Resources at the Margin

Tank Irrigation Programme in Karnataka

V M Rao
M G Chandrakant

Taking the tanks proposed to be constructed under the Kartnataka Tank Irrigation Programme as a typical instance of an unutilised resource in backward areas, this note holes at their costs and indicators of impact in a comparative perspective to bring out their weaknesses as a development resource. This is followed by a brief consideration of the ways to improve the viability of such marginal resources. The note concludes by pointing out issues which are likely to be crucial in evolving a development strategy appropriate to the resource situation of backward areas.

I
Introduction

IT is obvious that development of agriculture in backward areas with rainfed cultivation would figure prominently in the agenda of priority tasks for the Indian economic development over the next few decades. The recent debate among the agricultural economists on the theme of deceleration in agricultural production over the 70s has been somewhat inconclusive. But few will deny that the performance of agriculture in the non-green-revolution areas would play a crucial role in sustaining the process of agricultural growth over the longer period. As far as the immediate future is concerned, the success of the current attempts by the Planning Commission and the state governments to promote local-level planning in backward rural areas would depend, in a large measure, on the results achieved in activating the agriculture in these areas.

When thinking of development of an area, it is usual to give primacy to exploitation of unutilised resources in the area. The purpose of this note is to suggest and illustrate the idea that the resources identified as unutilised in backward areas are likely, in reality, to be weak local resources with limited development potential. If we visualise resources as getting drawn into the network of economic activities through market forces, planned development programmes or efforts of local people to earn a livelihood, it is obvious that the unutilised resources in the backward areas are those lying beyond the frontiers reached by these resource-users. It occurs to us that a development process seeking to sustain itself by drawing in marginal resources could encounter the barriers of high costs and low returns. Also, plausibly, it could face problems of adjustment and co-existence with the growth processes in the economy based on modern resources and technology. Our attempt in this note is to use an illustrative case to bring out the nature of these problems and their implications for development strategies and policies.

The illustration considered in this note is that of small irrigation tanks proposed to be constructed under the Tank Irrigation Programme taken up recently in Karnataka. Tank is a traditional mode of irrigation in Karnataka. There are about 40,000 tanks in the state, most several decades old and some in existence since the pre-British period. The investments in irrigation — both public and private — in Karnataka in the recent decades have gone mostly towards expansion of canal and well irrigation and the area under tanks has remained stagnant with its proportion to total irrigated area diminishing over the years. The lank Irrigation Programme referred to in this note covers the construction of 68 tanks in the backward areas in the state lacking, the potential for any other kind of irrigation. From the point of view of these areas themselves, the proposed tanks would be a desirable improvement in the infrastructure of local agriculture- But, as an observer of tank Irrigation in Karnataka has noted, new tanks could come up only in marginal locations bypassed by the historical spread of tank irrigation. Also relevant to note, as indicated by the recent trends in irrigation in the state, tank itself is a less-preferred mode of irrigation than canal or well. Thus, it would seem that the illustration choser by us does relate to an unutilised resource in the backward area which is weak and marginal in nature.

The authorities of the Tank Irrigation programme prepare a project report for each of the proposed tanks which is placed before an expert committee for assessment and approval. The process of preparation and approval of project reports would be over in the next few months. This note is based on the fifty project reports cleared so far by the expert committee. We rely only on the data available in the project reports as the tanks are at various stages of construction and have still to become operational. It is quite likely that the project reports conform to the common tendency in such documents to allow a measure of optimism to creep into their assumptions of costs and returns, It is necessary to keep this point in mind while looking at the data presented below. At the same time, we hasten to add that our attempt is not to assess the merits or viability of the Tank Irrigation Programme as such but only to illustrate the characteristics of the resource terrain over which the development process in the backward area has to move.

