

trification is not to urbanise villages in order to check men to leave villages. The main purpose of rural electrification is to help them in developing India's economy. If they are to use light etc. in homes and domestic purposes, they are sure to face the burden of economic trouble. Therefore, power should be utilised for the purpose of improving condition of the villagers. We should see how extensive use of electricity in irrigation and also in rural industries like small scale industries and cottage industries can be done.

We find congestion in towns and villages.

Villagers are more or less slum people. What we need is the improvement of roads. Here in the Metropolis of Calcutta, the lanes and roads (some of course) are hardly 5 ft. wide. In a city like Metropolitan Calcutta, a city which is a pride of every Indian, 3/4th of the roads and lanes are hardly 5 ft. wide. Some thoughts should also be given on this side. I now like to pass on this idea to you because you are the fittest persons to know how the villagers could be uplifted. Once again, I express my gratitude to you for calling upon me to come over here. Thank you.

Presidential Address

by

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Introduction

As a developing nation with over 560 million people, India is facing a gigantic task of economic development next only to that of China. Our problems are diverse and varied. Viewed from natural and human angles the most urgent and fundamental problem is to ensure self-sufficiency in the food resources for the nation on a firm and continuing basis. Thus agriculture gets the highest priority in our national plan for development.

With 162 million hectares of good arable and, India is favourably placed with regard to

the basic resource for agricultural development. The arable lands of the country for most part again are not covered seasonally under ice or snowfall (as in large parts of China) although certain sectors do have other constraints such as semi-arid to arid climate which are natural detrimental factors towards development of intensive agriculture.

Land and Its Water Potential

Within the physiographic and climatological variabilities India's total land area may be classified under six categories as shown in Table below :

Sl. No.	Region	Geographical area sq. km.	Area under forests steep hills, etc. sq. km.
1.	Desert Region	202,500	-
2.	Hard rock region with variable soil cover and in-land valley fills	1,560,000	345,600
3.	Coastal plains excluding Konkan coast	449,500	97,200
4.	Sindhu-Ganga-Brahmaputra plains	501,750	97,700
5.	Himalayan region	501,000	141,700
6.	Konkan coastal region	45,250	1,100
Total :		3,260,000	633,300

Out of these areas under the coastal plains (3) and the Sindhu Ganga Brahmaputra plains (4) together with the inland valley fill areas within hard rock areas and inter-montane valleys (2), form the most important groundwater reservoirs having water of suitable chemical quality. By and large, however, the areas under the groups (3) and (4), constitute the most important from the point of groundwater resources availability in large quantity.

Of the desert region (1) nearly 63 per cent or 128,000 sq. km. have been surveyed for groundwater and nearly one fourth of the area, i.e. about 32,000 sq.km. showed promise for groundwater development. Of the coastal plains nearly 30 per cent of the area or some 108,000 sq. km. have been covered under various degree of surveys, In the Sindhu-Ganga-Brahmaputra basin nearly 70% of the area requiring survey (404,050 sq.km. excluding forests and hills) or 280,000 sq.km. have been covered under survey and the most part of it have extensive reserves of groundwater.

Groundwater Resources and Development

It has been estimated that for entire India on an average down to the depth of 300 m. the total available groundwater storage is of the order of 37,000 milliard cubic metres (30,000 million acre ft.). A minimum of 20 per cent of this storage, i.e. 7,400 milliard cubic metres (6,000 million acre ft.) is withdrawable for use. Thus the utilizable groundwater in the country is about 14 times the total usable surface water potential, which has been estimated at 550 milliard cubic metres (450 million acre ft.). Yet, with such vast groundwater resources being available, the development of these resources for utilisation has indeed been painfully slow so that only 16.2 per cent of the (as on 1969) total arable land area could be provided by surface and groundwater irriga-

tional facilities. The slow rate of development will be apparent from the fact that as on 1960 (as a result of the All India Groundwater Exploration Project) some 60,000 sq.km. area of the country (6 million hectares) was proved worthy to sustain at least one large heavy duty irrigation tubewell per sq.km. Yet in the decade of the sixties only some 4400 sq.km. (440,000 hectares) of the proven area could be provided with tubewell irrigation facilities through state and private efforts. Thus in terms of proved and explored area itself the back log of development is in an area of 55,600 sq.km. or in other words an equivalent number of heavy duty tubewell construction.

