

POST INDEPENDENCE SCENARIO IN IRRIGATION SECTOR IN INDIA -NEED FOR PRIVATE PARTICIPATION

S.K.Mazumder

(Individual Consultant)

Former AICTE Emeritus Professor

Delhi College of Engineering (Now Delhi Technology University)

E-mail:somendrak64@gmail.com

Abstract: *Although India has made substantial progress in irrigation sector after independence, the performance of many of the projects is not satisfactory due to various factors discussed in this paper. There is a huge wastage of water principally due to poor on-farm irrigation management and the wrong pricing policy resulting in low irrigation efficiency. There is an utter need for private participation in irrigation sector for better management and efficiency. Some of the constraints of private participation have been highlighted. Some important role consultants can play in the public-private-partnership (PPP) model, as in roads sector, have been outlined.*

Keywords: Irrigation schemes, efficiency of irrigation, pricing of water, private participation

1.0 INTRODUCTION

After independence in 1947, most of the irrigated land went to Pakistan. In the year 1951, when first five year plan started, India had a population of about 300 million and the area covered by irrigation was only 23 million hectares (mha) producing 90 million tons of food grains. A large number of irrigation schemes have been completed over the years to assure firm water supply to the agricultural community. Out of a total of 113 mha area under irrigation in India today, 58 mha is by major and medium surface irrigation schemes, 15 mha area is by surface minor irrigation schemes and 40 mha is by minor ground water schemes (IWRS-2007). Because of the timely irrigation development, India is self sufficient in food today, producing 250 million tons of food grains for our 1200 million people. Fig.1 (Mazumder,2002) shows the projected growth in population, food grain production and irrigated area up to 2050.

It has been estimated (Iyer,1989) that by the year 2025, the total utilizable water resources of India (1100 mcum) is going to be almost the same as the total demand from different sectors (1050 mcum). Demand for irrigation water (840 mcum) has been steadily rising due to population growth and food requirement. It may be seen from Fig.1 that the irrigation potential of 113 mha is going to remain constant unless long distance water transfer schemes (IWRS, 1996) at a huge cost are implemented to bring an additional area of 35 mha under irrigation. Therefore, the only way the country can feed the people in future is through greater productivity of land with double or triple crops on the same land for which more irrigation water is needed.

The efficiency of water use of most of the surface irrigation schemes, which consumes about 80% of our utilizable water resources, must be improved to ensure productivity of agricultural land per unit of area, unit of water and unit of time. At present, overall efficiency of irrigation in India is about 35% which is too low when compared with the figures of 75% in Japan and 55% in China. Even a marginal increase in irrigation efficiency will cause substantial savings of water which can be either diverted for other uses or more agricultural land can be brought under

