



IRRIGATION MANAGEMENT NETWORK

**THE COMMAND AREA DEVELOPMENT PROGRAMME
IN INDIA: A POLICY PERSPECTIVE**

M V K Sivamohan and Christopher A Scott

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THE COMMAND AREA DEVELOPMENT
PROGRAMME IN INDIA: A POLICY PERSPECTIVE

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M V K Sivamohan and Christopher A Scott

1. INTRODUCTION

This paper traces the evolution of the Command Area Development Programme in India in the context of planned development. It examines processes both in the evolution of new policies, and their revision over time. The paper first summarises the evolution of the Command Area Development Programme in India, and the way in which early emphasis on on-farm development (OFD) resulted from the growing gap between the irrigation potential created in the post-independence boom in irrigation infrastructure, and the irrigation potential actually utilised. The unreliability of main system management, however, was seen to obviate initiatives below the outlet, and subsequent efforts were made to integrate the agriculture and irrigation departments in the CAD programme. The paper also examines how the CAD programmes themselves underwent policy revision on priorities and responsible agencies that reflected difficulties in their implementation and improved utilisation of irrigation potential. However, this paper suggests that the gap between potential and utilisation results as much from inherent water scarcity as from inefficient water use and inadequate management. It is argued that the continuing *impasse* can only be remedied through articulation of a comprehensive strategy of development which includes disparate fields previously thought to be unrelated to irrigated agriculture.

2. THE DEVELOPMENT CONTEXT

The early efforts in development in India before independence were characterised by individual initiative and vision. Many of the development projects taken up during that period came to be known by the names of the

individuals who were associated with them³. It took five years after independence for the state to slowly gear up for development activities. In 1951, The Planning Commission was established to initiate planned development in the country.

The First Phase

During the first decade after 1951, emphasis was laid on welfare goals and infrastructural works for rural development. The Community Development Programme, launched in 1952, envisaged the development of rural areas through concentration of efforts on individuals, primary cultivators and some changes in government administration at the district and below. The programme's origin was in the early experiments already mentioned - especially the Etawah project and Nilokheri project of S K Dey in rehabilitating refugees from Pakistan. Its thrust was promotion of welfare in the villages. The Community Development Programme was implemented along with the National Extension Service to bring about a progressive outlook among people, promote cooperative action and enhance increased production and employment in rural areas. Thus, the first phase of development efforts attempted to create an egalitarian rural society. The strategy adopted was based on the recognition of the need for structural changes such as land reforms.

The Second Phase

In the second phase of developmental efforts during the 1960s, productivity goals dominated planning. As the growth rate in the agricultural sector was not found satisfactory, in 1958 the Government of India approached the Ford Foundation to examine the ways and means of increasing food production in the country. Their report entitled *India's Food Crises and Steps to Meet It* identified pitfalls in food production. It suggested a programme entitled Intensive Agricultural Development Programme (IADP) to be introduced in eighteen selected districts. According to American and Indian experts, this report accurately highlighted the programmes needed for

³ Notable among the efforts by individuals were Gandhiji's experiment in Champaran (1917), the Shantiniketan experiment in Bengal by Rabindranath Tagore (1920), Spencer Hatch's Marthandam project in the erstwhile Madras Presidency (1921), Brayne's Gurgaon experiment in Punjab (1920), V T Krishnamachari's rural reconstruction movement in Baroda (1930), Gandhiji's Sevagram project (1936) and the Etawah project (1947).

India to attain the increase in agricultural production which was sought⁴. IADP has changed the direction and structure of development efforts by making them function on the basis of dominant goals⁵. While the community development strategy spread resources thinly across wide areas, IADP strategy was based on an intensive approach to maximise gains through integrated efforts⁶. However, the strategy of intensification of efforts - administrative, technical and financial - on an area basis did not achieve rapid increase in the levels of agricultural production.

Only in three of the eighteen selected districts were perceptible changes in food grain yields noticed⁷. The lessons of IADP showed that creating irrigation potential and providing extension support was not sufficient to step up agricultural production. Hence, the High Yielding Variety Programme (HYVP) to introduce improved seeds, chemical fertilisers, and other inputs was developed as a component for the IADP. Simultaneously, local pressure to launch identical agricultural development programmes was building up in districts where IADP had not been introduced. This resulted in the starting up of the Intensive Agricultural Area Programme (IAAP), identical in philosophy and approach to IADP, in as many as 114 districts. The second decade thus saw the emergence of area-based programmes such as IADP, HYVP and IAAP, all aimed at accelerating technological change to induce output and productivity improvements in the agricultural sector. The approach proved to be sound and resulted in the spread of the Green Revolution.

