

Volume 1  
Number 1 & 2  
Year 1999  
ISSN 1529-0905



Journal of  
**BANGLADESH  
STUDIES**



## TABLE OF CONTENTS

<b>From the Editor</b>	<b>Syed S. Andaleeb</b>	<b>i</b>
<b>Reflections on democracy and development in Bangladesh</b>	<b>Nurul Islam</b>	<b>1</b>
<b>Public enterprise inefficiency and the road to privatization in Bangladesh</b>	<b>Tanweer Akram</b>	<b>7</b>
<b>Garment exports from Bangladesh: an update and evaluation</b>	<b>Munir Quddus and Salim Rashid</b>	<b>28</b>
<b>Professor Amartya Sen and the 1974 famine: additional insights and policy implications</b>	<b>Akhtar Hossain</b>	<b>39</b>
<b>The emergence of market-oriented reforms in Bangladesh: a critical appraisal</b>	<b>M. Faisul Islam</b>	<b>64</b>
<b>Ground water policy framework and equity issues: emerging realities and responses</b>	<b>Syed Zahir Sadeque</b>	<b>73</b>

# GROUND WATER POLICY FRAMEWORK AND EQUITY ISSUES: EMERGING REALITIES AND RESPONSES

Syed Zahir Sadeque  
Social Scientist

International Centre for Integrated Mountain Development (ICIMOD)  
GPO Box # 3226, Kathmandu, Nepal  
Email: Sadeque@icimod.org.np

## Background

Bangladesh is country of 120 million people living within an area of 1,47,570 sq. Kilometers, largely formed by the floodplain and delta of two major river system of Asia: *Brahmaputra* (called *Jamuna* in Bangladesh) and the Ganges (for most part called *Padma* in Bangladesh). The semi-tropical high rainfall area (from a mean annual of 1500-4000mm) is crisscrossed with numerous rivers (most of which originate outside the country) and their tributaries. Considering the soil characteristics, high rainfall and flow of surface water from a very large catchment area, the county is generally endowed with good but uneven ground water resources. The rainfall is monsoon determined and is concentrated during the months of June-September. The remaining eight months receive about 20 percent of the annual rainfall. There is a distinct hot and dry period during March-May and water shortages are acute in parts of the country during this period. This is also the period of winter rice cultivation requiring constant irrigation that compounds the water scarcity further.

Thus, in a situation where water sources are abundant, sharing them within communities has never been a historical problem. However, in recent times, as their supply has become increasingly competitive with claims by multiple users, conflicts have arisen over their use. The existing legal and institutional structure and regime is rather unprepared to deal with these newly emerging issues. While communities are addressing the crisis with

homegrown solutions, public policies are still not well articulated by the authorities. This paper explores some areas of the legal and institutional mechanism and procedures that deals with sharing of this important common resource, and the options ahead to ensure equitable use of ground water to meet both food production as well as domestic needs.

## **Ground Water in Bangladesh: *conditions, development objectives and the mismatch***

The hydro-geological conditions in Bangladesh allow inexpensive extraction of ground water with simple technologies almost everywhere in the country. In terms of the water table, there are four major areas: Low Water Table Area (LWTA) where water is available below 8 meters, Shallow Water Table Area (SWTA) where water is available within 7 meters, Coastal Saline Area (CSA) where water at shallow depths is saline, and the hilly terrain of Chittagong Hill Tracts (CHT) Area where water is available at much lower depths. In the early eighties, about 75 percent of the country was under the SWTA, while around 8 percent of the country was under LWTA. The CSA and CHTA area are rather static, although, due to upstream withdrawal of surface water by India during the dry months, salinity is increasing in the coastal areas of Bangladesh. Over the years, the LWTA is increasing rapidly and the forecast is that it will subsume around 50 percent of the country by the year 2000 (DPHE, undated). In the SWT area, water is extracted by common No. 6 handpumps for drinking water purposes, while mechanized shallow pumps draw water

for irrigation; the depth for both being within 7 meters. In the LWT area deep-set handpumps are used for drinking purposes while mechanized deep tube wells are common for irrigating crops. The required depth of these tubewells is considerably below the shallow water table (7 meters) and varies according to soil conditions and water table. The CSA and CHTA use different types of deep tubewells and technologies for extracting ground water from far greater depths.

