.46	0.63	0.25	0.19	0.12	0.17	0.24	0.03	0.06	0.28	0.19

Annexure-XVI
Monthwise Employment Generation under RLEGP, 1987-88

(lakh manday)

S. No.	State / Union Territory	July 1987	August 1987	September 1987	October 1987	November 1987	December 1987	January 1988	February 1988	March 1988	April 1988	May 1988	June 1988	July 1988
1	Andhra Pradesh	17.13	14.11	24 69	19.78	18.50	18.30	17.55	30.42	36.42	5 37	7.86	12.63	20.75
2.	Gujarat	4 64	3.82	7 80	4.83	2.95	7.11	8.93	11.79	26.68	5 84	8.65	11.24	2.76
3.	Haryana	1 36	2.90	2.71	2 98	1 51	2.06	1.22	1.38	2.34	0 14	0.16	0.37	0.46
4.	Himachal Pradesh	0 85	0 95	1 46	1 48	1 50	1 63	1.74	2.10	2.77	0 72	0.94	0.89	0.50
5.	Jammu and Kashmir	0.29	0 24	1.09	0 63	0 80	0.60	1 01	0.71	4.40	0 02	0 30	0.21	0.43
6.	Karnataka	16 94	14 28	16.27	10.84	13.87	18.35	11 58	18.79	42.21	1.01	7.17	21.90	17.96
7.	Kerala	4 79	7 17	9 96	4 13	2.76	22.00	3 25	2.64	15.38	1.27	2 11	12.96	1.02
8.	Madhya Pradesh	24 98	14.76	12 04	24.78	25.75	16 26	37 34	39.50	40 02	14 60	14.28	18 03	16 49
9.	Maharashtra	17.88	12.38	13 67	15.83	14.84	10 47	14 30	30 28	55.85	9.26	7.29	19 69	17 94
10.	Nagaland	0.20	0.20	0 20	0 20	0.10	0 30	0.60	1 30	1 10	0 19	0.33	0.21	0.26
11.	Orissa	11.94	14.10	21.59	10 67	22 15	11 77	15 15	15 17	43.93	2 76	6.55	11.87	11.95
12.	Punjab	1.62	1 26	7.33	0 83	0 85	1.18	1 29	1 70	2.36	2 09	0 74	0.42	0.66
13.	Rajasthan	15.81	6.73	12.65	8.30	13 02	21.06	29 52	31 08	31.46	16 96	18 89	21.62	9 90
14.	Tamilnadu	14.61	17.21	51 74	21.34	21 96	29.57	24 71	26.77	53.91	1.55	10.63	33 41	21 71
15.	Uttar Pradesh	19.84	28.83	0 37	68.20	45 66	57.54	40 21	73 50	117.65	5 08	10 10	20.05	26.98
16.	Pondicherry	0.09	0 19	0 31	0.48	0 16	0.34	0.11	0 24	0.40	0.04	0.25	0.33	0 33

Annexure-XVII

Statewise Minimum Wages Paid under NREP and RLEGP, 1987-88

S.No.	State / Union Territory	Minimum Wage per day (Rs)
1.	Andhra Pradesh	12.50
2.	Arunachal Pradesh	16.00
3.	Assam	17.00
4.	Bihar	15.85
5.	Gujarat	11.00
6.	Haryana	19.25
7.	Himachal Pradesh	15.00
8.	Jammu and Kashmir	13.50
9.	Karnataka	09.80
10.	Kerala	15.00
11.	Madhya Pradesh	10.00
12.	Maharashtra	06.00 to 10.00
13.	Manipur	13.50
14.	Meghalaya	11.00
15.	Mizoram	16.00
16.	Nagaland	15.00
17.	Orissa	10.00
18.	Punjab	16.44
19.	Rajasthan	11.00
20.	Sikkim	14.00
21.	Tamil Nadu	11.00
22.	Tripura	12.00
23.	Uttar Pradesh	11.50
24.	West Bengal	12.00
25.	Andaman and Nicobar Islands	18.50
26.	Chandigarh	16.12
27.	Dadra and Nagar Haveli	11.00
28.	Delhi	18.80
29.	Goa, Daman and Diu	12.00
30.	Lakshadweep	12.00
31.	Pondicherry	10.00

Annexure-XVIII

Monthly Labour Strength in Drought Relief Works, 1987-88

(in lakh)

S.No.	State	August 1987	September 1987	October 1987	November 1987	December 1987	January 1988	February 1988	March 1988	April 1988	May 1988	June 1988	July 1988
1	Andhra Pradesh			1 97					0 44				
2.	Gujarat				15.30	16.53	18 54	18 36	18.72	18 63	17.21		
3.	Haryana			1.22	1.51	0.31	0.01	0.61	0.98	0.68	0.39		
4.	Karnataka			0 04	0.39	0 23	0.09	0 21	—	—	—	—	
5	Madhya Pradesh	0.16	0.62	1.13	1.18	2.7	4.7	5 7	5 5	5.8	5.6	6.0	4 9
6	Maharashtra				1.84	2.15	2.67	3.54	3.81	4 11	—	—	—
7.	Orissa			2.63	3.84	5.33	5.40	5.40	—	—	—	—	—
8.	Punjab					0.33	0.27	0 74	0.74	—	—	—	—
9	Rajasthan		10 00	10.00	15.00	16.00	17 00	16 50	16.50	17 00	20 4	20 4	6 00
10	Tamil Nadu		3.59	0.90	0.90	2.15							
11.	Uttar Pradesh		1.01	1.05	1.26	5.43	6.49	6 10					