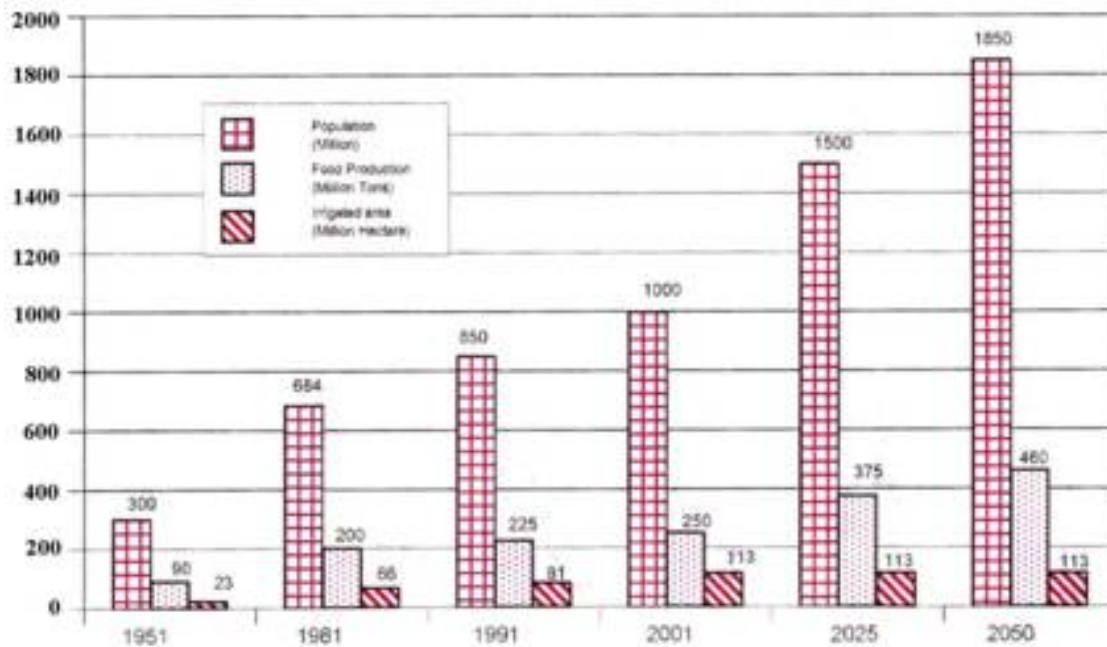


Fig. 1 Growth of Population, Food production and Irrigated area in India during 1951-2050

irrigation with the same amount of available water. Unlike other commodities like electricity, drinking water etc., water for irrigation is currently distributed almost free of cost. The present irrigation water rates are extremely low. Whereas during the British days, 87% of the overhead & maintenance costs of irrigation schemes used to be realized from irrigation revenue, today the revenue receipt is so low that it can hardly meet 15% of maintenance cost of the projects. The cost of operation and maintenance, administrative and depreciation cost and the interest on borrowed capital are being subsidized by the government (Mohile-1984). Many of the irrigation projects which were our national assets are soon going to be our national liabilities if the present situation continues. Some of the early storage projects are fast losing their live storage capacity due to siltation (CBIP,1994) requiring dredging at enormous cost.

2.0 PERFORMANCE OF IRRIGATION SCHEMES IN INDIA

The overall efficiency of irrigation projects (also called project efficiency) in India is too low at an average of 35% in the case of major and medium irrigation projects (INCID, 1998). The average project efficiency in three major river-valley projects, determined by author, was found to vary from 18.6% to 38.8% (Mazumder, 1984). Most of the irrigation water was found to be lost in conveyance and field application and extremely poor management of water (Mazumder,1986) at the farm level. Bharat Singh (1991) while emphasizing the present day need of intensive irrigation for maximizing yield per unit of area, identified the following major shortcomings of our present irrigation schemes:

- Gap between the creation of irrigation potential and its utilization
- Unreliable and inadequate supply
- Inequitable distribution of water between head and tail enders.
- Non-responsive and authoritarian administration

- Lack of control and increasing malpractices
- Low efficiency of canal systems and poor on farm management of irrigation water.

Planning Commission (1992), Govt. of India, recognized the three major shortcomings responsible for poor performance of irrigation schemes, namely,

- Unlined channels
- Lack of land consolidation, improper leveling and sizing of irrigated land
- Improper on farm management of irrigation water beyond outlets.

Zimmermann (1966) examined several drawbacks of protective type extensive irrigation practice being followed in India where available water is spread over vast areas through a widely spaced unlined canal networks. Most of the water in such a system is lost in conveyance and most of the remaining water is lost because of inefficient irrigation management (IWRS,2007)..

3.0 WASTAGE OF IRRIGATION WATER

Compared to minor surface and ground water irrigation (mostly at farmer’s control), wastage of water in major and medium schemes (under Government control) is much more. The conveyance losses in different stretches of the irrigation canal system is shown in table-1 (CWC-1995). Some of the principal reasons of wastage of irrigation water are discussed in the following sections.

Table 1 - Conveyance Losses in Main Canal and Branches in India

Type of Canal	In North India	As found by a sub-Committee for MP, UP, and Maharashtra	Purna Project
Main Canal	17%	25%	N.A.
Branches	8%	20%	20%
Distributaries	20%	20%	20%
Total	45%	65%	N.A.