The Third Phase

Then came the third phase of development efforts where attention was focused on those who could not derive benefit from the earlier

⁴ Taylor, Carl C, et al. (1967) *India's Roots of Democracy*. New Delhi, Orient Longmans, pp 245-6.

⁵ Fredericks, L.J. (1978) Comparative Study of Goals, Policies, Strategies for Rural Development, in Amara Raksataya and L J Fredericks (eds) *Rural Development; Training to Meet New Challenges* Vol 1. Kuala Lumpur, Asian and Pacific Development Administration Center, p 78.

⁶ Mukherji, B. (1961) *Community Development in India*. New Delhi, Orient Longmans.

⁷ Brown, D D. (1971) *Agricultural Development in India's Districts*. Cambridge, Harvard University Press.

developmental programmes. In 1970, a special agency called the Small Farmers Development Agency (SFDA) was established in forty-six districts, following the advice of the All India Credit Review Committee of the Reserve Bank of India. SFDA was in several ways different from the earlier programmes. Firstly, the approach was largely group-oriented. Secondly, loans with subsidy were extended as financial assistance. Finally, the primary emphasis was to enable small landholders to become viable producers - an approach which was not found in past development efforts.

At the same time, marginal farmers and landless labourers were catered to by yet another development programme called the Marginal Farmers and Agricultural Labourers (MFAL) programme. The activities included under SFDA and MFAL programmes were minor irrigation schemes (wells), agricultural development, dairying, sheep and goat rearing, fisheries, sericulture and the like.

Attempts were made in the 1970s to generate employment through development programmes in rural areas. In 1971-72 for the first time, the Crash Scheme for Rural Employment (CSRE) was launched which was later on intensified under the Pilot Intensified Employment Project (PIREP).

Areas such as deserts, drought-affected regions and hill regions did not benefit from such programmes as IADP, HYVP and IAAP. Hence, in the 1970s, special developmental programmes like the Drought Prone Area Programme (DPAP), the Hill Area Development Programme (HADP), and the Desert Development Programme (DDP) were initiated.

It was in this developmental context that, in 1974, the Command Area Development (CAD) programme was introduced as an integrated area development programme.

3. HISTORICAL PERSPECTIVE ON IRRIGATION

Prior to and since independence, India has been an agricultural state. With the partition of the sub-continent at the time of independence, although India was left with 80% of the population, it lost 31% of the irrigated land on which the country was dependent for its cereals, fibers and oilseeds. This loss was not merely in the area irrigated, or the quantity and quality of food grain production, but also the loss of some of the major irrigation systems,

such as the Sutlej Valley Project and the Sukkur Barrage across the Sind River. The food situation which was already in a critical state further deteriorated with the loss and resulted in a deficit of four million tons of food grains in 1947⁸.

The tasks before the India irrigation sector after independence were threefold: (1) the immediate creation of irrigation potential; (2) efficient distribution of irrigation; and (3) effective utilisation of the irrigation potential created. Irrigation management aims to achieve a balance among these three objectives. In the following paragraphs is presented a review of irrigation management as part of India's planned development process.

Era of Planned Development

When the era of planning began in 1951, heavy emphasis was naturally placed on irrigation development for raising agricultural production. At the time of launching the first five year plan, a gross area of 22.6 million ha was under irrigation; this constituted 17.1% of the total gross sown area of 131.9 million ha at the end of 1950-51⁹. The gross irrigated area was made up of 9.7 million ha under major and medium irrigation projects and 12.9 million ha under minor schemes¹⁰.

The two decades of development that followed 1951 saw the creation of considerable irrigation potential through the construction of several major and medium projects. In addition, there was a spurt of growth of minor irrigation projects and in the exploitation of groundwater resources.

The country's efforts in the four five year plans up to 1974 resulted in increasing irrigation potential from all sources at an average rate of one million ha per year (see Table 1). Although this growth was still insufficient in terms of the total irrigation requirement, it was considered to be most

⁸ Government of India. (1972) *Report of the Irrigation Commission (1972) Vol 1*. New Delhi, Ministry of Irrigation and Power, p 2.

⁹ Banerjee, S K. (1978) CAD: Its Genesis, Objectives and Main Features, *Kurukshetra*, xxvi (24), p 11.

¹⁰ For administrative purposes, the government classifies irrigation projects having cultivable command area (CCA) of more than 10,000 ha as "major" and those with CCA less than 2,000 ha as "minor". All projects in between are classified as "medium".

impressive¹¹. By that time, the area covered by irrigation was only half the country's irrigable area, yet it constituted over one fifth of the world's total irrigated acreage¹². While the irrigation potential created through major and medium irrigation projects was 21.6 million ha, its utilisation stood at 19.2 ha.