Note:–Blank space indicates absence of report

Annexure—XIX

Distribution of Land Ownership, 1970-71 and 1981-82

S. No.	Land Owning Category (1970-71)	Percentage distribution of Land Owned		Percentage Change in Land Ownership
		1970-71	1981-82	
	Landowners			
1	Marginal	100.00	94 14	(—)17 60
2.	Small	7.58	10.31	19 10
3.	Medium	36.00	36.38	(—)11 52
4	Large	23 71	18.49	(—)31 75
	Landless			
5.	Argicultural Wage earners	00.00	3.55	
6.	Others	00.00	2.31	

Source: NCAER (1986): Changes in Household Income, Interclass Mobility and Income Distribution in Rural India—A Longitudinal Study—1970-71—1981-82 (mimeo).

Note: 1. Marginal‹O‹LO‹1;Small:1‹LO‹4.0; Medium 4.0‹LO‹10 and Large; LO›10.0, where LO is Land Owned in hectare. Agricultural wage earners are those landless who earn more than 50 per cent of their household income from agricultural wages.

2. Following through the 1970-71 set of households in 1981-82 in each category.

Annexure-XX

Structure of Household Income by the land owning category 1970-71 and 1981-82 (Panel Households)

Sl No.	Land Owning Category (1970-71)	Farm Income				Non-Farm Income			Total Income
		Agricultural and allied (crop+live stock)	Agricultural Wages	All Farm Income	Self Employment(Non-Farm Business)	Other than Self Employment		All Non-Farm Income	
						Salary+ Non-Agricultural Wages	Others (Transfer Receipts+ Property etc.)		
		1	2	3(1+2)	4	5	6	7(4+5+6)	
	1970-71								
1.	**Landowners**								
1.1	Marginal (agriculutral wages earner)*	24.0	70.7	94.7	0.2	1.8	3.3	5.3	100.00
1.2	Marginal (rest)	52.5	12.9	65.4	18.1	10.7	5.8	34.6	100.00
1.3	Small	78.5	8.0	86.5	4.1	4.6	4 8	13.5	100.00
1 4	Medium	89 1	2.7	91.8	1.3	4.5	2.4	8.2	100 00
1.5	Large	92.6	0.9	93.5	1.0	2.7	2.8	6.5	100.00
2.	**Landless**								
2.1	Agricultural wage earner	5.5	80.7	86.2	1.9	7.9	4.0	13.8	100.00
2.2	Other	6.3	12.2	18.5	40.4	35.5	5.6	81.5	100.00
	All Households	60.0	17.1	77.1	9.5	9.1	4.3	22.9	100.00
	1981-82								
1.	**Landowners**								
1.1	Marginal (agricultural wage earner)*	39.9	36.3	76.2	6.3	12.1	5.4	23.8	100.00
1.2	Marginal (rest)	42.8	15.5	58.3	13.1	20.4	8.2	41.7	100.00
1.3	Small	68.1	9.2	77.3	5 2	13.3	4.2	22.7	100.00
1.4	Medium	79.3	3.8	83.1	5.1	7.2	4.6	16.9	100.00
1.5	Large	83.3	1.1	84.2	2.7	7.8	5.1	15.6	100.00
2.	**Landless**								
2.1	Agriculutral wage earner	21.2	44.6	65.8	6.0	23.5	4.7	34.2	100.00
2.2	Other	17.7	16.8	34.5	31.4	28.1	6.0	65.5	100.00
	All Households	53.3	15.0	68.3	10.0	16.4	5.3	31.7	100.00

*Marginal landowners who earn more than 50 per cent of their household income from agricultural wages.
**See foot note 2 in Annexure XIX.

Annexure - XXI

Structure of Household Income by the Land Owning Category, 1970-71 and 1981-82 (All - India)