II
Proposed Tanks: Location, Size and Technology

The major part of Karnataka falls in the region lying east of the Western Ghats. The proposed tanks are located, mostly, in this region. The region consists of two north-south belts — 'transitional' adjoining the

TABLE 1:TANKIRRIGATIONPROJECTS IN KARNATAKA

Zone	No of tanks Tanks	CCA Per Tank (Hectares)	Beneficiaries Per Tank	Construction Cost Per Tank (Million) rupees)
Northern-Eastern Transition	7	517	162	11.5
Northern-Eastern Dry	6	392	182	11.1
Northern Dry	10	360	150	10.6
Central Dry	1	48	30	2.4
Eastern Dry	8	180	145	4.5
Southern Dry	9	203	153	6,7
Southern Transition	4	464	294	15.0
Northern Transition	4	363	193	8.6
Hilly	1	150	71	6.1
All tanks	50	327	166	9.0

Note : The two zones having only a tank each omitted in the tables which follow.

TABLE 2 : CONSTRUCTION COSTS

Zone	Per Hectare of CCA	Per Beneficiary Family
North-Eastern Transition	22,234	71,029
North-Eastern Dry	28,226	60,607
Northern Dry	29,262	70,447
Eastern Dry	25,064	31,017
Southern Dry	33,245	43,933
Southern Transition	33,341	51,026
Northern Transition	23,642	44,521
All tanks	25,650	54,349

TABLE 3: CAPITAL COSTS PER BENEFICIARY OF SELECTED SUBSIDIARY ACTIVITIES

Activity	Cost (in Rupees)
Dairy (2 cross-bred cows)	9,000
Poultry Unit (200 layers)	5,000
Piggery (7 piglets)	3,000
Sheep Unit (21 sheep)	5,400

ghats and 'dry' further east. The geographers distinguish a number of zones in these belts. It is enough for our purpose to remember that, while the region as a whole is a modest rainfall area, the problem of low and uncertain rainfall is particularly serious in the case of the zones in the 'dry' belt. It can be seen from Table 1 that, out of the 50 tanks covered in our study, 34 are located in the 'dry' belt. When we recall the point mentioned above that the locales selected for the tanks are those lacking any other kind of irrigation, existing or potential, the focus of the Tank Irrigation Programme on the backward areas should become quite evident, The second point to be noted in Table I is that, on an average, a tank would have a command area of 327 hectares providing irrigation to 166 holdings; some of the zones in the 'dry' belt would have tanks even smaller than this average size.

As a layman would see it, these are, essentially, local-level production infrastructures serving a village or a couple of villages. One would expect such small and localised groups of beneficiaries to take the lend in perceiving and using the economic, opportunities based on local resources. However, the initiative for the Tank Irrigation Programme comes not so much from the beneficiaries as from the state government. The initial prospecting for sites and the preparation of technical reports are done by the Irrigation Department. The construction of tanks is undertaken by the contractors supervised by the departmental staff. There is a provision in the Tank Irrigation Programme for formation of groups of beneficiaries, after the tanks become operational, for the management of water use. But, apparently, the beneficiaries play little role in the planning and construction phases.

It is possible that an action role by the beqeficiaries in the initial phases is ruled out by the technical nature of the tasks involved in designing and constructing tanks, An indirect clue provided by Table 1 is that the construction cost of a tank, on an average, is 9 million rupees. It would seem obvious that the scale of capital expenditure needed by the tank is beyond the capacity of the local level organisations to undertake. Plausibly, the scale of capital expenditure itself is large because of the technology of construction involving substantial components of non-local and non-rural — technical skills and materials. Thus, it would appear that technology could be a factor hampering the local initiative and planning for using local resources.

Interestingly, the construction of tanks in Karnataka in the historical past proceeded on the basis of local labour, materials and initiative with the last provided, usually, by the rural chieftains, large landlords, affluent traders, etc. To a village community, tank was a multi-purpose collective asset and the people who gave the lead in getting the tanks constructed did it out of considerations — like charity and fame and status in the community - not directly linked with costs and returns. It is necessary to remember that the sites of the proposed tanks are those which remained unutilised during this historical process and, equally important to note, the process now bringing them under use relics far more than the historical process did on non-local initiative and technology.