Table 1: Irrigation Potential Created and Utilised Under Major and Medium Projects in India, 1950-74 (in million ha)

Period	Potential Created		Potential Utilised	
	During the plan period	Cumulative	During the plan period	Cumulative
Up to 1950		9.70		9.70
First Plan (1951-56)	2.49	12.19	1.28	10.98
Second Plan (1956-61)	4.36	14.33	3.37	13.07
Third Plan (1961-66)	6.86	16.57	5.47	16.76
Annual Plans (1966-69)	8.40	18.10	7.06	16.76
Fourth Plan (1969-74)	11.00	20.70	8.98	18.69

Source: Central Water Commission

The issue of the gap between the potential created and the area actually utilised came to the forefront, causing grave concern to the government during the early 1970s when the country was experiencing a continued food shortage. The increasing trend in the gap between potential created and utilised in major and medium projects is given in Table 2. It can be seen

¹¹ United Nations, Department of Economic and Social Affairs. (1974) *National Systems for Water Administration*. New York, p 13.

¹² *ibid*, p 4.

from Figure 1 that, according to official data, there was a gap of 15%. Observers, however, placed it between 20 and 70% in various projects¹³.

Table 2: Creation and Utilisation of Irrigation Through Major and Medium Projects in India, 1956-90 (in million ha)

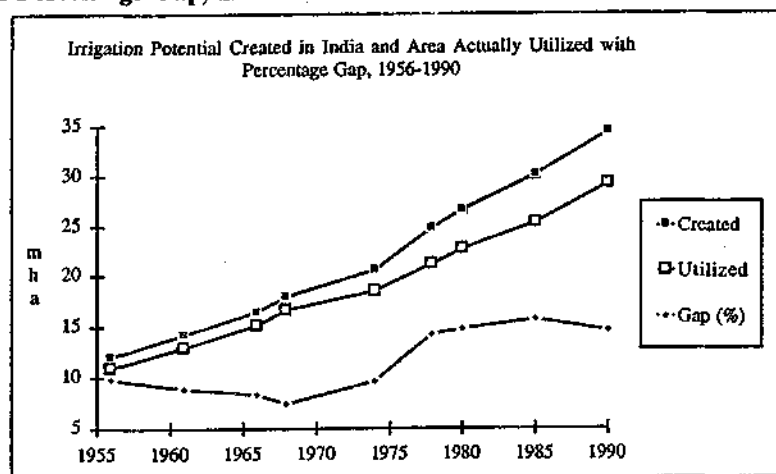
Year	Potential created	Increase in potential during the period	Potential utilised	Increase in potential utilised during the period	Gap
1956	12.19		10.99		1.20
1961	14.33	2.14	13.05	2.06	1.28
1966	16.57	2.24	15.18	2.13	1.39
1968	18.10	1.67	16.75	1.57	1.35
1974	20.70	2.60	18.69	1.94	2.01
1978	24.72	4.02	21.16	2.47	3.56
1980	26.61	1.89	22.65	1.49	3.96
1985	30.10	3.49	25.33	2.68	4.77
1990*	34.31	4.21	29.24	3.91	5.07

* anticipated

Source: Government of India, Ministry of Water Resources (mimeograph), 1989

¹³ Dasadra, H M. (1983) *Winking at Water, Economic and Political Weekly* 31(30):1352-54; and K Ramanujam. (1983) *Nine Years of Command Area Development, in Government of Uttar Pradesh, National Seminar on Impact of Command Area Development Programme, Technical Presentation Vol 1, Lucknow, pp 2-4.*

Figure 1: Irrigation Potential Created in India and Area Actually Utilised with Percentage Gap, 1956-1990



Note: Separate data in m ha and % can conveniently be presented on the same axis.

On the other hand, the recent status report of the Ministry of Water Resources published in June 1990 indicates that the potential utilised as a percentage of that created - which was hovering around 70% during the early 1980s in the 131 projects under the CAD programme - has picked up and has reached 77.4% in 1986-87 (see Table 3).

Concern for the Gap in Utilisation

The concern for under-utilisation in irrigation potential was voiced by several committees and commissions. The Irrigation Commission (1972) touched upon this problem and emphasized the need for a coordinated action to optimise the benefits from irrigated agriculture¹⁴. A conference of state irrigation and power ministers, held in 1972, took serious note of this malady. In August 1972, the Ministry of Irrigation and Power set up a committee, which in its report submitted in June 1973, pointed out the inadequate planning of irrigation projects and lack of one or more of the essential ingredients for irrigated agriculture. The committee suggested the

¹⁴ Government of India. (1972) *Report of Irrigation Commission* Vol 1, op cit, p 3.

provision of water courses or field channels extending right up to the field, land levelling and shaping, conjunctive use of ground and surface water, arrangements for input supply and credit, provision of infrastructure facilities and also provision for training and extension¹⁵. The concern for better utilisation of the irrigation potential already created became even more pronounced in 1973 after the initiation of action by the Union Government. On 3 May 1973, letters on this subject addressed to the chief ministers by the then union ministers of planning and agriculture highlighted the concern of the government. The concern of the government to eliminate the gap in irrigation utilisation set the way to start the CAD programme in 1974. There were several interrelated factors which facilitated its formulation.