S.No.	Land Owning Category	Farm Income			Non-Farm Income				
		Agricultural and allied (crop+live stock)	Agricultural Wages	All Farm Income	Self Employment (Non-Farm Business)	Other Than Self Employment		All Non-Farm Income	Total Income
						Salary+ Non-Agricultural Wages	Others (Transfer Receipts+ Property etc)		
		1	2	3(1+2)	4	5	6	7 (4+5+6)	8
1970-71									
1.	**Landowners**	74.92	9 48	84.40	5.71	5.60	4 29	15.60	100.00
1 1	Marginal (agricultural wage earners)	25.02	70 37	95 39	0.60	1 33	2.68	4.61	100.00
1.2	Marginal (rest)	49.76	12.51	62 27	19.44	12.25	6.04	37.73	100.00
1.3	Small	77.42	8.04	85.46	4.14	5.36	5 04	14.54	100.00
1.4	Medium	89.90	2.41	92.31	1.54	3 44	2.71	7,69	100.00
1.5	Large	93.05	0.76	93 81	1.22	2 28	2.69	6.19	100.00
2.	**Landless**	5.54	45.30	50.84	23.20	21.28	4.68	49 16	100.00
2.1	Agricultural wage earner	4.93	82.68	87.61	1.67	7.15	3 57	12.39	100.00
2.2	Others	6.08	11.94	18 02	42.44	33.38	5.66	81.98	100.00
All Households		60.07	17.14	77.22	9.45	8 95	4.38	22.78	100.00
1981-82									
1.	**Landowners**	66.06	7.46	73.52	5.91	16.57	4 00	26 48	100.00
1.1	Marginal (agriculture wage earners)	25.47	64.72	90.19	5.65	0 10	4.06	9.81	100.00
1.2	Marginal (rest)	45.15	6.76	51.91	9.40	33.39	5 30	48.09	100.00
1.3	Small	71.69	6.28	77.97	4.85	13.03	4.15	22 03	100.00
1.4	Medium	83.90	1.54	85.44	4.66	7.71	2.19	14.56	100.00
1.5	Large	92.45	0.26	92.71	1 43	3 38	2.48	7.29	100.00
2.	**Landless**	5.65	32.87	38 52	21.12	33.26	7.10	61.48	100.00
2.1	Agricultural wage earner	3.64	87.28	90.92	5 04	0.59	3.45	9.08	100.00
2.2	Others	6.67	5.01	11.68	29.36	50.00	8 96	88.32	100.00
All	Households	54.77	12.21	66.98	8.75	19.69	4.58	33.02	100.00

Annexure - XXII

Allocation and Lifting of Rice by State/Union Territories 1986 - 88

(thousand tonne)

S.No.	State/Union Territory	1986		1987		1988	
		Allocation	Lifting	Allocation	Lifting	Allocation	Lifting*
1.	Andhra Pradesh	1240.0	1341.2	1165.0	1186.1	845.0	720.8
2.	Arunachal Pradesh	61.5	49.0	68.6	65.1	78.0	55.6
3.	Assam	530.0	398.9	530.0	481.2	455.0	366.5
4.	Bihar	300.0	50.8	345.0	45.6	200.0	45.5
5.	Goa	54.0	42.1	51.75	50.9	52.2	39.7
6.	Gujarat	290.0	255.1	390.0	297.5	420.0	333.3
7.	Haryana	42 0	10.1	42.0	11.5	38.0	21.8
8.	Himachal Pradesh	78 0	30.7	78 0	40.9	71.0	51.5
9.	Jammu and Kashmir	228.0	106.4.	305.0	217.5	277.0	171.2
10.	Karnataka	595.0	586.2	675.0	673.7	610.0	498.5
11.	Kerala	1650.0	1590.9	1660.0	1604.9	1530.0	1412.5
12.	Madhya Pradesh	300.0	190.1	330.0	226.1	250.0	171.8
13.	Maharshtra	660.0	533.2	720.0	630 4	750.0	590.9
14.	Manipur	52.5	24.2	58.5	46.0	66.0	32.5
15.	Meghalaya	102.0	100.00	108.0	111.2	114.0	91.4
16.	Mizoram	79.5	77.4	79.0	76.9	82.0	64.5
17.	Nagaland	67.0	66.1	92.0	89.0	105.0	73.6
18.	Orissa	178.0	59.5	255.0	163.0	320.0	236.1
19.	Punjab	20.1	2.7	18.0	3.6	18.0	5.6
20.	Rajasthan	24.0	10.5	30.0	19.3	48.0	17.0
21.	Sikkim	51.5	40.9	54.0	31.6	55.0	33.7
22.	Tamil Nadu	700.0	444.3	600.0	470.7	680.0	566.4
23.	Tripura	150.5	118.8	167.0	139.9	152.0	105.0
24.	Uttar Pradesh	600.0	144.6	635.0	275.1	510.0	336.2
25.	West Bengal	1500.0	946.2	1500.0	807.2	1070.0	753.5
26.	Andman and Nicobar Islands	12.0	8.9	12.0	9.2	14.0	5.2
27.	Chandigarh	4.45	3.2	6.0	2.9	6.0	4.9
28.	Dadra and Nagar Haveli	1.6	0.6	2.3	—	3.6	0.7
29.	Daman and Diu	—	—	2.25	0.8	5.4	1.4
30.	Delhi	300.0	167.2	300.0	175.5	300.0	213.5
31.	Lakshadweep	5.5	3.0	5.5	3.1	5.5	3.7
32.	Pondicherry	25.25	12.1	23.0	3 9	30 0	3.5
	Total	9902.40	7414.90	10307.80	7961.20	9160.7	7028.0

Note: * Upto Ocotber, 1988

Annexure - XXIII
Allocation and Lifting of Wheat by States/Union Territories, 1986-88

(thousand tonne)