III
Construction Costs: A Comparative View

We now take a look at the capital costs of construction in terms of costs per hectare receiving irrigation and costs per beneficiary family. The data are given in Table 2.

The construction costs per hectare of cultivable command area (CCA) range from about Rs 22,(XX) to a little over Rs 33,000, Between the 'transitional' belt and the 'dry' belt, the costs appear to be on the higher side in the zones belonging to the latter belt, One way of putting these costs in a perspective is to consider the corresponding costs of providing well and canal irrigation. A study is currently in progress in the ISEC to evaluate the NABARD programme for financing the sinking of dug-wells in the hard-rock areas in Karnataka. The study covers dug-wells constructed recently in three selected districts — Kolar. Mandya and Bijapur. While the fieldwork of the study is yet to be completed, the indication that we get is that the construction costs per hectare irrigated by dug-well is between Rs 10,000 and Rs 20.000 — substantially lower than the costs seen in Table 2 for tank irrigation. The costs of canal irrigation appear to be still lower. The data available in the Karnataka Bureau of Economics and Statistics show that the investments in the recent decades in the major canal irrigation projects in the state have been of the order of Rs 800 crore leading to an irrigation potential of about 1.43 million hectares. This gives construction costs of a little over Rs5,000 per hectare.

The limited purpose of this rough comparison of costs is to suggest that, if one were looking at the state as a whole, the economic considerations, by themselves, are likely to rule out investments in tanks. The tanks, in this sense, are resources lying beyond the economic margin. They begin to get noticed only when one moves to the backward areas and looks for resources within these areas which have remained unutilised so far When the objective is to undertake development activities in the backward areas, it is, indeed, quite right and proper to locate such resources but one should keep in mind the likelihood of their having a weak economic case for exploitation.

A second and complementary way of looking at the construction costs is in terms of costs per family (i e, holding) benefiting from the

TABLE 4: INDICATORS OF IMPACT

Zone	CCA per Beneficiary (in hectares)	Cropping Intensity (%)	
		Existing	Proposed
North-Eastern Transition	3.2	109	119
North-Eastern Dry	2.2	127	125
Northern Dry	2.4	109	120
Eastern Dry	1.2	102	109
Southern Dry	1.3	97	123
Southern Transition	1.6	104	140
Northern Transition	1.9	96	130
All tanks	2.0	105	124

TABLE 5: INDEX OF GROSS VALUE OF OUTPUT PER UNIT OF LAND

Irrigation Situation	Index
No Irrigation	100
Tank Irrigation	195
Canal Irrigation	350
Well Irrigation	500

Notes: The index value of 100 corresponds to a gross value of output of Rs 2,250 per acre.

TABLE 6: INCOME EQUIVALENT IN TERMS OF DRY LAND OF SELECTED ACTIVITIES

Activity	Income Equivalence in Terms of Dry Land (acres)
One cross-bred cow	5
One poultry unit of 100 layers	5
Piggery unit of 7 piglets	5
One sheep unit with 21 sheep	6

TABLE 7: PROPOSED CROPPING INTENSITY BY RAINFALL CLASSES

Annual Rainfall (mm/year)	No of Tanks	Cropping Intensity
< 600	12	119
600 to 750	19	121
751 to 900	14	129
901 and above	5	135
All tanks	50	124