Table 3: Creation and Utilisation of Irrigation in the Projects Covered by the CAD Programme

Year	Potential created since 1956 (m ha)	Potential utilised (m ha)	Percentage utilisation
1979-90	11.09	7.77	70.0
1980-81	11.82	8.48	71.7
1981-82	12.51	8.79	70.3
1982-83	12.77	9.04	70.8
1983-84	13.07	9.32	71.3
1984-85	13.82	10.43	75.5
1985-86	14.00	10.40	74.4
1986-87	14.41	11.16	77.4
1987-88	14.54	10.72	73.2

Change in the Conception of Irrigated Agriculture

First, there was change in the very concept of irrigation itself. Irrigation was no longer viewed as a mere protective measure against recurrent droughts and famines in the interests of subsistence agriculture in the country. It had come to be viewed rather as a critical factor in productive agriculture.

¹⁵ Banerjee, S K. *op cit*, p 11.

Secondly, there was a new appreciation of the role of agriculture in the rural and national economies. It was no longer considered merely as a way of life but as a commercial venture based on the scientific exploitation of the genetic capabilities of high yielding varieties and the management of market forces for maximum returns. The culmination of these two conceptual shifts, themselves the outcome of historical trends, resulted in a thinking which was fundamental to the concept of command area development, namely, that any effort to increase irrigation potential must be accompanied by a better and more scientific use of water and associated inputs for agriculture.

Responsibility for Infrastructural Development

Another factor which was most important in the conceptualisation of the CAD programme was the need for an institutional framework to undertake and integrate various activities and functions below the outlet of the irrigation distribution system. The entire work of transporting irrigation supplies from the outlet to the fields by constructing properly aligned field channels, land levelling and the like, were traditionally considered as the responsibility of the users and were hitherto left entirely to their initiative. The nature of such works and the inherent difficulties in their execution called for an integrated organisational structure to fill the vacuum. On-farm development activities were to become the mainstay of the CAD programme.

Distributive Justice

Yet another important factor that promoted the CAD concept was the principle of distributive justice. Lessons learned during the previous twenty years indicated that the unirrigated lands within the potential command areas were located primarily in the systems' tailend regions. By improving utilisation, both productivity and equity goals would be served. Thus, the need for equitable distribution of irrigation water to marginal, small or tailend farms formed an important aspect in the CAD concept.

The Command Area Development Authorities (CADs): A Suggested Model

The National Commission on Agriculture emphasised the need for the development of command areas in a manner comprising: (1) the efficient layout of plots and facilities like water courses, field channels, drains and farm roads- (2) consolidated of farmers' scattered plots into one or two operational holdings; (3) construction of water courses and field channels;

(4) construction of field drains where necessary and linking them with connecting drains; (5) construction of farm roads; and (6) land formation to suitable slopes¹⁶.

The concept envisaged by the National Commission on Agriculture was later developed into an action programme during the consequent visits of a central team headed by B Sivaraman, a member of the planning commission, to all states, following the union minister of agriculture's letter in May 1973. The consensus that emerged from the discussions of the team with representatives of the states, favoured an area development approach for the major and medium irrigation commands instead of taking up different development programmes independently. "It was recommended that a Command Area Authority (in each major irrigation project) would be established with reasonable autonomy in administrative control and fiscal control over the several departments concerned with the above programme¹⁷.

The CAD concept as perceived in 1973 was novel in the sense that it was viewed as an integrated area development programme with an attempt to synchronise systematically various activities under one roof to facilitate optimum productivity in irrigation and agriculture for overall development.

Launching the CAD Programme

The recommendations of the central team were communicated to the state governments with a request to set up CAD authorities (CADAs) in the irrigation projects identified in consultation with the representatives of the respective state governments. In total, fifty projects were identified. Following the directives of the central government, by the end of 1981, forty-five CADAs were constituted for seventy-one of the seventy-six important irrigation projects spread over sixteen states and one union territory (UT). Most of the states started organising CADAs in 1974

¹⁶ Government of India. (1976) *Report of the National Commission on Agriculture: Resources and Irrigation*. New Delhi, Ministry of Agriculture, p 112.

