multi-disciplinary research team Α Agricultural from the Bangladesh (BAU) in Mymensingh. University. carried out a survey in 1985 on the performance of 100 tubewell and lowschemes under lift pump irrigation different government and non-government institutions. The survey was conducted in two locations: a) Tangail upazela (high water table and flat topography); and b) Gazipur upazela undulating table (low water and topography), both in Gazipur District. In-depth case studies on selected sites and a follow-up survey of installations were also conducted in Tangail in 1986.

These two areas represent only a of the diverse part and complex physical and social conditions of the country, but the research brought out a number of important findings with far-reaching policy implications. The detailed analyses, findings and recommendations of this research are documented in the proceedings of the two separate workshops held at the BAU in 1985 and 1986 (IWM-11 and IWM-12). The major findings of this research are as follows:

- >> Minor irrigation schemes have prominent technical deficiencies such as low water discharge of poor water conveyance pumps, systems, high canal loss of water, and poor on-farm water management. However, these deficiencies are not significantly related to the performance of tubewells in terms of command area or yield.
- >> Differences in the approaches of the different management institutions do not have significant impact on irrigation performance, except in the case of specialized programs such as those of Irrigation Management Programmes (IMP) and Cooperative for American Relief Everywhere (CARE) Even in these

cases, initial better performance must be discounted by high drop-out rates, and high overhead costs.

- >> The physical, social and agronomic factors such as soil type, topography, cropping patterns, inputoutput prices, land tenure and kinship relationships appear to have affected command area and yield performance of tubewells.
- >> The most important factors affecting irrigation performance in terms of command area and output were found to be the economic institutions such as the system of payment for water. For example. under tubewells operated cash payment system performed significantly better in terms of command area and output than those run on 25% crop-share payment basis in Tangail. In Gazipur, tubewells run on manager-supplied fuel system performed significantly better than those operated with farmer-supplied fuel.
- >> Although the privatization of irrigation equipment has succeeded promoting distribution in of equipment and increasing the area under irrigation, it does not appear to be associated with significant improvements in tubewell capacity utilization or yield. Rather. privitization appears to be associated with greater inequality in the distribution incomes. of and further transfer of land from the poor to the rich through sales, mortgaging, and sharecropping of land.
- >> The state of inequality has further intensified by the pervasive failure of the government institutions to recover bank loans and pump rental charges from managers or owners who accumulate huge profits from

water sales and high yields on their own plots.

important conclusion which One emerged from the research was that following privatization of irrigation equipment and the accompanying changes in the management approaches of the irrigation and credit institutions, a market for water has emerged but with varying implications for productivity, efficiency and equity. In areas with high water table allowing both deep and shallow tubewells, as in Tangail, the market for water has been In low water table areas, competitive. such as in Gazipur, no such competition has yet taken place. However, given the unequal access to credit, factor and product markets, the process of competition in the water market is far from perfect and highly inegalitarian, which has meant further inefficiency the utilization of equipment and in inequality in the distribution of benefits.

The implication of these findings is a recommendation to take measures aimed at removing institutional rigidities and social inequalities so that the emerging water market can work more efficiently and with more favorable impact on equity. Major publications from this research are:

- BAU (1985): Evaluating the role of institutions in irrigation management programmes. Workshop proceedings No. IWM-11, Department of Irrigation and Water Management, Bangladesh Agricultural University, Mymensingh.
- BAU (1986): Water markets in Bangladesh: Inefficient and Inequitable? Workshop proceedings No. IWM-12, Department of Irrigation.
- M.A.S. Mandal (1987): Imperfect institutional innovation for irrigation management in Bangladesh, Irrigation and Drainage Systems 1(3), pp. 239-258.

- R.W. Palmer-Jones and M.A.S. Mandal (1987): *Irrigation Groups in Bangladesh*, ODI/IIMI Irrigation Management Network paper 87/2c.

copies of first two Limited the publications listed are available from Department of Professor M.R. Biswas. Irrigation and Water Management, Agricultural Bangladesh University, Mymensingh, Bangladesh.

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Lift Irrigation Cooperative Societies

A case study from Gujarat, India

Panchamahals is a backward district of Gujarat state inhabited by peoples belonging to the Bhil tribe. The predominantly parched and gravelly soils of the district contrast with patches occasional where green surrounding water is trapped in the undulating terrain. The annual rainfall of 750 mm is not altogether meagre, but it is erratic. Tiny streams with small flows run all year except when drought is severe, as during 1985-87. possible only Settled agriculture is where stored water can be used for irrigation. Once covered with rich forests, the now barren lands stand ecological degradation. testimonv to Migration for eight months in the year is a necessary survival strategy for the tribal people.

In this land of the poor, the specter poverty, hunger of or compulsory migration need not be the only reality. Water can be lifted from natural lakes and bunded streams to irrigate lands that are surprisingly fertile. The problem has not been with technology, but with organization,

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