Successive governments in Bangladesh have always been involved in the provisioning of water for all purposes with varying level of involvement. Until recently, it was the exclusive responsibility of the government to provide drinking water. In the rural areas, this has changed considerably in the recent past as individuals are sinking and operating No. 6 suction mode handpumps in increasing numbers (Sadeque and Turnquist, 1995). Despite the impressive private sector participation in SWTA, other areas are still dependent upon government provisioning of water and the available technologies are relatively more expensive. In the absence of piped water system in the rural areas, beneficiary contribution remains limited to a small down payment at the time of installation and minor repairs only. For ground water irrigation however, the introduction of mechanized pumping, although government induced has become almost totally privatized now. Prevalent technologies are mechanically operated Shallow Tubewells (STW) and Deep Tubewells (DTW), and farmers either buy them individually or form a group to buy one. The availability of ground water in most areas has resulted in proliferation of tubewells both for drinking and irrigation purposes. Currently there are over 2.5 million handpumps in operation, less than one third of which are government provided and the rest are privately owned. It is estimated that around half a million STWs and nearly 35 thousand DTWs are currently in operation for irrigation purposes. The STWs, due to their low cost, are increasing rapidly and around 40-45 thousand are added every year. Irrigation season in Bangladesh is the months of February-May,

when the water table also remains at its lowest, and precipitation is minimum. It is during this period that the mechanized irrigation pumps are increasingly viewed as a competitor to handpumps that provide drinking water.

This crisis has been exacerbated in recent years as irrigation coverage has increased dramatically, further lowering the ground water level. Since its emergence as an independent country in December 1971, Bangladesh has continued to face problems in meeting its food needs. Increasing food production through improved practices, which invariably requires irrigation water, has always been the driving force of the development strategy in Bangladesh. With the withdrawal of increasing amount of water in upstream countries (primarily India), and the sinking of an ever-increasing number of mechanized tubewells, lowering of ground water level in the dry season has become a reality. In this competition for ground water, simple, low cost technologies, like hand tubewells, used mostly for drinking and other domestic uses, lose out. As water has always been found in abundance, rules/norms for using this common resource has never been codified and people are confused about confronting the emerging reality--the scarcity of this seemingly abundant resource.

This paper explores the context of this emerging situation for ground water in relation to existing legal and institutional issues. For the ground water sector, there is evidence that due to cultural and religious sanctions water is not denied to anyone; however, exchanges do occur between parties. Often recipients of drinking water have to provide equal amount of surface water to the irrigation channel in order to receive clean water from mechanized tubewells during the lean period. As more and more handpumps become inoperable due to the irrigation triggered draw-down, people are questioning the relentless use of ground water resources for the benefit of irrigated agriculture, practiced by people owning land in the irrigation block. The equity implications complicate the conflicts further as rich landowners either own or control irrigation pumps (and, therefore,

water during the dry period) and are major beneficiaries of irrigation. Therefore, the emerging informal rules over the harvest of this open resource are affected by existing power relations in the society. What remains to be analyzed is to what extent are the conflicts arising out of ground water use supporting the development of informal rules and whether the agreed consensus is equitable and sustainable as an option compared to technocratic administrative controls, which have been conceived in the past to regulate the sinking of deep drawing mechanized tubewells.

Food self-sufficiency has always been a top priority in successive five-year development plans of Bangladesh. To achieve that goal, huge investments were made in flood control and irrigation development. The Fourth Five Year Plan (1990-95) noted that in order to achieve food autarky the country needs to transform the agriculture sector from “rainfed to irrigated agriculture” (The Fourth Five Year Plan, 1990). Ground water based minor irrigation has been the mainstay of this transformation. After the deregulation of the minor irrigation sector and privatization of all equipment in the late eighties, the sector began witnessing a phenomenal growth in the number of mechanized pumps. Although the more expensive DTWs registered a slower growth, the STWs grew by 40-50 thousand each year during the 1990-95 period. In the LWT areas, DTWs are the major source of irrigation. DTWs, typically of 2 cusec capacity can irrigate 25 hectares of rice land. DTWs, when in operation, create a conical depression in the water table and pump out water from that displacement. That is why they are associated with temporary draw-down of water table in the adjoining areas. Typically, in the relatively elevated LWT areas of North-west Bangladesh, ordinary No. 6 handpumps become inoperative during the dry months when water table recedes below 7 meters. With the large scale introduction of DTWs and STWs, the water table, during the dry months, has receded further, rendering more and more hand tubewells (HTW) inoperative. The numerous traditional low cost HTWs have thus become useless in the LWT area.