S No.	State/Union Territory	1986		1987		1988	
		Allocation	Lifting	Allocation	Lifting	Allocation	Lifting*
1.	Andhra Pradesh	252.0	93.7	252 0	81 0	153.0	81.7
2.	Arunachal Pradesh	16.8	3 7	13 8	5.9	9.6	5.8
3.	Assam	436 8	177 0	436.8	183.6	237.8	193.8
4.	Bihar	864.0	330.7	1006.0	608.4	790 0	574 9
5	Goa	27.6	12 9	23.6	13 3	18.0	14.2
6.	Gujarat	520.0	341.2	720.0	494.0	815.0	638.9
7.	Haryana	362.0	77.3	360 0	98 9	280.0	101.9
8.	Himachal Pradesh	60.0	41 2	60.0	42.5	140.0	103.0
9.	Jammu and Kashmir	144 0	60.2	150 0	84.9	175 0	93 1
10.	Karnataka	300 0	133.5	300 0	175 2	205.0	147 0
11.	Kerala	420 0	110.6	420.0	105 6	235.0	126.4
12.	Madhya Pradesh	600 0	217.4	600.0	223.3	410.0	249.4
13.	Maharashtra	740.0	656 1	1080.0	1007.2	1040.0	855.9
14.	Manipur	24 0	5 0	24 0	11 2	24.0	7.9
15.	Meghalaya	25 2	18.8	25.2	27.2	25.2	18.4
16.	Mizoram	12.6	3.1	12 6	2.7	12.6	5.3
17.	Nagaland	45.0	34 1	44.0	46 7	24.0	20 3
18.	Orissa	276 0	64.7	276.0	105 3	249.0	164 0
19.	Punjab	180.0	19.0	155 0	1 4	85 0	5.8
20	Rajasthan	690.0	445.4	800.0	641 3	1040 0	831 5
21.	Sikkim	3.0	3.6	3.0	3 1	3.0	2 0
22	Tamil Nadu	360.0	101.7	360 0	70.7	360.0	119.4
23.	Tripura	30 0	9 1	30.0	11.5	30 0	14 1
24.	Uttar Pradesh	540 0	122.3	600.0	260.4	640.0	423.4
25.	West Bengal	1512 0	917.6	1512 0	774.1	1072 0	783.6
26.	Andaman and Nicobar Islands	8 4	4.7	8.4	3 1	8 4	2.7
27.	Chandigarh	21.6	5.7	21.6	10.4	21.6	12.1
28.	Dadra and Nagar Haveli	0.5	0.2	1 1		1 2	0.3
29.	Daman and Diu			0.5		1.7	0 8
30.	Delhi	584.0	319.1	600.0	335.3	600.0	422 5
31.	Lakshadweep	0.07		0.07		0 08	
32.	Pondichery	3.2		3.6		3 45	
	Total	9058 7	4329.6	9899 2	5429.1	8709.6	6020 1

Note: * Upto October, 1988.

Annexure - XXIV

Distribution of Rice and Wheat to States and Union Territories under Integrated Tribal Development Project, 1987-88

(thousand tonne)

S.No.	State/Union Territory	July, 1987 to December, 1987			January 1988 to August 1988			Total Foodgrains		
		Wheat	Rice	Total	Wheat	Rice	Total	Wheat	Rice	Total
1.	Andhra Pradesh		63.3	63.3		70.5	70.5		133.8	133.8
2.	Assam	1.8	8.6	10.4	1.9	9.9	11.8	3.7	18.5	22.2
3.	Arunachal Pradesh	2.8	37.0	39.8	4.3	45.5	49.8	7.1	82.5	89.6
4.	Bihar	95.5	10.5	106.0	98.0	10.8	108.8	193.5	21.3	214.8
5.	Daman and Diu				0.1	0.5	0.6	0.1	0.5	0.6
6.	Gujarat	78.5	53.9	132.4	155.2	99.5	254.7	233.7	153.4	387.1
7.	Himachal Pradesh	5.0		5.0	7.1		7.1	12.1		12.1
8.	Karnataka	8.9	33.0	41.9	10.8	44.7	55.5	19.7	77.7	97.4
9.	Kerala	7.1	24.5	31.6	5.7	18.1	23.8	12.8	42.6	55.4
10.	Lakshadweep	Neg.	1.5	1.5		3.8	3.8	Neg.	5.3	5.3
11.	Manipur		8.6	8.6		8.4	8.4		17.0	17.0
12.	Meghalaya	13.9	57.0	70.9	15.9	75.1	91.0	29.8	132.1	161.9
13.	Madhya Pradesh	66.1	51.2	117.3	95.6	56.4	152.0	161.7	107.6	269.3
14.	Maharashtra	52.2	38.8	91.0	50.1	39.6	89.7	102.3	78.4	180.7
15.	Mizoram	0.4	42.7	43.1	4.5	54.4	58.9	4.9	97.1	102.0
16.	Nagaland	16.6	52.6	69.2	16.4	62.1	78.5	33.0	114.7	177.7
17.	Orissa	12.4	58.8	71.2	26.7	97.4	124.1	39.1	156.2	195.3
18.	Rajasthan	131.6	8.2	139.8	155.8	7.6	163.4	287.4	15.8	303.2
19.	Tripura		25.9	25.9		26.5	26.5		52.4	52.4
20.	Uttar Pradesh	1.5	1.2	2.7	0.1		0.1	1.6	1.2	2.8
21.	West Bengal	75.3	29.0	104.3	73.3	28.5	101.8	148.6	57.5	206.1
	Total	569.6	606.3	1175.9	721.5	759.3	1480.8	1291.1	1365.6	2656.7

Note: Neg: Negligible.

