

IRRIGATION IN AFRICA AND ASIA - POLITICS AND PROBLEMS

CHRIS EDWARDS Lecturers, University of East Anglia, Development Studies,
LINDEN VINCENT Norwich, England.

1. Objectives of this paper: to provoke discussion at the 1981 WEDC Conference among irrigation engineers and planners about the need to consider the social structure as well as the natural environment when planning irrigation schemes. The points raised in this brief paper arise from the experience of:

Chris Edwards, economist; and
Linden Vincent, hydrologist, both
at the School of Development Studies,
University of East Anglia, Norwich,
England, and from the writings of
other people on irrigation - full
reference to which are given at
the end of the paper.

2. Irrigation - what is it? Irrigation is defined here as the application of water to land for cultivation using manual or mechanical means. There are many different methods of irrigation, some of which are illustrated in figure 1; there is a range of technologies, with the class structure in a particular society as well as the physical environment determining the technology used. The large-scale schemes, such as gravity canals or deep tube-wells, are invariably controlled or at least sponsored by central or local state agencies, while the smaller scale schemes are more commonly associated with private capital. The annual capital costs per hectare range between US\$ 10 and US\$ 40. It should be noted that these are rough estimates, based on 1978 prices and exclude interest charges. Clearly the range of capital cost per hectare is quite small, but these capital costs per hectare are calculated on the basis of the potential or maximum command areas specified in figure 1; the actual areas irrigated are often considerably less, particularly for the large-scale schemes.

3. The scope of, and need for irrigation

In the four countries in which we have experience, the utilisation of irrigation potential varies considerably - ranging from over 60% in India to less than 2% in Zambia as shown in Table 1 below.

In Bangladesh, the population density is one of the highest for any country in the world; land is relatively scarce and labour plentiful. Irrigation is indispensable for increasing agricultural output (See ref.1). It is required both for reducing the risk attached to high-yielding varieties and for multiple cropping; see figure 2. Here, particularly, there is a conflict between fragmented land-holdings and a relatively indivisible technology - we come back to this central point in section 4 below.

Dryland India also confronts a severe land constraint. Water resources are regionally variable, but often poor - see fig 2 - with limited groundwater availability and restricted potential for small storage schemes because of the volume and pattern of rainfall. As in Bangladesh there are strong class distinctions in access to capital for irrigation equipment.

In Tunisia, sophisticated technology is required whether it be for the large communal schemes in the north and centre, or oases, and irrigation schemes have been associated with resettlement. In general, compared with Bangladesh and India there is less pressure on the land, and irrigation is not an indigenous activity, having been 'superimposed' to alter or extend traditional rainfed cropping, and is associated with bring farmers into the market economy.

In the latest Zambian Five Year Plan, two prominent objectives are to increase agricultural output and to promote self-reliance. Irrigation is inferior on both counts compared to more intensive rainfed agriculture through, for example, the use of oxen. Land is not as serious a constraint in Zambia as labour, and there is a progression by farmers through oxen and tractor ownership for rainfed farming before labour and capital is released for irrigation (see ref.2).

4. Politics and problems in irrigation

In the mid 1970's, the Agricultural Administration Unit of the Overseas Development Institute began a programme of