Beginning in 1986, the Government of Bangladesh-UNICEF Rural Water Supply and Sanitation Program has started sinking a new lift mode pump, locally known as “Tara Pump”, which can access water from water table upto 15 meters. For the LWT areas this is the appropriate pump for drinking water supply. As a technology, it is well proven and accepted; however, it is still not widely available and is usually 5-6 times more expensive. It is also a manual lift mode pump rather than the prevalent suction mode technology and although it is manufactured locally by the private sector, it is still only available through the public sector distribution system.

Thus, we note that the overriding consideration in water resource management has been to address the growing food demand. Such considerations can and do jeopardize the needs of other areas, notably the water-sanitation sector. Thus, food production priorities are in conflict with social sector objectives. The development objectives of Bangladesh are yet to address such internal contradictions. As a result, a mismatch of objectives and expectations are very much noticeable.

### **Ground Water Use Policies and Regulations:** *The Legal and Institutional Regime*

Historically, rights and ownership issues concerning ground water have never been viewed seriously. This is contrary to surface water, which has been regulated and utilized by central authorities even prior to the arrival of British colonialists in the eighteenth century. Central authorities have regularly reviewed control of surface water and regulations have been developed over the years. As early as the nineteenth century, under the Irrigation Act of 1876, diversion or overuse of surface water compared to the existing natural flow of water has to be notified by government if such plans are underway. The idea behind this is twofold: first the affected people may make alternative arrangements and claim compensation (Khan and Khan: 1987). Similar issues with amendments were included in subsequent surface water regulations of 1952, and in 1983

during the Bangladesh period. However, no such regulatory framework concerning the rights of ground water by its users as well as the stakeholders exists. It is not even considered as a similar activity like mining, that many other countries consider (Ali et. al. 1987). During the early eighties, there were efforts to regulate ground water use by defining the siting conditions of mechanized DTWs, but the regulations were never seriously enforced, as part of the deregulating and liberalizing the economy. Tubewell sinking (for irrigation) was deregulated during the mid-eighties and no controls whatsoever exist today.

Thus, we find that there is ambiguity in defining the ground water resource and the rights over it. Historically, in academic research, there remains some confusion and controversy over “Common property and open access regimes”, “Common pool and resources and common property regimes”, and “Resource system” (Ostrom: 1996, P.i). Such confusion at the conceptual level also lends itself to field levels as we see the case of ground water in Bangladesh. It is neither in the private domain, nor entirely in the public domain. As far as its extraction and use in agriculture, industry, or domestic sectors is concerned, both the private and public sector are involved. However, extraction of water for selling to other users is not possible by the private sector, which would have resulted in its being an extractable commodity because all sub-soil products are, by law, under the government’s jurisdiction. However, the selling of water by farmers and other groups is permissible to increase the command area of irrigation wells.

Competition over ground water resources between mechanically powered Deep Tube wells (DTW) and manual handpumps for drinking water supply are forcing communities and authorities to think about instituting regulations over the use of ground water. Technocratic and regulatory approaches favor a zoning and regulatory control perspective. However, as conflicts are increasing, people and communities are beginning to develop local level controls and self-management of this

critical open access resource. Unlike the other major open access resource--surface water of rivers--whose use faces some regulations in terms of diversion or lessening of flow, as well as fishing rights, the ground water resource is still very much in a *laissez faire* state. It is also not a common resource for communities to regulate its use, as its extraction is dependent upon technologies without which it is not available unlike forests and pastures, which are there for people to use.

With an average annual rainfall of 1500-4000 mm, presence of numerous rivers flowing through the country and floodplain depressions and marshlands, it is often difficult to comprehend that the water table in Bangladesh, at least in certain areas, is actually declining consistently. The availability of groundwater is dependent on properties of groundwater storage reservoir and the annual recharge from rainfall, rivers and flooding. Seasonal lowering of groundwater level caused by increasing ground water use runs the risk of periodic tubewell failure due to large annual variability of rainfall distribution (National Water Plan, 1990). Therefore the Water Plan has accepted the seasonal failure of handpumps and goes on to conclude that only Deep Tubewells can realize complete development of agricultural potential (NWP, P. 10-71, 1990). It may be pointed out that water resource development in Bangladesh has always considered food production as the goal and guiding principle for planning and investment purposes. Therefore, the NWP was more concerned with availability of irrigation water rather than domestic use requirements.