Annexure—XXV
Nutritional Survey, 1987
Report

Table XXV-A: Population Covered

S.No.	State	Number of Districts	Number of Blocks/ Taluks	Number of Villages	Number of Children	Number of Adults	Total Number of Individuals
1.	Andhra Pradesh	1	5	13	788	710	1498
2.	Orissa	4	8	67	1160	1919	3079
3.	Gujarat	2	4	34	2059	1952	4011
4.	Tamil Nadu	4	8	16	739	1449	2188
5.	Karnataka	5	14	32	1153	1911	3064
6.	Madhya Pradesh	4	8	16	1970	1583	3553
7.	Rajasthan	6	30	62	1797	6427	8224
	Total	26	77	240	9666	15951	25617

Table XXV—B: Rainfall, 1987

(mm)

S.No.	Rainfall / State	Normal Rainfall	Rainfall Average	Range	Percentage Deficit	Remarks
1.	Andhra Pradesh	510	476	309—638	6.0	Delayed rains
2.	Orissa	1600	740	295—1475	51.0	
3.	Gujarat	650—1278	80	0—120	88.0	
4.	Tamil Nadu	NA	NA	NA	NA	
5.	Karnataka	NA	788	550—947	—	
6.	Madhya Pradesh	982	662.7	—	32.5	
7.	Rajasthan	346	70.5	30—104	79.6	

Note: NA—Not available

Table XXV—C: Food Consumption

(g/cu/day)

S.No.	Food / State	Cereals and Millets	Pulses	Green Leafy Vegetables	Other Vegetables	Roots and Tubers	Milk	Fats and Oils	Sugar and Jaggery
1.	Andhra Pradesh	505(560)	12(23)	13(2)	58(38)	10(12)	17(82)	7(9)	5(10)
2.	Orissa	488(566)	28(32)	23(25)	55(76)	29(40)	7(6)	4(5)	4(4)
3.	Gujarat	494(430)	17(28)	0(1)	38(23)	57(63)	55(242)	14(18)	30(40)
4.	Tamil Nadu	475(511)	25(27)	12(10)	63(62)	8(23)	5(57)	7(9)	4(14)
5.	Karnataka	550(701)	27(54)	10(16)	54(30)	20(30)	23(26)	3(7)	16(33)
6.	Madhya Pradesh	448(470)	35(50)	26(5)	37(52)	5(41)	25(103)	3(16)	17(27)
7.	Rajasthan*	450(494)	NA	NA	NA	NA	NA	NA	NA
8.	RDA (ICMR, 1981)	460	40	40	60	50	150	40	30

Note: Figures in parentheses are intakes during pre-drought period as per NNMB surveys.
*(F NB survey in case of Rajasthan); g : Gram; cu = Consumption unit;
NA—Not Available. ; RDA: Recommended Dietary intake for Indians.

Table XXV—D: Deficit in Food Consumption

(g/cu/day)

S.No.	Food / State	Cereals and Millets	Pulses	Roots and Tubers	Milk and Milk Products	Fats and Oils	Sugar and Jaggery
1.	Andhra Pradesh	9.8	47.8	16.7	79.3	22.2	50.0
2.	Orissa	13.8	12.5	27 5	16.7	20.0	Nil
3.	Gujarat	Nil	39.3	9.5	77.3	22.2	25.0
4.	Tamil Nadu	7.0	7.4	65.2	91.2	22.2	71.4

5.	Karnataka	12.5	50.0	33.3	11.5	57.1	51.5
6.	Madhya Pradesh	4.7	30.0	88.0	75.8	79.0	35.5
7.	Rajasthan*	8.9	NA	NA	NA	NA	NA

Note: *(F NB Survey in case of Rajasthan) ; g : Gram ; cu = Consumption unit; NA—Not Available.

Table XXV-E: Nutrient intake

S.No.	Nutrient / State	Calories (Kcals)	Proteins (g)	Calcium (mg)	Iron (mg)	Vitamin A (mg)	Thimine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
1.	Andhra Pradesh	1936	51	245	16.4	184	1.23	0.77	13.8	32.2
2.	Orissa	1978	50	433	15.9	289	0.78	0.57	12.2	37.4
3.	Gujarat	2258	70	392	30.2	176	2.26	1.09	19.8	25.4
4.	Tamil Nadu	1895	44	423	8.9	144	0.71	0.53	8.9	18.9
5.	Karnataka	2150	55	1237	22.7	152	1.98	0.95	11.3	20.1
6.	Madhya Pradesh	1889	58	NA	26.0	162	NA	NA	NA	NA
7.	Rajasthan	1554	45	NA	NA	NA	NA	NA	NA	NA
8.	RDA (ICMR, 1981).	2400	55	400-500	24.0	750	1.20	14.0	16.0	40.0

Note: g: Gram; NA: Not Available; RDA: Recommended Dietary intake for Indians.