TABLE 8: PROPOSED CROPPING INTENSITY BY SIZE CLASSES

CCA (in hectares)	No of Tanks	Cropping Intensity
< 100	15	121
101 to 200	16	126
201 to 300	6	129
301 to 400	4	109
401 and above	9	130
All tanks	50	124

tank. This helps in comparing tanks with the alternative ways of providing income-earning activities to the households in the backward areas. Let us note, at the outset, that the range of costs per family — Rs 31 .000 to Rs Rs 71,000 — is wider than the range of per hectare costs. Tanks being a community asset, the costs per family would depend on factors like settlement pattern of villages, si/e and dispersal of holdings, etc. There is a suggestion in Table 2 that the costs per family tend to be on the higher side in some of the zones in the northern part of the state. While we do not go here into the reasons for these high costs, it would be relevant to note that the dispersal of rural population works as a barrier in the provision of many community amenities and facilities. Here, again, if one were to go by the economic considerations alone there would be numerous rural communities and areas lacking the minimal eligibility for such amenities and facilities.

How do the costs per beneficiary family of tank compare with the corresponding costs of alternative income-earning activities? It would seem appropriate, for the comparison, to choose the activities commonly recommended as subsidiary enterprises in the dry farming areas in Karnataka. Table 3 shows the costs as reported in a recent study prepared in the University of Agricultural Sciences. Bangalore.'

Since the comparison here is only in terms of capital costs, we draw the limited inference from Table 3 that the tank irrigation may not necessarily be the priority choice, from among the alternatives available, in devising the strategy for the development of backward areas. Interestingly, the lank Irrigation Programme in Karnataka is a typical instance of a sectoral programme undertaken in isolation and not as a part of an overall plan to initiate and sustain the development process in a backward area. When the resources in an area are generally weak and marginal in nature, a likely situation in the backward areas, the question of priorities and proper combination of activities becomes more important — and not less — than in the areas having an obvious major resource capable of serving as the centre-piece in the development strategy. It occurs to us that a better way for the State Government to go about could have been to consider the proposed tanks as a component in a package of activities to minimise the risks of wrong priorities. The indicators of impact of tank irrigation, discussed next, appear to provide further evidence emphasising the need for such caution.

IV

Indicators of Impact

The project reports provide two indicators of prospective impact of tank irrigation — area irrigated per beneficiary family and change in the crop-pattern. The proposed tanks would have very little area in their command under the perennial crops (less than 2 per cent of command area). While the area under two season crops would be a little higher (7 percent of command area), it would be negligible in most of the zones excepting a few in the northern part of the State. More important, the tanks would only help in stabilising the prevailing modest extent of area under the perennial and two-seaspn crops (1.7 per cent and 5.3 per cent) rather than bring about an increase in the extent of these crops. The main effect of tanks on the crop-pattern would be a small rise in the cropping intensity from the prevailing level of 105 to about 124. Thus, put simply, the impact of tanks would be more in the nature of stabilisation rather than any substantial transformation in the economic milieu of the backward areas. The purpose of this section is to present some indicative data suggesting the plausibility of this proposition.

Table 4 shows, zone-wise, the irrigated area per beneficiary family and the existing and proposed cropping intensities. It would seem superfluous to comment on the modest nature of impact, particularly in the dry zones, indicated by the table. To place the impact of tank in a comparative perspective, we have put together Table 5 based on the impressions gathered from the colleagues in the University of Agricultural Sciences (UAS). The table presents an impressionistic index of gross value of output per unit of land under different modes of irrigation. The index is based on the assumption of adoption of appropriate technology and crops recommended by the UAS for each irrigation situation. Obviously, this assumption would be rather unrealistic to make in the case of backward areas considered in this note and, hence, the increase in gross value of output under tanks could be even more modest than indicated by Table 5.

The comparison of impact is more difficult to make in the case of non-agricultural activities. The UAS study referred to above in connection with Table 3 provides a set of estimates which are of some help in comparing tanks with the activities shown in Table.3.[2] The study has sought to express these activities in terms of the acres of dry land yielding the same income as the income earned from the activities. The estimates are shown in Table 6. If these estimates are judged in the light of the tank irrigated area per beneficiary family (Table 4) and the differential between the dry land and tank-irrigated land (Table 5), it would seem obvious that the contribution to income from the activities in Table 6 could be better than that from tank irrigation. At the same time, as seen in Table 3, these activities require initial capital costs much less than those entailed by the tanks.