3.1 Unlined Canal Systems:

Permissible velocity in unlined canals (depending on the type of soil) is quite low compared to lined ones. As a result, time of travel from the storage reservoir to the farm lands are considerably high resulting in greater losses due to seepage and evaporation. Due to lack of proper maintenance, most of open canals have luxurious growth of weeds and water hyacinth which evapo-transpires more water.

3.2 Poor on-Farm Irrigation Management:

There is hardly any on-farm development e.g. land consolidation, shaping and leveling of land, lining of watercourses and field channels, farm roads, service tanks etc. Lack of proper irrigation scheduling results in colossal loss of irrigation water diverted from outlets. Ministry of Agriculture & Irrigation, (1979) ,Government of India have found that most of the water released from irrigation outlets go waste due to uncertainty of delivery and lack of preparation of land, inefficient method of irrigation application (e.g. wild flooding and basin flooding), unlined water courses and field channels, improper scheduling of irrigation as per soil-water -plant relations (Mazumder,2007),

existing practice of charging irrigation rate on area basis in many a projects, absence of proper forecast of rainfall and pre-irrigation soil moisture content . INCID (1998) in its report found that in major and medium irrigation projects, less than 50% of water released from the storage reservoir reaches the outlets. Further loss occurs at farm level due to lack of technical know how for efficient application of irrigation water.

3.3 Inadequate and Unreliable Supply at the Outlets:

To be of greatest use to the crops, the irrigation application must be timely and in quantities adequate to meet the consumptive requirement of crops at any given stage of growth. In large irrigation projects, where it takes several days for the water to reach from the storage/diversion works to the farm point, the timely supply of water in required quantities are uncertain. Operation of the irrigation system, mostly done manually, is dependent on so many factors related to man, machine and structures. Proper irrigation scheduling and its delivery by rotation need expertise and enlightened farmers receiving proper training. Design assumptions, design inputs, construction quality, operation and maintenance of the projects are interrelated and govern reliability and adequacy of irrigation (Thatte,2000, Bharat Singh,1991).

3.4 Water Pricing and Realisation of Irrigation rate

Because of the prevalent policy of charging irrigation water (Planning Commission,1992) on the basis of area, the farmers at the head end have a tendency to draw as much water they can without bothering for those at the tail end of canals. Volumetric measurement (Mazumder,1999) of irrigation water supplied to farmers and charging irrigation rate on the basis of actual consumption are the best way to achieve higher irrigation efficiency and reduce wastage of water. For equitable and scientific distribution of water amongst the farmers and realization of irrigation rate, considerable cooperation and understanding are needed between the supplier and the consumers of water. As in most cases of our public life, there is utter confusion and lack of clarity at the consumers level wherever the government tries to control.

Average productivity of land in India is found to be only about 2.0 T/ha in irrigated areas and 1.0T/ha in rain fed un-irrigated areas (Prasad –2000). It is too low when compared with the yield of about 5 to 6 T/ha in developed countries like Japan, USA, Canada, Australia etc. Cost of irrigation projects, on the other hand, is increased several times due to long time overrun, escalation in price and rampant corruption at all levels in the Govt. departments. Considering the heavy investments (from Rs. 4.42 billion in 1st plan to about Rs. 2,320 billion in 11th plan - Center and states together), it is extremely important for a developing economy like India, to carry out critical review of the financial performance of all irrigation schemes.

Revenue return from irrigation schemes may be taken as the gross receipts from the scheme which may be due to (i) sale of water to farmers i.e. irrigation rates (ii) sale of hydro- power (iii) navigation receipts (iv) proceed from plantations (v) irrigation cess and different kinds of levies. Working expenses include (i) direction and administration (ii) machinery and equipment (iii) extension and improvement (iv) operation, maintenance and repairs works etc. Average (of 15 states in India) year-wise recovery of working expenses as percentage of O & M costs of irrigation projects is shown in fig.2. According to a compilation made by Central Water Commission (CWC 1990) on financial aspects of irrigation, the total deficit in the year 1986-87 alone was found to be of the order of Rs.120 billion. Unrecovered costs are subsidies. But one must not assume that this subsidy accrues only to users of irrigation. Part of it represents the cost