¹⁷ Sivaraman, B. (1977) *Command Area Development*, in K K Singh and R Cidambi (eds) *Command Area Development: Success and Learnings*. Hyderabad, Administrative Staff College of India, p 3.

itself¹⁸. The sequential inclusion of irrigation projects in the CAD programme is as follows (Table 4):

Table 4: Sequential Inclusion of Irrigation Projects in the CAD Programme

Period	Number of projects included*	Cumulative number of projects	Number of states included
1974-75	60	60	13
1978-79	16	76	
1983-84	29	102	
1985-86	31	NA	
1988-89	4	131	20+2 UTs**

* 9 projects were deleted during the 1980s

** UT = Union Territories

Objectives of the Programme

An examination of the ordinances and executive orders creating CAD Authorities in various states showed that the CADAs were envisaged to address a wide range of objectives and diverse tasks in order to promote integrated area development in their respective service areas. Therefore, the priorities of individual CADAs varied from state to state. Each state, with its own administrative system and ethos, developed separate work strategies and basic tasks, taking into account such factors like agricultural tradition, tenancy pattern and physical parameters, such as topography, soil, rainfall, and the like.

The initial working paper of the Government of India on command area development suggested inclusion of several components to achieve irrigation utilisation and increased agricultural production¹⁹.

¹⁸ Government of India. (1982) *Report of the High Level Committee*. New Delhi, Ministry of Irrigation, p 21.

¹⁹ Hashim S Ali. *Problems in Management of Large Irrigation Schemes: Integration of Agricultural Engineering and Administrative Staff and Farmers at Field Level*,

1. Modernisation, maintenance and efficient operation of irrigation systems down to the outlet of one cusec capacity.
2. Development and maintenance of main and intermediate drainage systems.
3. Development of field channels and field drains within the command of each outlet.
4. Land levelling on the basis of an outlet command for the type of irrigated crop that is to be grown.
5. Consolidation of holdings and redrawing of field boundaries on an outlet command basis.
6. Enforcement of a proper system of *warabandi* and equitable distribution of water to individual fields.
7. Development of groundwater for conjunctive use.
8. Selection and introduction of suitable cropping pattern.
9. Supply of inputs and services including credit.
10. Development of marketing and processing facilities and communication.
11. Preparing individual programmes for action for small farmers and agricultural labourers as part of a master plan.
12. Diversification of agriculture and development of activities like animal husbandry, farm forestry, and poultry.
13. Soil conservation and afforestation where necessary.
14. Town planning.

The CADAs created in the country since 1974 have incorporated virtually all the work ingredients suggested by the Government of India. As

(mimeo).

mentioned, however, the priorities accorded to the tasks changed from time to time.

Financial Support

The proposed financial support for the CAD programme was tentatively outlined in an August 1973 letter of the union minister of agriculture. The magnitude of financial support, Rs 1 billion in the central sector under the department of agriculture, and Rs 9.6 million in the state plans, was finalised in the fifth five year plan. The pattern of financial support was approved by the public investment board in December 1974 and has been changing over the years suiting to the requirements of CAD programme as they emerged and to some extent adjusting to the Authorities' environmental conditions. A comparative statement of the financing pattern before and after 1 April 1986 is given in Table 5.

CAD Policy

Irrigation and agriculture being state subjects, command area development has to be implemented by the state governments. On the advice of the central government, the states went about creating CADAs to suit their individual administrative traditions and preferences. By and large, most states located the CADAs under the department of agriculture.

Initially, CADAs were entrusted with numerous responsibilities in accordance with the overall focus on area development rather than on irrigation development alone. For example, rural infrastructural development, development of animal husbandry, improving the economic conditions of the rural poor, afforestation, horticulture and a variety of programmes were implemented by the project authorities. This comprehensive area development approach, however, gradually lost focus when the many complex problems associated with the development of irrigation and its utilisation began to surface. For instance, in most projects, farmers did not contribute to the expenses for the comprehensive on-farm development (OFD) package recommended to them.

Table 5: Central Financing for Irrigation Activities Before and After 1 April 1986

Activity	Central assistance (%)	
	Before 1 April 1986	After 1 April 1986
Grants		
Establishment, planning and surveys	50	50
Warabandi	50	50 (including wireless communication)
Crop compensation	50 (2/3 of crop value)	50 (2/3 of crop value)
Adaptive trials, demonstration and training	50	50
Subsidy for small and marginal farmers on IRDP pattern	50 (adjusted against loan)	50 (adjusted against loan)
Construction of field channels	25 (of the cost to individual fields)	50 (of the cost to outlet block of 5-8 ha)
Construction of field drains	Nil	25
Management subsidy for farmers' association	Nil	50 (Rs 100/ha for first 2 years, Rs 75/ha for third year)
Orientation training of senior officers	Nil	100
Evaluation studies	50	50
Loans		
Construction of field channels	25 (of cost from outlet to fields)	25 (of cost within 5-8 ha blocks)
Construction of field drains	Nil	25
Equipment and machinery	50	50
Equity support to land development corporation and farmers' service societies	50	50
Special loan account for financing ineligible farmers for execution of OFD* works	50	50