The project reports contain two further clues to the weak impact of tanks. First, tank is not a dependable mode where the rainfall is low and uncertain. While there is no easy way to find out the effect of uncertainty, the project reports permit classification of the proposed tanks by the normal annual rainfall in the taluks in which they are located. It can be seen from Table 7 that the cropping-intensity expected to prevail after the tanks become op-

TABLE 9: COMPONENTS OF INFLOW OF WATER (PER CENT)

Zone	Losses	Surplus	Available for Irrigation	Total Inflow
North-Eastern Transition	12	1	87	100
North-Eastern Dry	20	1	79	100
Northern Dry	17	2	81	100
Eastern Dry	15	1	84	100
Southern Dry	8	32	60	100
Southern Transition	9	1	90	100
Northern Transition	19	14	67	100
All thanks	14	10	76	100

TABLE 10: COMPONENTS OF CONSTRUCTION COSTS (*Rs lakh*)

	Case A	Case B
Command area (hectares)	350	80
Total costs	163	38
Salaries of technical personnel	16	4
Items of construction involving non-local materials like steel and cement (spill way, stilling basin, bridges, cross-drainage works, buildings)	40	13
Earth work and field channels involving local labour and material	48	14
Land	11	1
Catchment protection	4	Negligible
Miscellaneous and contingencies	44	6

erational is positively related with the quantum of rainfall. Second, we also get a hint that the proposed cropping-intensity would be higher under larger tanks than the smaller ones (see Table 8). It would seem a plausible assumption that the tanks having a relatively weak impact, viz, the small tanks and the tanks in low rainfall areas, would also be subject to larger variability of impact from year to year.

V

Making a Marginal Resource Viable

Given the finding that tank is a high-cost-cum-weak-impact resource, a relevant question to ask is whether there are any ways to improve the viability of such marginal resources. While the answer to this question could differ from resource to resource, it is possible in the case of tanks to argue that research in two relevant areas could be of some help. First, a feature which we find surprising as laymen is that, out of the total inflow of water received by the tanks, 14 per cent would be lost through evaporation and another 10 per cent would remain as surplus left unused by the recommended croup pattern for the tank command areas (see Table 9); in a few zones, the 'surplus' component is seen to be quite substantial. Might not research on crop varieties, specifically focused on the soil-climate features of backward areas, be of the help in improving the extent of inflow used for irrigation? If agricultural research so far has been biased in favour of areas with developed agriculture, there would be a presumption that unexploited research opportunities exist in the backward areas to be benefited by the proposed tanks.

Second, consider the break-up of costs of tanks shown in Table 10. The itemisation of costs in the project reports makes it difficult to get what may be called *on* economic classification of costs and Table 10 is confined to two illustrative cases which we could discuss personally with experienced engineers. If we leave aside the last item 'Miscellaneous and Contingencies', it would be seen that the non-local components — salaries of technical personnel and modern types of construction account for about a half of the construction costs. Presumably, research on low-cost construction might suggest ways to reduce the non-local components and, thus, help in bringing down the costs of construction.

The limited point that we want to make is that situation-specific research to improve the costs and returns of marginal resources might go some way in improving their economic viability. However, it would be wishful to expect research alone to solve the resource problems of backward areas. It is unlikely, for example, that the problems of viability of many rural non-agricultural activities (such as rural handicrafts, cottage industries etc) could be overcome through research alone. These problems arise from the dualistic nature of the economy and would need more fundamental policy measures going beyond the programmes and schemes implemented for and within the backward areas.