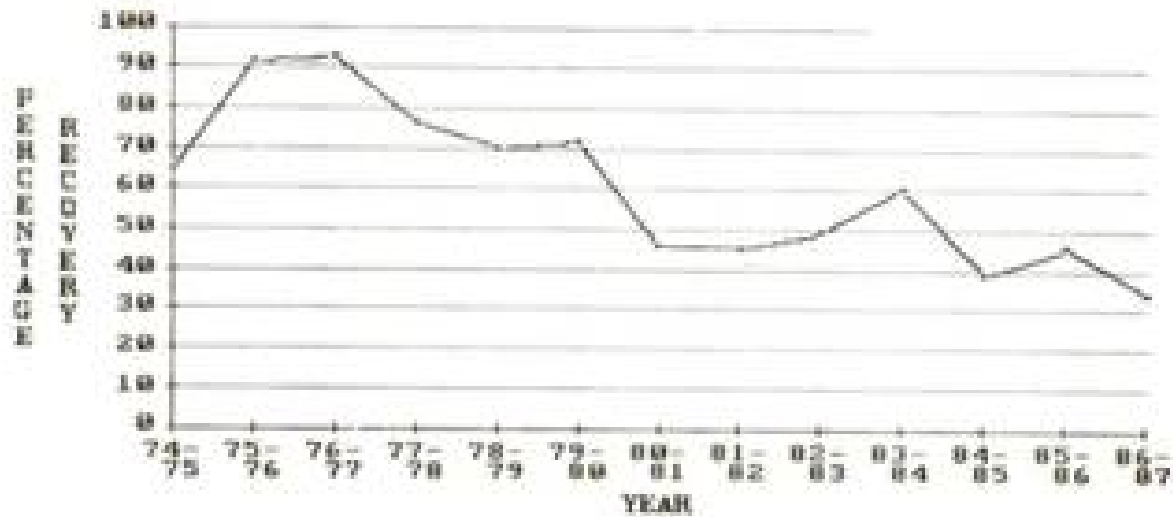


Fig 2 Average Year-wise percentage recovery of working expenses for 15 states in India

of inefficiency due to poor planning, design, operation and maintenance of the irrigation system. Objective should be to reduce government subsidy, improve efficiency and effectively manage irrigation water (Mazumder, 2013). Indian Water Resources Society in its theme paper on “Water: Vision 2050” (IWRS, 1999) state “Water resource development has so far been governed by highly subsidized supply-management policies. Maintenance of infrastructure built at enormous cost is severely constrained due to shortage of funds resulting in all round deterioration in the performance of irrigation projects. Examples of cost and time over-run in the case of a few irrigation projects in India are given in Table-2.

NEED FOR PRIVATE PARTICIPATION IN IRRIGATION SECTOR

Need for limited private participation and consultancy in irrigation management arises due to the following facts:

- With the increasing costs of irrigation development (from Rs.42,750/- per ha during 7th plan to 1,00,000/- per ha during 10th plan) and because of its overall resource crunch, Govt. alone can not bear the responsibility of providing food security for the rising population.
- Govt. allocation is inadequate to meet the expenditures even for the ongoing irrigation projects resulting in spillover of the projects with consequent time and cost over-run. In many a cases, the entire investments made by the Govt. are lying idle.
- In case of completed projects too, fund allocation is extremely inadequate to meet the expenditures of O&M, operation, modernization, depreciation etc. resulting in poor irrigation efficiency and huge wastage of water in transportation and field application (Mazumder, 2002)
- Govt. allocation in irrigation sector has reduced over the years because of the increasing demand of fund for development of other infrastructures, e.g. roads, railways, industries etc.