Water resource management is increasingly assuming a critical role for the growing population of Bangladesh due to burgeoning demand and increasing conflict between alternative uses. Water is both a public and private good and therefore the allocation system must take into account the needs of all users, particularly the poor. It is also an economic and a scarce commodity and therefore its use should be determined by opportunity cost pricing. However, that should not ignore such basic needs as access to safe drinking water,

sanitation and hygiene practices. As water is a common resource and has wide ranging uses, its development and management should involve all users and beneficiaries.

Although the government, since 1990, has enunciated comprehensive survey of water resources and development strategies, Bangladesh still does not have an approved water policy. Consequently the planners and managers of water resources operate with a segmented approach and is target oriented. Efforts are usually disjointed and supply driven and are usually detrimental to national interests, ignoring such important principles as equity and sustainability in water harvesting, water balance, conjunctive use of water, and efficient utilization of an unitary economic resource.

Inspite of the absence of a stated policy, Bangladesh does have a set of laws (some dating back to the British colonial and Pakistani period) governing the use and control of water. Most relevant of them are The Bengal Irrigation Act, 1876, Bangladesh Irrigation Water Rate Ordinance, 1983, East Bengal Embankment and Drainage Act, 1952, State Acquisition and Tenancy Act, 1950 and Ground Water Management Ordinance, 1985, (subsequently held in abeyance). The Irrigation Acts were designed to determine Levy of water rates, while the Embankment and Drainage Act defined the construction, O&M of embankments and drainage structures. The Acquisition Act of 1950 recognized the rights of State on subsoil resources (ground water).

With the passing of the State Acquisition and Tenancy Act of 1950, the ambiguity on the control and ownership of subsoil water stemming from English Common Law tradition dissipated. Although State ownership of ground water became recognized with that Act, it was never treated accordingly and remained in the common domain--neither public nor private. This means that individuals or groups outside the Municipal areas (Municipal areas have laws regulating sinking of mechanized deep wells) can sink deep wells for irrigation or any other industrial purposes (domestic use needs are met

by shallow wells). This principle still determines the control and use of water as will be elaborated in the next section.

The Groundwater Management Ordinance of 1985 was the first attempt to regulate the fast growing minor irrigation sector. The purpose of The Ground Water Management Ordinance was to address siting, installation and spacing of minor irrigation equipment (STW, DTW). It was promulgated during the heyday of regulations in the economy and agricultural development like other sectors of the economy, were led by parastatals. However, the Ordinance, which aimed at regulating siting, installation and spacing of DTWs and STWs, met with severe resistance since it was promulgated. It was never acted upon seriously as deregulating moves were already underway and the parastatal organization (Bangladesh Agricultural Development Corporation, BADC) entrusted with its implementation was itself being downsized, completely surrendering the irrigation related responsibilities to the private sector.

There are several government agencies under different ministries dealing with water issues. Their mandates are different and therefore the priorities they set out are also often conflicting. Therefore, planning and management of water resources, under such conditions, are for obvious reasons rather disjointed, disregarding critical factors in their use and allocation principles. Surface water is under the authority of Ministry of Irrigation and Water Resources. Ground water activities are carried out and monitored by individuals, Water Resources Ministry, Ministry of Environment, and agencies under Local Government Ministry. The legal framework on control and ownership of ground water is held under Common Law traditions, leaving the scope of regulation rather difficult. However, inspite of not having a stated policy, the National Water Plan of 1990, 1991 and the Bangladesh Water and Flood Management Strategy, as well as the Five Year Development Plans address all the important issues as part of the water resource management strategy. As often is the case the plan

documents contain all the right rhetoric but are rarely put to use. Lack of a single institutional focus and mechanism as well as the absence of a comprehensive policy that is binding on all, is the cause of such adhoc-ism in the sector. Particularly important is the question of water rights and allocation principles, which is not addressed in any of these ordinances or strategy papers. As has been mentioned earlier, the overriding concerns with water in Bangladesh centers around flooding and water management issues. Due to abundance of both surface and ground water, and as no major conflict beyond local level has yet emerged in terms of control of the resource, the water rights and allocation principles are yet to be accorded the importance it deserves. However, as we notice the declining water table, particularly in the dry season and as more localized conflicts arise in rural areas over the use of ground water, it is time that planners and administrators dealing with water should consider revamping the existing regulations by recognizing the water rights of individuals, communities, and sectors before it becomes too complicated and goes out of hand.