Table XXV-F: Nutrition Deficiency Signs in Pre-school Children

S.No.	Nutrition Deficiency / State	Protein Energy Malnutrition			Night Blindness	Bitot's Spots	Angular Stomatitis	Anaemia (Pallor)
		Emaciation	Ocdema	Maramus				
1.	Andhra Pradesh	2.8	0.8	2.0	0.4	2.2	7.5	2.2
2.	Orissa	5.3	1.0	3.3	0.1	0.3	6.8	4.9
3.	Gujarat	1.8	0.3	1.0	0.7	4.1	0.4	0.3
4.	Tamil Nadu	0.4	0.1	0.9	0.1	2.0	10.1	7.4
5.	Karnataka	1.0	0.1	0.5	—	1.0	16.1	2.3
6.	Madhya Pradesh	—	—	—	—	0.1	0.6	0.9
7.	Rajasthan	Pooled	13.3	—	13.6	14.4	27.4	46.1

Table XXV — G: Anthropometric Measurements

S.No.	Measurement / State	Male				Female			
		Weight (Kg.)		Height (cm)		Weight (Kg.)		Height (cm)	
		X	SD	X	SD	X	SD	X	SD
1.	Andhra Pradesh	46.9 (50.6)	6.14	161.4	5.45	41.3 (43.2)	5.29	150.5	5.42
2.	Orissa	48.7 (50.5)	7.24	162.0	3.58	40.0 (41.6)	5.91	150.5	6.15
3.	Gujarat	51.2 (50.0)	6.60	166.5	6.63	44.8 (43.9)	6.76	154.2	5.58
4.	Tamil Nadu	49.9 (50.3)	7.30	162.7	6.27	42.3 (44.2)	6.26	151.8	6.33
5.	Karnataka	48.6 (50.0)	5.78	162.6	6.38	42.3 (42.5)	5.92	151.2	6.51
6.	Madhya Pradesh	45.9 (50.7)	NA	162.4	NA	40.9 (44.6)	NA	150.3	NA
7.	Rajasthan	51.2	8.04	NA	NA	45.3	6.18	NA	NA

Note: Figures in parentheses are as per NNMB data.
X = Mean, SD = Standard Deviation

Table XXV-H: *Gomez Classification for Pre-School children

S.No.	State	Gomez Grades				
		Number	Normal	Mild	Moderate	Severe
1.	Andhra Pradesh	788	4.9(18.3)	34.8(43.4)	45.3(33.5)	15.0(4.2)
2.	Orissa	1160	12.1(18.3)	51.2(43.4)	33.4(32.5)	3.8(5.8)
3.	Gujarat	2059	12.4(11.8)	43.1(37.1)	36.3(40.1)	8.2(11.0)
4.	Tamil Nadu	735	17.4(17.6)	50.5(46.2)	28.7(30.1)	3.4(5.8)
5.	Karnataka	1153	11.5(14.2)	50.9(47.7)	34.0(33.3)	3.6(4.8)
6.	Madhya Pradesh	1970	7.6(13.4)	35.9(29.4)	44.2(42.9)	12.3(14.8)
7.	Rajasthan	1225	17.1	40.3	33.4	6.2

Note: *Using standard values of well to-do Hyderabad children
Figures in parentheses are well-to-do as per NNMB surveys.

Table XXV-I: Energy Intakes for House holds (cu/day)

S.No.	State	Number	Energy Intake (Kilocalories)					
			<500	500-1000	1000-1500	1500-2000	2000-2400	>2400
1.	Andhra Pradesh	129	—	4.6	16.8	35.1	28.2	15.3
2.	Orissa	311	0.3	3.1	20.1	33.7	14.2	95.6
3.	Gujarat	157	—	0.6	11.5	31.2	19.8	36.9

Note: Cu: Consumption unit

Annexure - XXVI

Milk Procurement Under Operation Flood Programme, 1986-87

(thousand kilogram)

S.No	State	May		June		July		August		September		October	
		1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
1	Andhra Pradesh	585.80	559.21	550 82	402 65	402.65	421.76	356.78	357 38	446.63	452 21	646.97	688 19
2.	Gujarat	1722 20	1777.80	1547 60	1450 45	1361.45	1556.97	1484.94	1484.94	1918 64	2099.19	2122.63	2218 95
3	Haryana	69 48	110.03	48 45	67 41	68.15	85.31	78.26	123.99	137.98	157 59	149 11	158.42
4.	Himachal Pradesh	10 15	8 72	10 29	7.87	11 59	8.98	15.98	11.67	20.16	14.43	17.49	12 82
5.	Jammu and Kashmir	7 39	9 54	7.64	9 54	7 69	8.58	6.75	7 54	6.67	5.96	5 24	5 87
6	Karnataka	625.99	556 20	670.02	679 10	679.18	559.84	666.66	544.13	733.32	376.95	899.37	89 73
7	Kerala	113.13	129.30	151.30	127.54	178.47	120 30	148.07	107.24	155.99	93.51	727 58	98.18
8	Madhya Pradesh	127.34	125 33	104.59	100.59	155 33	100.51	110.05	126 84	248 81	179.27	230.96	212 17
9.	Maharashtra	1602 75	1721.96	1406.05	1521.61	1332.00	1229 53	1377.51	1457.94	1479.77	1590.99	1574.92	1719.36
10	Orissa	19.38	20 54	18.62	27.79	27.79	20.23	30.18	19 72	28.55	17.75	26.92	16 03
11.	Punjab	312 27	368 70	258.77	198.11	198.11	249.60	242.56	306.36	343 46	364.60	368.58	373.73
12.	Rajasthan	325 02	508 34	272 21	410 02	262.82	405 17	159.20	428.76	248.91	362.82	240.26	300.46
13	Tamil Nadu	819 91	772 53	735.56	746.30	707.09	632.07	652.23	592 07	567 50	583.94	729.37	714 00
14	Uttar Pradesh	204 22	186 45	102.45	152 42	141.46	193.79	190 11	220.15	311.50	337.95	343.71	417.22
	Total	6545.19	6851 25	5704.77	5932 77	5488.77	5593.32	5519.28	6095.84	6647.89	6835.06	7628.11	7747 13
	Percent Variation	(-) 4 5		(-) 1 9		(-) 1 9		(-) 9.5		(-) 2.7		(-) 1 5	