Minor Irrigation

While on this subject it may not be out of place to refer to the well publicized Fourth Five Year Plan allocation in the field of minor irrigation (mostly groundwater based irrigation) which is of the order of Rs. 1650 crores. This sum include the following :

	Rs. (Crores)
1. Refinance fund from Agricultural Refinance Corpn.	650
2. Investment by farmers themselves	300
3. Rural Electrification Corpn.	300
4. States' and Central allocation for public sector development activity	400

Out of the State and Central allocations nearly 200 crores is against expected foreign assistance programme (I. D. A., World Bank, Asian Development Bank, USAID etc.). It may appear reasonable to conclude that financial constraint for groundwater development for irrigation is not a major bottleneck any more.

The Agricultural Refinance Corporation of the Reserve Bank of India is the largest single institution through which financing arrangements are provided to the land development banks, co-operative banks, Agricultural Credit Banks or Land Mortgage Banks. From the

1970-71 annual report (page-17) of the ARC it is seen that for 237 minor irrigation schemes the ARC upto June 1971 had committed a sum of Rs. 169.48 crores since its inception of 1st July 1963. During the first two years of the Fourth Five Year Plan it has disbursed Rs. 59.22 crores only out of its total plan allocation

of Rs. 650 crores. Thus to ensure full utilisation of funds in the remaining three years the ARC has to disburse Rs. 590.78 crores.

From the annual report of the ARC the following table may be examined which indicate the States and number of schemes and amounts disbursed in 1970-71.

TABLE-II

Name of State	No. of Schemes	Total Loan Assistance to Borrowers	(Rs. in Crores)	
			Corporation's (ARC) Commitment to Financing Banks	State : Govt. & Bank Com-mitments
Andhra Pradesh	8	6.08	4.61	1.47
*Assam	1	0.05	0.04	0.01
*Bihar	3	2.38	2.04	0.34
*Haryana	6	5.58	5.05	0.52
Kerala	8	1.09	0.80	0.29
Madhya Pradesh	4	5.85	5.15	0.70
Maharashtra	23	10.06	8.71	1.35
Mysore	13	4.56	3.87	0.69
*Punjab	2	5.02	4.52	0.50
Rajasthan	3	1.73	1.38	0.35
Tamil Nadu	16	8.08	7.22	0.86
*Uttar Pradesh	12	11.49	10.34	1.15
*West Bengal	1	0.18	0.18	-
Total	100	62.15	53.92	8.25

*added: These are States where the groundwater resources in the Sindhu-Ganga-Brahma putra plains awaits development and utilisation to a large measure.

It is evident that excepting Uttar Pradesh where 12 schemes have been financed from funds available with ARC (Rs. 10.34 crores being ARC commitment) all the other States sharing the Sindhu-Ganga-Brahmaputra plains—the largest single zone which stores over 50 per cent of the usable groundwater resources in the country—have not for one reason or another made any significant attempt to utilize

the financial resources available from ARC. The reasons for such poor response require an objective review and analyses, otherwise the very objective of intensified tubewell irrigation may be jeopardised.

Technical Infrastructure and Equipment for Ensuring Intensified Tubewell Irrigation Programme

The installation of irrigation tubewells, and

their maintenance for long term efficient performance call for co-ordinated efforts of survey organisations like GSI, development agencies of the Government like the Central Groundwater Board, the State Groundwater Boards, Agro-Industries Corporation, etc. on the one hand and between these organisations and industries (both in Public and Private sectors) producing varied material and diverse equipment needed in tubewell irrigation programmes. Concurrently, maintenance services have to be developed and intensified both at State and private levels. One other essential point to be considered is the question of ensuring training facilities for not only hydrogeologists, hydraulic engineers, irrigation engineers but also for

drillers and drilling engineers. In respect of drillers and drilling engineers the training facilities are far too inadequate in the country and thus trained drilling personnel who could be self employed professional men are far too few. This has been one of the main reasons for lack of efficient small scale private drilling agencies in the country. There are only a few companies who are engaged in tubewell construction activities and most of them are fully occupied round the year.