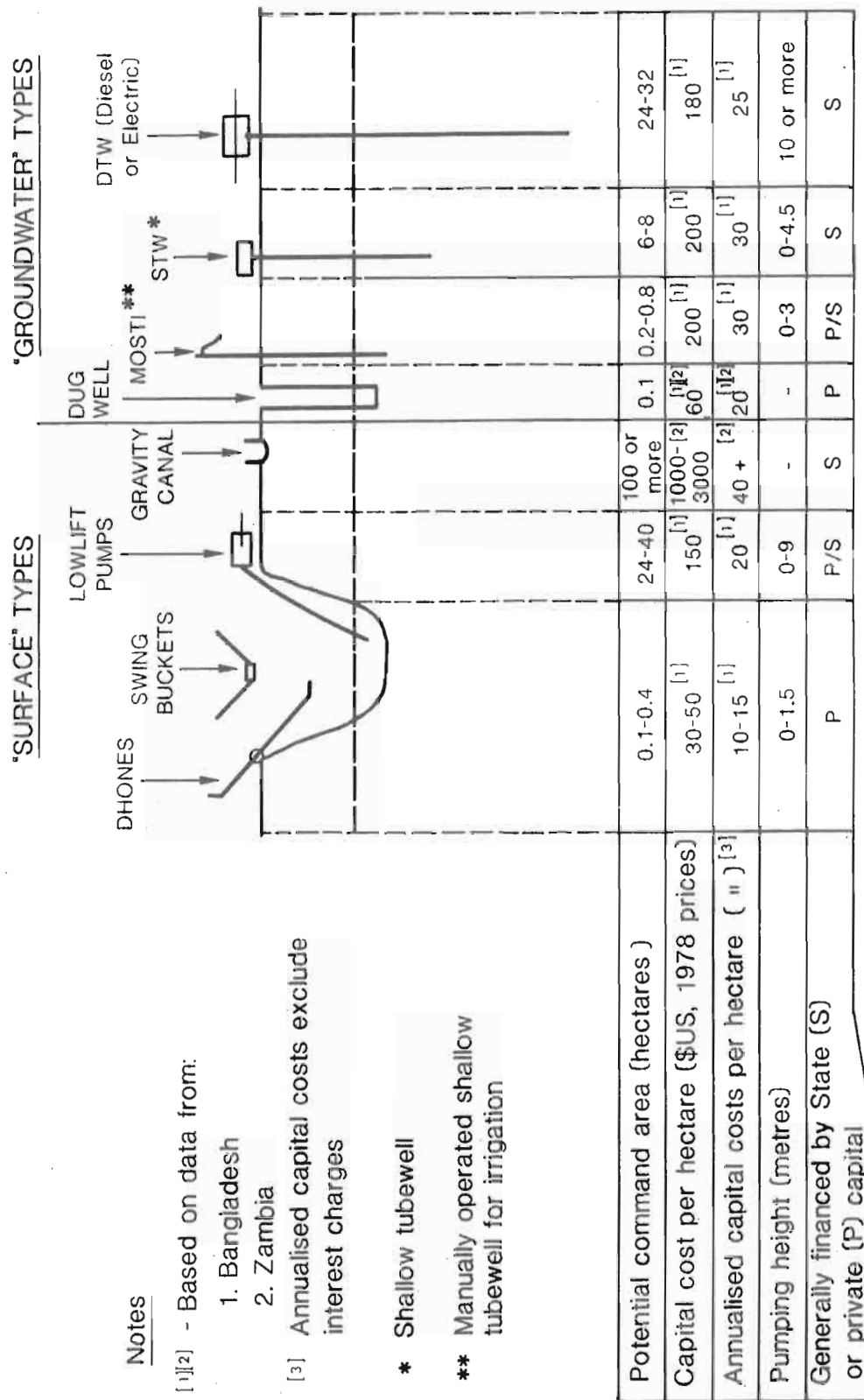


Fig. 1 Irrigation Methods

Table 1

	Bangladesh	India	Tunisia	Zambia
Total population (1980-mns)	90	630	6	6
Total cultivable area (mn has)	9	152	9	32
People per cultivable hectare	10	4	<1	<1
Irrigated area				
- actual (mn has)	1	58	0.14	0.02
- potential (mn has)	8+	93	?	1-10
- % actual factor to potential	12	62	?	2 or less

comparative research on the organisation and management of irrigation schemes (ref.3). The motivation for this study was provided by the failure of many large irrigation projects, with much of the poor performance being blamed on weak management. In some areas (eg. Taiwan) the schemes seem to have been successful but it is claimed by some of them that there are historical reasons peculiar to Taiwan accounting for this success (ref.4). In other areas (eg. on the Mwea and Gezira schemes in Kenya and Sudan respectively), a highly 'integrated management' structure seems to have been successful (in terms of increasing agricultural output) in the early stages of the schemes, but seems to have suffered from institutional stagnation (see refs.5 and 6).