Source: Government of India, Ministry of Water Resources, 1990

The necessity to confront such problems directly, since they lay at the core of irrigated agriculture, led to changes in programme perspective and policy. Attention turned from an overall perspective on rural development to the need to tackle specific problems of irrigation development and utilisation. Here too, the development of the irrigation infrastructure below the outlet became the focus. Supplying water to farmers' fields and providing the necessary support became the most important issues. This change was reflected in a definite shift in policy. The then minister concerned with CAD in the Government of India noted that, "for the time being, the CAD authorities should confine their activities to only those items which have a direct bearing on utilisation of irrigation potential and optimisation of agricultural production"²⁰.

Physical Development Below the Outlet

In the early years of CAD, a package of OFD practices were prescribed. It included topographic surveys, construction of field channels and water courses, land levelling and shaping within farmers' fields, construction of drop structures and distribution boxes and, finally, providing drainage an outlet to each irrigation block. In some places for holdings with proper layout of plots, trunk drainage channels, approach roads and irrigation channels were provided for a block as a whole.

A policy focus is reflected in the preamble to the CAD section of the sixth five year plan document (1980-85). "For obtaining benefits from irrigation water. . . a comprehensive programme of CAD. . . which will include systematic programming of land consolidation, scientific land shaping, construction of water courses and field channels to carry water to individual fields, field drains to carry surplus water. . . will be necessary"²¹.

Soon, however, it was found that a comprehensive OFD package was extremely time consuming to implement. Farmers resisted any major attempt to realign their fields. Few were willing to donate land for drainage. Many did not see the value of land levelling or shaping and even if they did, they did not have the money to finance it. Many had taken other loans and were not eligible for institutional loans meant for OFD. Due to numerous

²⁰ Minister for Irrigation, inaugural address to the conference of state secretaries in charge of Command Area Development, New Delhi, 18 June 1983 (mimeo).

²¹ Government of India, *Sixth Five Year Plan 1980-85*. New Delhi, Planning Commission, p 156.

such problems the progress of the CAD programme was seriously hampered. Project administrators openly complained about the difficulties in achieving targets. A review of policy was called for and carried out.

Focus on Construction of Field Channels

Priority was now given to the construction of field channels over all other items of the OFD package²². Instead of going in for a comprehensive OFD package, it was decided, as a matter of deliberate policy, to concentrate on linking the source of water with each farmer's holding or a common point between fields from where water could easily flow to fields and farmers could benefit from irrigation. Construction of irrigation channels and suitable infrastructure for irrigation in the outlet command became the main objective of CAD.

As mentioned earlier, one of the important reasons for the large gap between potential created and utilised was taken to be the under-development of irrigation infrastructure between the main system and farmers' fields. It was now recognised that this gap had to be tackled directly by concentrating on the construction of field channels and supplying water as close to the farmers' fields as possible. In 1983, the union minister for irrigation expressed the opinion that even though the CAD programme had been in operation from the beginning of the fifth five year plan, the construction of field channels received pointed attention only during the sixth plan period²³. Though the policy focus continued on the activities below the outlet, an important change was brought about. Attention turned to field channels as against a comprehensive OFD package. This change in approach was reflected in the pattern of financial assistance given by the central government.

Rotational Water Supply

During the sixth and seventh plan periods, the construction of field channels and the completion of the irrigation infrastructure below the outlet were implemented at top speed. This was to make irrigation water accessible to each farmer's fields. But, for water to actually run into fields it must first be available in sufficient quantity at the outlet. In addition, for the last

²² Ali, Hashim S. *Practical Experience of Irrigation Reform, Andhra Pradesh*, in Ian Carruthers (ed) *Social and Economic Perspectives on Irrigation Management*, p 21.

²³ Government of India, Minister of Irrigation, *op cit* (mimeo).

farmer to draw his rightful share, those above must take only their legitimate share. Should canal operations fail to deliver the designed discharge at the outlet or the upper reach, farmers would draw more than their share with the resulting shortage of water.

Though there has been widespread awareness of the difficulties faced by the tailenders in an irrigation system, the implications for CAD were not realised until the prioritisation of the development of the outlet command with the sole purpose of carrying water to the last fields. Time and again it was observed that in spite of irrigation channels being excavated and being in good shape, tailend farmers could not draw water because there was not enough flow. Water scarcity was compounded by difficulties in operations that resulted from defects in the main system, sometimes for operational reasons and also because of inadequate maintenance funds²⁴. The realisation that field channels alone could not ensure the delivery of water to all eligible farmers led to the conclusion that a system of water rotation was necessary along with the development of the outlet command to provide for equity and regularity in the supply of water.