Table-2 Cost & Time Overruns in a Few Irrigation Schemes in India				
Project	Budget Year	Budget (Rs. x106)	Increase on Original Budget	Comments
Indira Sagar	1984-85	13928.5		Estimated cost for earliest time of completion.
	1988-89	21676.7	56%	
	1993-94	34967.9	151%	
	2004-05	75000.0	438%	
Onkaleshwar	1984-85	5780.00		
	1988-89	19092.50	230%	
	1993-94	40000.00	592%	Ditto
	2004-05			
Maheshwar	1985-86	2412.70		
	1993-94	8240.00	242%	
	2004-05	23000.00	853%	Ditto
Sardar Sarowar	1984-85	42400.00		
	1986-87	64066.40	51%	
	1992-93	131806.20	211%	
	2004-05	275000.00	549%	Ditto

Consultants – both public and private - can play major role in improving professional management skills and provide better and efficient services, introduce latest technology for fast development and optimal utilization of limited water resources of our country (Mazumder,2010).

5.1 Need for private participation in irrigation management

Private participation has been encouraged by the Ministry of water resources (MOWR), Govt. of India. In section 12 and 13 of the National Water Policy (MOWR,1987), it is stated “private sector participation in planning, development and management of water resources may help in

introducing innovative ideas, generating financial resources and introducing corporate management and improving service efficiency and accountability to users". The Planning Commission, Govt. of India (2002), in section VIII (infrastructure) of its 10th five-year plan (2002-07) document mentions "Despite massive investments and impressive achievements, a lot more investment is needed to fully harness the available irrigation potential. The unit cost of irrigation development is nearly Rs.1,00,000/- per ha of CCA. This is so high that even recovery of interest on capital from the service is difficult, unlike many services which are able to pay for themselves with or without some incentives or subsidies. Hence the desirability of mobilizing financial resources from the private sector which will ensure better irrigation efficiency and better service."

Indian National Academy of Engineering (INAE-2008) observed that water management and water use efficiency need to be improved in all water-use sectors to optimize productivity. Out of the several recommendations made by the experts, one important recommendation is regarding public-private partnership (PPP) in water sector for efficient management of water. To generate funds and provide incentives for private investments, one of the ex-secretary, Ministry of Water Resources, Govt. of India, recommended levying 10% tax on all cold drinks and bottled mineral water and transfer it to irrigation sector in a manner similar to transfer of oil cess to road sector

5.2 Some constraints and limitations of privatization

Even though there are a number of benefits of private participation in irrigation management,, there are several constraints and limitations for private participation as follows:

- Water is far more basic than any other commodity. Control and ownership of water is a very sensitive issue. Private companies will be interested in investment only when they own it and sell it to realize costs from consumers. This may result in so high price of water which the poor and disadvantaged section of our society may not afford.
- Unlike other commodities which can be supplied as per demand, there is a lot of risks In irrigation water supply due to unpredictable nature of rainfall which is the principal source of irrigation water in India.
- Unless there is business ethics and a national outlook, private sector may try to exploit the irrigation water to maximize their profit and corner as much wealth as possible for their personal benefits irrespective of long term environmental damage.
- Many of the private contractors in water and other sectors carrying out construction/operation of projects/industries have a tendency to bribe authorities to avoid strict adherence to specifications, rules and regulations laid down by the Govt. for long term benefit to the society.
- Except a few, most of the private organizations in India are accustomed to perform only routine type jobs in a haste. They are reluctant to invest enough money and time for quality up-gradation of the employee (Mazumder, 2008) through R&D.

Considering the above constraints, a high power committee appointed by Govt. of India, recommended private participation in irrigation for some pilot projects on a selective basis. The committee further recommended that the Govt. must exercise its full control as regulator-economic and environmental.

5.3 Public-private partnership (PPP) in irrigation management

PPP is a mode of implementing government program/schemes in partnership with private initiative through corporate bodies, WUAs, NGOs, cooperatives, self help groups, individual partnership farms, voluntary organizations, community development centers etc.. The objective of PPP as opposed to privatization is to improve the performance within the existing realm of public sector responsibility for the quality of services provided..