But why is the strong and detailed management provided by, for example, the irrigation associations in Taiwan necessary? We argue that 'strong management' is an attempt to resolve a contradiction which arises in the context of irrigation, and which is particularly evident in, for example, Bangladesh. This is the contradiction between a fragmented landholding structure and a relatively indivisible irrigation technology. The average landholding in Bangladesh is very small (see Table 2 below) with even moderately rich farmers in Bangladesh having too little land in one holding to make the purchase of a hand-pump economically viable without the sale of water to neighbouring farmers. This sale is

often difficult to effect because of the nature of the commodity. Thus the risk associated with the purchase of even small-scale irrigation equipment is high; the provision of credit by the government may eliminate this risk, but because of the political power of rich farmers, the loans are invariably not repaid, thus reducing the incentive to sell water. The problem of equipment underutilisation then emerges.

The contradiction and the equipment underutilisation may be resolved by the consolidation of landholdings under private ownership. This seems to be happening particularly rapidly in those areas of Bangladesh in which state credit has been most extensively given for irrigation and other investment in agriculture (see ref.7). But then this "capitalist" consolidation has created growing landlessness. The landlessness may be avoided without recreating a fragmented landholding structure through the establishment of production cooperatives as in the communes of China (see ref.8), but this requires a political framework not obtaining in the countries of South Asia.

Consolidation, whether 'capitalist' or 'collective', is one way of resolving the contradiction between fragmentation of landholdings and an indivisible technology. Another way is to make the technology divisible. The latter route was discussed in an article by Ed Clay which discussed innovations in the Kosi region of Bihar in India (ref.9). Clay pointed out that "the two most important innovations were the development of lower cost wells culminating in the bamboo borings, made largely of local materials, and the emergence of a market in the services of pumpsets" (see p. 77, ref.9). The latter also seems to have been occurring in Bangladesh with farmers buying the services of pumpsets for use on their own land rather than buying the water pumped from the land of a neighbouring farmer (see ref.10).

Table 2 - median landholdings (hectares per farming household)

Bangladesh	less than 1
Dryland India	3
Tunisia	more than 5
Zambia	2

These - the consolidation of landholdings or the fragmentation of technology - are alternatives to a 'strong integrated' management system. They are, of course, not