While looking for a suitable model for operation of water supply, attention turned to *warabandi* practised in the northern canal systems, *shejpali* in Maharashtra and Gujarat, and comparable systems in operation under tanks in the southern states of India. In the first half of the 1980s the central government took the decision to implement rotational water supply in the command areas of all major and medium irrigation projects. Subsequently, *warabandi* (or rotational water supply, RWS) was included as a regular item of the CAD programme for which central assistance was made available to the states.

It did not take long, however, to realise that rotation water supply would not work unless farmers cooperated with one another. This was found to be especially true in areas where the idea of RWS was new and farmers had already developed set habits of responding to government-managed irrigation systems according to their social position and the location for their fields. Involving farmers in irrigation matters became an important issue and this continues even today. The initial success with RWS supported with irrigation associations of the involved farmers led to the belief that outlet-based committees such as "pipe" committees, *kolaba samitis*, or *pani*

panchayats would be able to manage irrigation on their own. But this was not to be.

It was soon learned that wherever RWS was introduced with the participation of the new system of water distribution, it began to break down because farmers could not cooperate with one another. An enquiry into the reason for this led to a significant finding. Quite often breakdown of the farmers' associations was directly related to the inability of the association to draw its share of water at the outlet point. When water is scarce, competition among water users for a valued commodity which is in short supply leads to conflict and erosion of communal ethics. Outlet-based irrigation associations are highly vulnerable to water shortages due to main system operations. Once they do not have enough water to ensure equitable distribution among all users, they cannot discipline members.

Some new approaches to farmers' associations were tried out, namely, an association that covered a number of outlets located on a minor or a distributary, or water cooperatives, but invariably the question of organisational viability vis-a-vis unsatisfactory main systems operations was encountered. No workable solution has been found.

Integrated Water Management

The difficulties encountered with the unsatisfactory management of RWS made it clear that the management of irrigation below the outlet of a distribution network was highly dependent on the operations and maintenance of the system above the outlet. Although there have been marked differences among irrigation managers about the reasons why RWS ran into difficulties, to the outside observer there was no doubt that it arose from such reasons as the limitations of the main system, operational deficiencies, and indiscipline among farmers. To these observers, physical improvements in canal systems, superior methods of operations and maintenance and the involvement of farmers were essential to promote better utilisation of irrigation resources²⁵. Views have converged on the point that upgrading the irrigation infrastructure below the outlet was by itself no answer to better irrigation utilisation. Simultaneous investments were required to allow for greater control over water delivery. System

²⁴ Ali, Hashim S. (1983) *One Season of Integrated Water Management in Andhra Pradesh*. London: Overseas Development Institute, p 4.

²⁵ Chambers, Robert. (1988) *Managing Canal Irrigation*. New Delhi: Oxford & IBH Publishing Co, pp 90-91; and Hashim S Ali. *One Season of Integrated Water Management*, op cit, p 8.

operations had to be geared to agricultural needs and forums created for dialogue between irrigation officials (canal managers) and the users of irrigation water at different levels of the canal system.

Major shifts in command area development policy took place as a better understanding was developed concerning what lies at the root of inadequate or improper water utilisation. The CAD programme highlighted the various limitations of the irrigation system and its management. Starting from a comprehensive area development approach in which focus was on increased agricultural production and investments for rural prosperity, change first took place in favour of investments below the outlet, then RWS, followed by emphasis on RWS supported by irrigation associations and, finally, integrated water management in which investments in the main system and its management along with direct dialogue with water users was seen as integral to the attempt to bridge the gap between irrigation potential created and utilised.

Policy Process at Work

As one can surmise from the preceding discussion, state governments participate in policy formulation through the annual review meetings of secretaries and ministers of the states convened by the union minister in charge of the CAD programme. The states also elaborate the policy guidelines by programmes and approaches which are suited to their requirements. The Ministry of Water Resources is the nodal agency to assist policy formulation and to coordinate CAD programmes in different states. Some of the factors that have influenced policy are reviewed in the following paragraphs.

Departmental Responsibility

Traditionally, the government did not take any responsibility for the construction or maintenance of irrigation channels from outlet points to the farmers' fields. CAD made a significant departure from this tradition when the government openly took on responsibility for ensuring the delivery of water to the farmer. In the initial years of CAD, the state irrigation departments did not take active interest. Work below the outlet was not their area of operation. The responsibility for CAD fell to the department of agriculture. In Andhra Pradesh, a separate CAD department was created under the ministry of agriculture to integrate irrigation development with agriculture. It was headed by a separate secretary to the government who

was later appointed as the agricultural production commissioner. However, the integration ran into a major difficulty, like in all other states.