### **Conjunctive Use of Water: *The Bone of Contention***

As stated earlier, there are two principal sectors of water use in the rural areas: agriculture and drinking water supply. Supply of irrigation water has been the responsibility of both Water Resource and Agriculture Ministry in the past, while provisioning of domestic water services belonged to Local Government Ministry. However, water sector in general has seen privatization efforts in the recent past to attain greater efficiency and for reducing budgetary allocations. In a seemingly water abundant country like Bangladesh, scarcity has never featured prominently and coordination amongst Ministries and agencies to deal with the scarcity issue has never been a priority. Recent deregulation of the water market may have exacerbated the problem. The NWP, 1990 recognizes the serious conflict between expanding irrigation abstractions and viability of potable water supplies obtained through

suction hand tubewells (No. 6 HTWs). As the HTWs are mostly sunk in homestead plots which are on an average greater than 1 meters above the crop field level, operation of mechanized STWs for irrigation also affect the availability of ground water for HTWs. The NWP conducted several sophisticated tests showing the adverse effects of irrigation abstraction upon the HTWs in Northwestern districts (NWP, Vol. 1, and P.8-14-18).

In the LWT area of North-west Bangladesh (Rajshahi, Naogaon, Chapai Nawabganj and Natore Districts), increasing irrigation activity has severely affected drinking water supply abstracted from HTWs. As water rights are largely undefined and uncodified in Bangladesh, it is critically important to study the issues surrounding conjunctive use of water particularly for irrigation, drinking water supply, fisheries and the impact upon each of these sub-sectors. Recent micro-studies reveal some interesting findings on the rights of ground water. Some of these findings from field research conducted in two villages, namely *Ilisha Bari* and *Hat Govindpur* in Rajshahi and Chapai Nawabganj districts respectively, form the core of the next section.

### **Impact of Declining Ground Water on Drinking Water Supply**

Over the years, winter (*Boro*) rice has become a critical source of food and income for the North-Western villages. These areas used to be rain-fed and single cropped. With the introduction of DTWs they have become double cropped areas; and due to higher productivity and less uncertainty, *Boro* rice has become the major harvest for the villagers. Each year beginning in February the irrigation machines (DTW) start functioning and after a month or so the HTWs begin to run dry as the water table recedes well below their suction capacity. The seasonal handpump failure continues during March-May for this region. The entire population of both the villages begins their vigil for collecting drinking water. The couple of Tara Pumps in their village are their only alternative. These pumps are built with a capacity to supply water



to about 10-15 households. But during this long 3-4 month period they are always in operation as more and more people start obtaining water from these pumps. These pumps are provided by the government Rural Water Supply and Sanitation (RWSS) Program to groups of ten households. The Caretakers (the household that organizes the signature collection of allottees and usually pays the contribution sum), who are the *de facto* owners of the pump, institute new rules for use of the pumps during this period. As they (caretakers) are also responsible for maintenance, the extra pressure on the pumps becomes a source of irritation for them.

Previous studies on access and equity issues of public HTW, have also noted that the caretaker households control access to tubewells and make rules about non-owners' access (Sadeque and Turnquist, 1995). Although religious and cultural norms preclude total exclusionary tactics by the controlling household, the caretaker family places restrictions of various sorts especially at times of crisis. Some of the restrictions faced by the non-owning families in *Ilisha Bari* and *Hat Govindpur* are summarized below:

- Caretaker family has the right to jump queue.
- Complete restriction on taking water for domestic purposes, other than drinking, cooking.
- Families related to caretakers have better, often unrestricted access.
- Low caste people (there are several Hindu families, both low caste and upper caste in these villages) are tactfully discouraged.
- Restrictions on account of the pretext that children are careless users.
- Restrictions on account of privacy of caretaker family.