In the sector of material and equipment supplies, the most important basic equipment and material needed for construction of tube-wells are indicated in the table below :

TABLE III

Equipment and Material	Whether Indigenous Production available
1. Direct circulation water well drills	5 companies Total annual installed capacity 60 drills
2. Reverse circulation water well drills	3 companies Annual installed capacity 30 drills
3. Deepwell turbine pumps	4 companies
4. Air compressors	6 companies
5. Steel tubes Seamless and ERW casings	Production in 6 companies. Present demand partly met from imports.

Water utilisation being a State subject under the Indian Constitution, the onus for planning and development for tubewell irrigation lies with the States. All States seem to be eager to develop the groundwater resources. Notwithstanding this there is a gap in development when major constraints like survey of resources,

engineering material supplies and finance are not standing in the way.

The ARC funds are disbursed through banking institutions which cater to individual farmers. Bulk financial allocations from ARC are not available for state sector or departmental development programmes. By and

large, heavy duty irrigation tubewell installation in an intensified pattern of necessity has to be a state sector programme since the utilisation of water from such tubewell will be on community basis. In the ultimate analysis efficient management of groundwater based irrigation can be ensured only through unitary control of agriculture or irrigation departments of States. Therefore, it may be worthwhile to examine whether institutional financing of State sector projects could also be ensured. Small farmers who constitute over 75 per cent of the agriculturists of the country would thus be able to avail of irrigational facilities which will be ensured by State projects. If institutional financing from Agricultural Refinance Corporation, Life Insurance Corporation, etc. are made available for all State projects also, many of States would be able to take advantage of them and launch massive tubewell Irrigation Programmes. The States sharing the Sindhu-Ganga-Brahmaputra basins, the East Coastal plains amongst themselves would be able to convert these two most fertile and naturally arable terrains into three crops cultivation zones. As estimated a decade back by the Food and Agricultural Organisation of the United Nations, such intensified agriculture in these two zones would not only wipe out the food deficit of the entire country but would also leave considerable economic surplus in the agricultural sector for investment in other sectors of our national economy. A re-thinking in an objective manner is long overdue and I feel we make a concerted effort towards it.

I may conclude by saying that the status of groundwater resources survey and evaluation has over a decade's advantage vis-a-vis the rate of growth in development activities. None-the-less, the survey activities are being intensified and GSI is geared to achieve the Fourth Plan

targets in the field of survey, exploration and evaluation of resources. Concurrently, development activities for utilisation of groundwater in the field of tubewell irrigation must be intensified. The development agencies may consider the following basic norms for drawing up of development projects :

- 1) Projects will be given priority in those areas where survey and evaluation of groundwater have already been made.
- 2) Second priority project areas will be selected where current survey activities are in progress.
- 3) Identify specific problematic areas or areas requiring special consideration and indicate them to survey organisations for taking up high priority surveys.
- 4) Publicize programmes of development to all concerned industries which produce the equipment and material need for tubewell construction so that industry might get geared up in a commensurate manner.
- 5) The States may give high priority to develop organisations to provide technical services to farmers in matters relating to tubewell construction and maintenance of irrigation tubewells as well as organise a Central State data bank on water resources development and utilisation data. Such data should be readily available to the survey organisations and only then the survey organisations could provide the States with the answer relating to the problems that may arise in long term management of water resources.

With co-ordination of efforts of the Central Survey Organisations and development agencies of the States supplemented by collaborative and complementary enterprise from concerned industries both in the public and private sector, the maximization of tubewell irrigation in the country could really be made into highly remunerative success.