Note: Figures refer to average daily procurement.

Annexure-XXVII

Requirement of Fodder in Rajasthan and Gujarat, 1987-87

(a) Rajasthan

(lakh tonne)

S. No	Fodder Requirment	November 1987	December 1987	January 1988	Februrary 1988	March 1988	April 1988	May 1988	June 1988	Total
1.	For the entire State	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	249.84
2.	For Crisis Area	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	112.00
3.	For Cattle Camps, Feeding Centres, Fodder Depots, etc.									
	(a)Cattle Camps									
	Number of Cattle (lakh)	8	10	12	17	22	27	32	32	
	Fodder required	1 20	1.50	1 80	2.55	3 30	4.05	4.80	4.80	24.0
	(b) Fodder Sale Depots	0.80	1.00	1.20	1.40	1.50	1.60	1.80	2.00	11.30
	Total (a+b)	2.00	2 50	3.00	3.95	4 80	5.65	6.60	6.80	35.30

(b) Gujarat

(lakh tonne)

S. No.	Fodder Requirment	November 1987	December 1987	January 1988	Februrary 1988	March 1988	April 1988	May 1988	June 1988	Total
1.	For the entire State	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	148.00
2.	For Crisis Area	8.25	8.25	8.25	8.25	8 25	8.25	8.25	8.25	66.00
3.	For Cattle Camps, Feeding Centres, Fodder Depots, etc.	1.60	1.60	1 60	1 60	1.60	1.60	1.60	1.60	12.80

Annexure-XXVIII

Districtwise Fodder Supply and Expenditare on Cattle Conservation in Rajasthan, 1987-88

Sl. No.	District	Expenditure (August 1987 to March 1988) (Rs. in lakh)	Fodder Supplied	Number of Fodder Depots
1.	Ajmer	84.37	493333	202
2.	Alwar	11.26	13052	22
3.	Banswara	34.03		
4.	Barmer	536.06	1461892	331
5.	Bharatpur	6.43		
6.	Bhilwara	19.80	117815	144
7.	Bikaner	564.87	2327438	363
8.	Bundi	6.43		
9.	Chittor	15.78		
10.	Churu	267.08	828859	268
11.	Dholpur	3.33	820	5
12.	Dungerpur	75.70	72067	86
13.	Ganganagar	199.14	23045	38
14.	Jaipur	30.78	61702	69
15.	Jaisalmer	529.86	367428	145
16.	Jalore	173.26	750473	285
17.	Jhalawar	3.77		
18.	Jhunijhunu	85.20	151630	92
19.	Jodhpur	575.00	2463700	423
20.	Kota	8.09		
21.	Nagaur	213.45	359730	192
22.	Pali	196.59	785402	226
23.	Sawai madhopur	10.25	66428	57
24.	Sikar	135.79	108277	98
25.	Sirohi	56.64	138822	89
26.	Tonk	12.70	2262	
27.	Udaipur	75.93	443175	287
	Total	3931.59	9953506	3282

Annexure — XXIX

Afforestation and Tree Plantation during Seventh Five Year Plan

The total afforestation during the Sixth Plan period was only 4.65 million hectare. In the first three years of the Seventh Plan an area 5.04 million hectare has already been covered. The annual progress is shown in Table XXIX-A

Table XXIX-A: Expenditure and Area Afforested, 1985-86 to 1988-89

S.No.	*Year*	*Expenditure (Rs. in crore)*	*Area Afforested (million hectare)*
1.	1985-86	372.44	1.51
2.	1986-87	460.22	1.76
3.	1987-88	486.79	1.77
4.	1988-89	632.00*	2.00*

Note: *Target

A number of steps were taken to monitor and evaluate social forestry programmes. An operational guide for monitoring these programmes was prepared and circulated to the States. On this basis a computerised information system was established in 26 States and Union Territories for reporting progress of afforestation to the GOI. Independent evaluation of on-going schemes was conducted by NWDB and the Planning Commission. Survival rates of plantation over a period of 5 years were evaluated for the first time in a study covering States of Gujarat, Karnataka, Tamil Nadu, West Bengal and Uttar Pradesh by the Indian Institute of Public Opinion. Table XXIX - B shows Statewise survival rates of plantation.

Table XXIX-B: Survival Rate of Plantation in Selected States.