The Tara pumps meant for tiding over the lean

period have created a set of rules around its use. This is quite contrary to the objectives of their installation in the first place. As they are limited in number, and the only ones to operate during the dry season, the allotted group, fearing over-use by non-members or break down of the pumps are instituting restrictive use by non-members. Therefore, it is evident that volumetric restrictions, and a general note of discouragement hangs over non-group (Tara pump allotted) members. Volumetric restrictions affect the lives of people in many ways. Health-hygiene of people suffers most, as sufficient quantity of safe water is not available. In the study area prevalence of various skin diseases were noticed, with the women and children as the worst sufferer as bathing water is scarce. Children do without bathing for consecutive days. Going without bathing during the hot and humid March-May days, and even scarcity of clean water for *Oju* (ablution) for Muslim adults is cruelly felt by the local residents. Adult men take bath in ponds, which usually has a couple of feet of muddy water. In a country where the monsoon season (June-September) brings in enormous amount of rain and a third of the country is regularly inundated, scarcity of water for bathing is a tragedy that these helpless people cannot comprehend. Upstream withdrawal of water by India from the major rivers of these two districts--Ganges, Atrai, and Mahananda--have compounded their woes. But, it is the increased ground water abstractions for irrigation that is directly linked with the lowering of the water table beyond the limits of common suction pumps which is adversely affecting the lives of LWTA people without unrestricted access to improved technology that can ensure clean water for them.

As the Tara Pumps are meant for drinking water and are situated in homestead clusters, they are favored as the source of drinking water during the dry months. However, people sometimes secure drinking water from DTWs irrigating the crop field. But as they are further away from homesteads and women and children are the principal carriers of water, DTWs are not a favored source. Although the capacities of the DTWs are far greater and users need not touch

the machines to collect water, it is nonetheless not that convenient or easily accessible by people. Costs are associated with the sinking and operation of DTWs and it is now mostly private. Therefore, public welfare at private cost has become problematic. Increased power costs and uncertainty of electrical power availability has further compounded the problem. For the farming community of these LWTA winter rice cultivation has become increasingly critical for household food security as increasing aridity in the region and high input prices now mean that cultivating minor crops has become unprofitable and the only alternative is irrigation based cereal production. Due to these factors there are some restrictions on fetching water from DTWs imposed by the operators and managers as well. They are summarized as below:

- Non-irrigating households are least favored in collecting DTW water.
- Women cannot bathe in the open area of the crop field.
- Washing cannot be carried out at the DTW pump site.
- Physical limits exist on carrying water from distant crop fields where DTWs are located.
- Operation of DTWs take place at odd hours (usually late evenings).

Irrigating households feel that since they are the ones paying for the irrigation pumps and their maintenance, they should have exclusive right to the water. To discourage others to carry water from the pumps, DTWs are often run at odd hours like late at night or early morning. This is also due to technical reasons to minimize evaporation losses and availability of electricity during non-peak hours. However, such restrictions affect non-irrigating households, as irrigation pumps are often the only running water source in many neighborhoods.

Dry season water shortage is a phenomenon that LWTA people are and will have to live with. Although many of the rural people are not knowledgeable about the technical issues associated with declining ground water table,

they perceive some causality with the operation of DTWs and the lowering of ground water level. People in our study area are yet to articulate sophisticated arguments regarding the indivisibility of ground water resources for public welfare. But they are aware that for a natural resource like water, exclusionary policies and subtractibility from one's welfare due to use by others is unjust. People who do not have access to technologies that can extract water from deeper levels during the period of declining water table view the expansion of ground water based irrigation as contributing to their misery. They argue, often rightly, that the deep tubewells are sucking water from the reach of public handpumps

Ground water is a finite resource; a consistent decline of its level over the years is indicative. However, recharges can fill up used portions under ideal conditions. But nonetheless, they are often not replenished to their original state and the effects are visible. Hydrographic data indicate a slow but consistent decline of ground water over the years, which is in addition to seasonal draw-down (NWP, 1990). Therefore, it cannot be treated as an open access resource like open water and deep-sea fishing. Our study area people also voiced their concern in the same vein, regarding the nature of this "God given resource", or natural resource in academic lexicon. The immutability of water as a natural resource for the benefit and sustenance of everybody is engraved in the perception and world view of the rural inhabitants, who are feeling the erosion of their inalienable right to this resource. They point out that access to deep water table extracting technology by some is rendering the resource (water) to become alienable.