One of the ways of seeing the need for a comprehensive set of policies for the backward areas is to look at the costs and returns of development in these areas from a broader perspective. For example, taking the case of tanks, the minimum of non-local components needed for the construction of tanks could be regarded not as a cost but as a subsidy provided to the area. Similarly, the unskilled labour and local materials could be valued at their opportunity cost rather than at prices actually paid by the project authorities. On the side of returns, it would be important to take note of the contribution of tanks to objectives like provision of work to the unemployed, stabilisation of agriculture, improved water supply for domestic uses, etc. The broader perspective is of help in reaching a more valid assessment of the viability of marginal resources; more important, it could make explicit the many links of commitment which the larger economy has to have with the backward areas to acquire the capacity to work for their development.

VI

Development Strategy for Backward Areas: Some Issues

Listed below, briefly, are some issues which could be crucial in evolving a policy framework for the backward areas.

(a) An implication of having to work with marginal resources is that the development strategy would have to take a comprehensive view of the resources to exploit the opportunities for integration of activities into viable packages. It would be difficult to implement such a strategy from a distance which underlines the importance of having participatory local-level planning in the backward areas.

(b) The integrated approach would also be important from the point of view of equity since any single programme would have a modest coverage of beneficiaries (for example, the Tank Irrigation Programme would benefit only about 10,000 holdings dispersed over the backward areas in the state) and not every household would have the eligibility and willingness to participate in every activity (for example, rearing of pigs may not be acceptable to households of certain castes).

(c) The process of using marginal resources would need a strong measure of support from the larger economy. The case of tanks points out two areas — situation-specific research and provision of non-local personnel and materials. The non-agricultural production activities would usually need, in addition, support in the areas of finance and marketing.

(d) Resources being marginal means that there would be fairly restrictive limits to development achievable for the people in the backward areas by using these resources alone. Typically, such

resource-situations contain powerful disincentives against investment by people in their own nutrition, health, education, skills and extension of contacts outside. These investments widen the range of accessible economic opportunities and, also, help in integrating the backward areas with the mainstream economy. Normally, the urge to go in for such investments gathers strength only when income crosses a threshold level and a crucial strategy issue is how to promote these investments in the backward areas, fast enough and in adequate magnitude, ahead and supportive of income rise,

(e) Another major field needing a promotional thrust for similar reasons is the improvement of rural amenities and services. It is enough to remind ourselves that, currently, the development personnel like bank officers consider the placement in a typical backward area as a penalty posting.

Notes.

1 "Subsidiary Enterprises in Dry Farming Area: Programme and Strategy", by K A Jalihal, theme paper presented for the Seminar-cum Workshop on Dryland Development held in the University of Agricultural Sciences, Bangalore in October, 1983.

2 See the study referred to in footnote I.

African Development Bank

THE African Development Bank (AfDB) approved 35 loans totalling $ 574 in 1983, compared with 33 loans totalling $ 399 million in 1982. The African Development Fund (ADF), the AfDB's soft loan affiliate, approved 41 loans totalling $ 344 million in 1983, compared with 42 loans totalling $ 358 million in 1982. The decline in lending by the African Development Fund reflected the resource constraints it faced in 1983.

The largest share of the AfDB's commitments in 1983 went to projects in the public utilities sector, which received 33 per cent of total lending. The transport sector received the second largest share of commitments at 24 per cent, followed by agriculture (23 per cent), education and health (10 percent), and industry (9 per cent). Member countries in the East African region received the largest relative share of the AfDB's commitments in 1983. These countries received 40 per cent of total AfDB lending compared with 35 per cent in 1982.

Disbursements of AfDB resources totalled $ 190 million in 1983, compared with $ 147 million in 1982. The largest share of ADF resources was allocated to the agriculture sec-or in 1983, which received 36 per cent of the total. This was followed by the transport sec-or with 27 per cent, the public utilities sector (25 per cent), and education and health (13 percent).

As in the AfDB, members in the East African region received the largest share of ADF commitments, at 45 percent of the total, compared with 44 percent in 1982. Disbursements by the African Development Fund in 1983 totalled $ 159 million, compared with $ 124 million in the previous year.