It is apparent that under the existing conditions, the Govt. can not give legal ownership right and its regulatory capacity of irrigation water to the private sector due to several socio-economic-political constraints. On the other hand, the private sector may not be interested to make any large scale investments in major and medium irrigation schemes due to very high cost, long gestation period, uncertainty and risks involved.

There is a growing realization that given their respective strengths and weaknesses, neither the public sector nor the private sector alone can deliver the goods to the people in the best interest of agriculture and irrigation. It is a fact that the irrigation water supply provided by the government through its own departments has almost failed to meet the requirements resulting in sufferings of people, especially in rural and semi-urban areas where 70% of our population live. PPP is a middle path solution - a joint venture of public and private sector- where each partner brings inputs like finance, technology and management practices. Together they work for achieving a common goal and in doing so they share the risks and benefits jointly. PPP enables the government to retain a better control on the service than what would be possible without government's involvement. However, because of the sensitivity associated with water, PPP schemes in irrigation management are much more complex compared to other sectors. PPP is welcome in small and micro irrigation projects as well as in areas like operation, delivery, flow-metering, billing, collection of water tariff etc. beyond the distributory canal system in the major and medium projects. PPP is most suitable in water conservation and preservation of small scale water bodies like springs and wells, tanks and ponds, nallas and small streams, drainages, recycling and re-use of domestic and industrial sewage etc. as suggested by Vasimalai (2004), executive director, DHAN foundation.

6.0 ROLE OF CONSULTANTS IN IRRIGATION MANAGEMENT

Consultants can play a very important role in the service sector in bridging the gap between private initiative and public responsibility and in allaying the fears of both the government and the private bodies. Development of consultancy profession in India has been quite significant during the last few decades. Consultancy Development Center (CDC), Consulting Engineers Association of India (CEAI), Engineering Council of India (ECI) under the Department of Scientific and Industrial Research (DSIR) of the Ministry of Science & Technology, Govt. of India, have data base of consultants/consultancy firms - both public sector undertakings and private organizations. - covering areas like agriculture and rural development, banking and finance, construction and construction management, health and education etc. In the water sector, there are both public undertakings (e.g. CBIP, NHPC, WAPCOS, NPCC, EIL, EPIL, MECON STUP etc.) and private consultants (e.g. J P. & Associates, TCS, L&T, Jacob-CES, DHI, ICT, SPAN, SMEC, URS-SWI, HALCRO, AQUAGREEN etc.) who offer consultancy services in water sector in India and abroad. Consultants face steep competition amongst themselves for winning projects by projecting bio-data of their experts who act as key persons in the various

disciplines to prove their capability and worthiness. Consultants have also to train their engineers to efficiently perform the various jobs assigned to them by the team leaders and specialists to complete the project in a time bound, cost effective and efficient manner to the satisfaction of their clients. They help in identification and cross fertilization of best practices, development of best strategy, analytical techniques and soft wares, technology up gradation, innovative ideas, application of latest R&D and best management practices to establish their credibility. Many times, a consultant associates with other consultants of repute from India and abroad or outsource a part of the job where they lack in necessary expertise and experience.

Collaboration strategies of consultancy organizations in India have been discussed in depth by Diwan (1999) in a national workshop on “challenges in the management of water resources and environment in the next millennium”- organized by Delhi College of Engineering (now Delhi Technological University) in association with Indian Water Resources Society (IWRS) and Indian Society for Hydraulics (ISH).

7.0 SUMMARY AND CONCLUSIONS

India has successfully completed a large number of irrigation schemes after independence. This has definitely helped us in meeting the challenge of food production for our ever-increasing population. Many of the major and medium schemes are, however, operating at poor efficiency due to high conveyance loss and poor on farm irrigation management. Irrigation rate and the realization of rate are too low to meet even the working expenses. Many of the projects which used to be national assets are fast becoming national liabilities. There is a need for public-private- partnership in better management for efficient utilization of water for irrigation which consumes nearly 80% of our water resources. Consultants- both public and private- can play a major role in bridging the gap between private initiative and public responsibility for overall economic benefits and prosperity of the country.

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