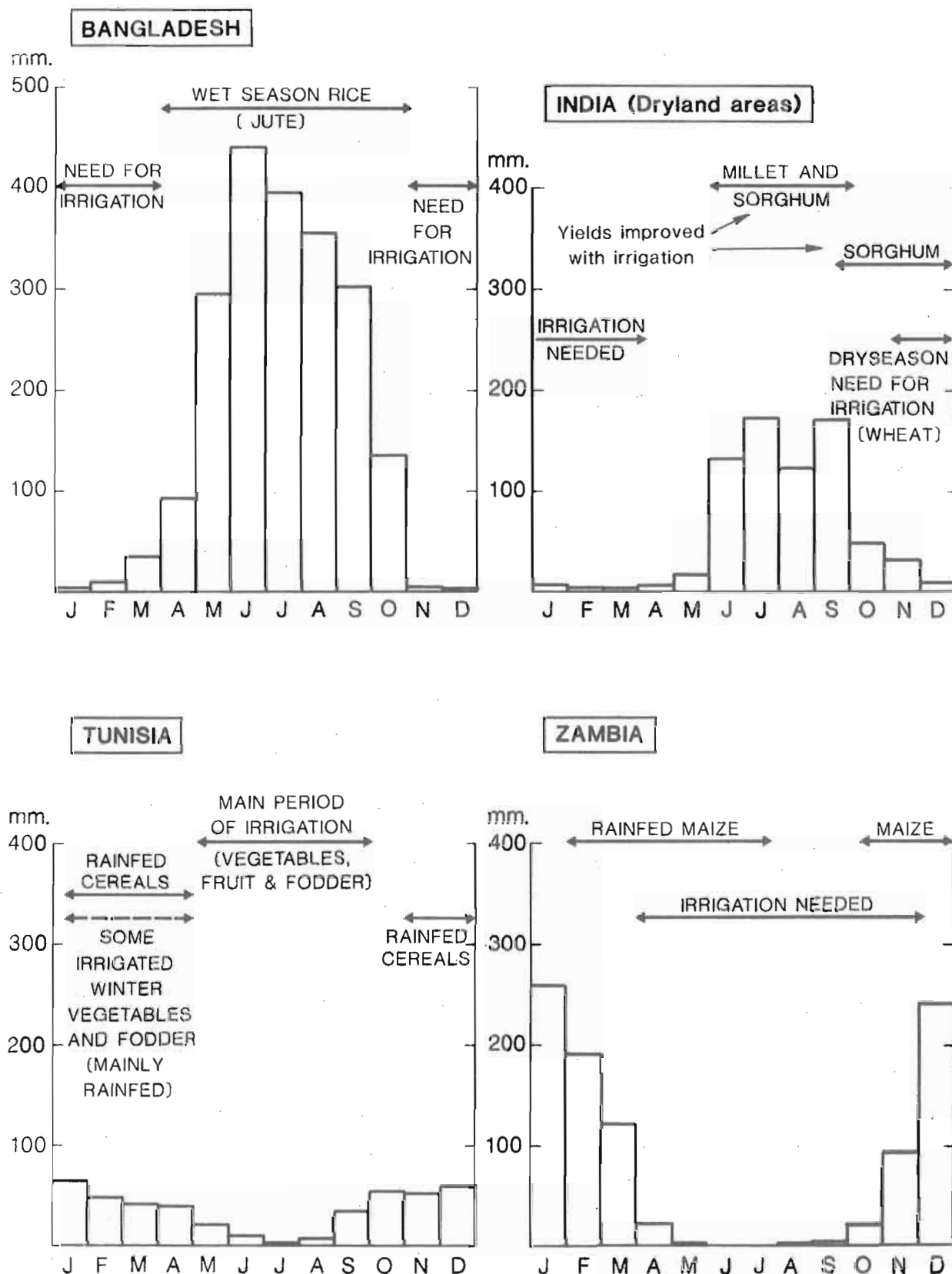


Fig. 2 Crop Calendar and Irrigation Needs in Four Countries

mutually exclusive alternatives but we emphasise them to illustrate the importance, for irrigation planners, of considering the political structure of a society.

5. Five important points

We wish to emphasise five points which arise from our experience of irrigation:

- (i) without specific political commitment, the smaller farmers do not have equal access to irrigation;
- (ii) the promotion of irrigation and other agricultural "improvements" by the governments of those countries in which we have worked, has encouraged the growth of capitalism in agriculture along with landlessness and inequality (see ref.11): but...
- (iii) land reform, if limited to redistribution of land ownership through re-fragmentation, may hold back long-run development and accumulation in agriculture, even though it reduces landlessness and inequality in the short-run;
- (iv) the cost-benefit analysis of irrigation schemes is often a spurious paper exercise with highly unrealistic assumptions commonly made about irrigation command areas given the social structure. In these circumstances, detailed technical planning is useless or even counter-productive (see ref. 12).
- (v) if a scheme fails, the temptation of blaming the failure on an "irrational peasantry" should be avoided. A number of studies suggest that such a simplistic conclusion is invariably unwarranted (see refs.12 and 13).

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