S.No.	State	*Percentage of Survival*	
		All Plantation	Farm Forestry
1.	Gujarat	63.60	43.60
2.	Karnataka	79.40	61.60
3.	Tamil Nadu	60.50	53.00
4.	Uttar Pradesh	60.69	70.42
5.	West Bengal	67.57	69.88

A number of programmes were taken up to secure people participation. A scheme of grant-in-aid to voluntary agencies was initiated with a view to involve non-government organisations in the process of development of wastelands with people participation. Under this scheme, priority is given to: (i) Establishment of decentralised nurseries and school nurseries; (ii) Block plantation specially on cummunity land and land of seheduled castes/scheduled tribes and people living below the poverty line; (iii) Pasture development through people's institutions and people involvement; and (iv) Assistance in implementation of the tree *patta* schemes.

This scheme is in operation for the last two years. It has been very well received by the voluntary sector and the rural public at large. Grant-in-aid is provided under the scheme to voluntary agencies, tree growers, cooperatives and non-government organisations involved in nursery raising, plantation, increasing awareness, training of rural public and pasture development. As many as 248 projects involving 199 agencies were finalised upto 31st November, 1988 all over the country involving a financial commitment of Rs. 20.15 crore. About 82 lakh seedlings in 1985-86, and 250 lakh seedling in 1986-87 were raised.

A scheme for decentralised people's nurseries was also initiated with the following components:—

(a) *Kisan Nurseries:* Kisan Nurseries have been set up in the rural area and 34.26 crore seedlings have been raised.

(b) *School Nurseries:* School nurseries are being promoted on land made available by schools.

(c) *Voluntary Agencies:* Many non-Government organisations are helping in promoting decentralised nurseries by involving landless, poor, small and marginal farmers.

(d) *NDDB:* NDDB has been involved in a big way to set up decentralised nurseries with the help of their milk union federations.

An amount of Rs. 20.41 crore has been disbursed. The decentralised nurseries programme has proved popular with the people and made them aware of the benefits of afforestation. It has brought seedling at the doorsteps of users, thus reducing transportation cost and mortality. It has given additional income to poor nursery persons. School nurseries have helped in raising awareness amongst the children.

To ensure the best results guidelines were issued to the State Governments regarding choice of species to be planted under the social forestry programmes. It was suggested that the species appropriate to soil, moisture and climatic conditions of different parts of the country should be selected taking into account the extent of degradation of land, the availability of water with reference to local needs and preferences. The choice of exotic species were required to be restricted to cases where it was absolutely unavoidable and where there was clear proof that such exotic species would not be detrimental. Species selection should ensure multiple culture and in some area mixture of fodder, fuel trees and leguminous grasses should be planted. Specific guidelines were also issued discouraging monoculture of eucalyptus under social forestry programmes.

Annexure -XXX

Recommendation of the Advisory Council on 20 Point Programme Implementation —October, 1987

1. Names should be selected when everyone is present and the *sarpanch* should be present physically on each occasion when the names on the muster rolls are finally selected.

2. If it is not possible to give employment to one member in a family of 5 or 2 in a family of 10 the least the government can guarantee is employment to one member in a family of 10. The Council strongly recommends that this is immediately implemented.

3. Those families identified as the poorest of the poor must receive employment through the duration of the famine and drought period because their survival depends on the wages they receive in time. Those partially employed or under-employed and those who do not feature in the list of Integrated Rural Development Programme beneficiaries could be given employment on a rotation basis every 15 days.

4. Families who do not possess tools and cannot afford to buy them should not be penalised and refused employment on famine relief works.

5. Minimum wage fixed should be paid to the workers regularly and in time so that they are not exploited, particularly during times of crisis.

6. Part payment (50 per cent) should be made in kind (wheat) to ensure subsistence income and to improve nutritional level.

7. A shelf of identified viable productive projects should be kept ready for implementation.

8. The Council is of the view that wherever feasible, development of private land of small and marginal farmers (2.5 to 5 acre) should be started immediately, preferably on a group basis, under scarcity and famine relief works. Relief activity should also include employment activities for artisans and craftsmen like weavers, leather workers, potters, handicrafts, etc.

9. Old age pension should be given in the form of foodgrains through PDS.

10. Drought relief works and PDS may be supplemented with gruel kitchens or direct distribution of grain without insisting on work in certain specialised area during specific periods.

11. The poor should be allowed to purchase their quota of grain in smaller quantities instead of insisting on their lifting full quotas at once.

12. The system of guaranteeing food for all through separate ration cards be introduced.

13. The Council suggests the formation of Water Committees for monitoring the inflow of water in the pumps to be supported by water meters installed in the pumps.

14. More attention should be paid for conservation of water and avoiding waste.

15. For maintenance of handpumps, *Handpump Mistri Scheme* of Rajasthan may be adopted.

16. Innovative ideas/schemes indicated in para 46 of the report may be introduced.

17. The Council is of the opinion that the suggestions and observations of the development groups must seriously be noted and acted upon.

18. There is a need to involve teachers at the village level in the correct identification of the poor families to be employed on famine relief works as well as their supervision when time comes for payment.

19. There should be coordination between the Famine and Education Departments at the State level. With the active mobilisation of the teachers there may be more check and balances in the process thus resulting in less leakages in the systems.

INDEX