The irrigation department, which controls the delivery of water, did not consider itself a part of CAD. As a result, comprehensive policies and enabling solutions to boost irrigated agriculture were not evolved. The preoccupation continued to be with OFD without a concomitant commitment to deliver water which the farm distribution system could carry to farmers' fields. When the futility of implementing OFD works without assured water supply was brought to people's notice, attempts at the highest level were made to reorganise the CADAs in 1980-81. The policy was to recommend that CADAs in the states be brought under the irrigation departments and that irrigation utilisation (synonymous with CAD), be viewed as an integrated problem from the reservoir or diversion point to the farmers' field. In fact, this design was being followed in Maharashtra. The linking of CAD with irrigation was called the "Maharashtra pattern" and was referred to all states to examine and implement. From 1981 onwards, this change was introduced in many states.

While the CAD-irrigation department merger helped improve water delivery, it created peculiar problems of its own, especially in Andhra Pradesh. One direct outcome was that the agriculture function of CAD was neglected. The officers of the agriculture department working under CAD were withdrawn. Agriculture in CAD projects has since been looked after by the agriculture department as a normal activity in the state as a whole. The integrated approach to agriculture in irrigated areas has been abandoned. The CADAs do not have expertise of their own to educate farmers on irrigation and agriculture. The policy thrust developed in the earlier years of CAD has been more or less lost in all the states.

Making Policy Work

The review of CAD policy in India brings out several salient points. There is a need for a comprehensive policy. The central and state governments along with the CADAs have to evolve a comprehensive CAD policy covering all aspects such as irrigation engineering, agriculture and cooperation. The policy goals differ from state to state depending on the local requirements and other policies and laws in operation. Though there is a positive recognition of the problems of irrigation utilisation in successive plans, integrated efforts by the government based on a well thought out policy are still to emerge.

The CAD programme is a centrally sponsored programme while the issues addressed, irrigation and agriculture, are under state governments' preview. The central government must evolve a comprehensive CAD policy which leaves options to the state government and the respective CADA for detailed development of the policy. The central government need not go to the extent of preparing operation manuals, as it did for the implementation at the field level. In a vast and diverse country like India, it is difficult to prescribe a single policy to be fitted everywhere. Having initiated the programme and having invested money, the central government should ensure systematic monitoring of the programme through state governments.

The policies, rules and procedures of the departments closely linked to the CAD programme must also be looked into and streamlined to the extent necessary. In Andhra Pradesh, for example, the policy of localisation²⁶ must be re-examined thoroughly to facilitate CAD policy. One of the goals of CAD is achievement of equity in its service delivery. The policy of localisation or the attempts to relocalise areas would lead to inequity and haphazard development of lands. Although under the existing acts and rules, the government can prohibit the growth of any crop under pain of penalty, such enabling provisions are likely to be oppressive and are unsuited to the present day socio-political environment. Modern technological advances in the management of soils, water and crops, and the rights and privileges enjoyed by the people of a free country do not favour imposition of such restrictions, particularly in the services from a public system. The farmers in the command should have equal opportunity of access to water and option to grow the crops of their choice. If the state government or CADA wants to encourage or discourage the growth of any crop in the interest of the community, it should do so not through the process of localisation, but through the means of support prices for the produce, pricing of irrigation water, allocation of water per unit area, system operational procedures and the like.

Canal Operations for Demand-Based Irrigation

While evolving policies related to canal operation, it must be borne in mind that future operations must respond increasingly to a demand schedule of

²⁶ "Localisation" is the term used in South Indian irrigation commands for the process of demarcating certain lands for cultivation of less water-demanding crops (called "irrigated dry", or ID) mostly in the head reaches, and certain lands for "wet" crops, i.e. water-demanding crops, in the lower reaches.

irrigation for diversified cropping. Hence, the old systems require remodelling in order to facilitate introduction of future innovations for farmer-responsive operations. New infrastructure may be required for downstream control. It is likely in some systems that operation will increasingly be done by remote control and automated water distribution structures. In still others, the increasing shift toward demand-based irrigation will require dynamic regulation, whereby the entire system must respond not only to changing demand schedules but also to fluctuations in water availability.

4. CONCLUSION

There can be no single development policy goal. It is possible to conceive of an interrelated set of policy goals for each of the major components of development, such as agriculture, education, health, social welfare, industry, power, transport, communications, etc. Agricultural development policy in turn resolves itself into several components such as land, irrigation, cooperation, extension education, pricing, marketing, warehousing, etc. The irrigation development policies can in turn be related to major, medium and minor irrigation projects, command area development, conjunctive use of surface and groundwater, flood control, water logging and drainage systems.

The concept of CAD is very unique. It aims to integrate a very wide range of developmental, sectoral, and functional components and sub-components of development. Meaningful articulation of this nexus into a unified, integrated and comprehensive CAD policy calls for innovation in the policy making structure and process.

Agricultural Administration Unit
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