In spite of the competition over ground water resources for irrigation and drinking water supply and the conflicts and resentments arising out of it, there is evidence of emerging consensus in sharing this finite economic resource. In both *Ilisha Bari* and *Hat Govindpur*, we came across several examples of self-management in sharing this common resource. Water is a critical life support

resource. Providing water to the thirsty is a cherished virtue and a sign of piety in Islam. Culturally, water is also synonymous with life in all communities and therefore access to it cannot be denied. In both villages and in other areas, people can access water fairly easily and secure a pitcher or two of DTW water. But under drought-like conditions, people are often encouraged to bring in equal amount of surface water (available in ponds, ditches, and canals). This is becoming more of a norm in certain areas, where the irrigation command area is extensive and lowering water table affects all tubewells. This exchange practice, although not highly discriminatory is a real threat to public health. Carrying muddy water from ditches runs the risk of contaminating the water pitchers carrying drinking and cooking water. As incidence of water borne diseases are very high during this period, public health experts see further deterioration of health conditions of people due to this practice in addition to the dermatological problems associated with lack of clean bathing water.

Another form of cooperation that is emerging in the area is operation of the DTWs in the early morning hours. Usually the pumps are operated during evening hours to minimize evaporation losses, which also partly holds for early morning hours. Early morning is also the peak water use time for rural households. Many households are collecting water from DTWs at these hours. However, it is only possible to carry a limited amount of water from distant crop fields. People are also allowed to bathe in some DTWs (but usually no washing of clothes with soaps), but obviously only the men and children can take advantage of this.

Some of these cooperative arrangements were beginning to emerge in the late eighties when regulatory steps to control siting and installation of tubewells (Bangladesh Groundwater Management Ordinance, 1985) were in the process of implementation and regulatory control was at its highest level. People realized that negotiation was better than having controls imposed by central and distant authorities, which may not be in the interest of either

parties. Additionally, regulations would result in bureaucratic control and therefore encourage corruption.

Technologies are not scale neutral, nor are they gender neutral. Agricultural modernization programs in developing societies have never quite come to terms with this issue. Irrigation water and the emerging water markets are often no exception to this anathema. We have already noted how women suffer due to lack of access to clean water during the lean period. As household in-charge they are the prime users and collectors of water. Improved technologies for harnessing water from deeper levels have thus disproportionately affected them. Access to new technology is likely to create newer configurations in the sharing of benefits. Those who are excluded from the technology are likely to lose out and differentiation will increase at a brisker pace. The opportunities in supplying drinking water on the other hand are quite promising and are able to bypass these problems. Higher value of drinking water, which also requires lower volumes, makes drinking water supply an ideal case for self-management and decentralization.

### **Policy Options for balancing the conflicting Needs**

Seasonal draw-down of water table in the LWT area has become a reality, and so are the problems associated with its conjunctive uses. As the LWT area is increasing, to ensure the sustainability of the so-called almost universal coverage (stated to be 97% in 1995, by UNICEF) of safe drinking water, certain policy actions are needed.

Foremost among these is a clear enunciation of water use priorities and declaration of a comprehensive water policy. Any future statement on this must depart from the conventional thinking of target fixing and supply driven response. The economic value of water must be accorded due consideration in the policy statement. Community participation and special attention to the needs of women, children and vulnerable groups must also be

given priority in tandem with economic valuation. They need not to be mutually exclusive, as numerous examples of water delivery system around the world testifies (Narayan 1995). Technology choice, demand preference, and the opportunity for capacity building at the user level (where appropriate) and institutional level also should be looked at when developing the policy statement.

A host of short and medium term recommendations to deal with the seasonal water scarcity in the LWT area are suggested below:

1. Investigate possibilities of facilitating group ownership of Tara pumps as opposed to present allotment to groups with nominal contribution sum. This will lessen the subsidy burden for the government (currently approximately 85%) and allow for more distribution with the same resources, as well as encourage ownership of the program by beneficiary groups.
2. Although the *Tara* Pumps are manufactured by the private sector, the government exclusively distributes them. Initiatives for private sector distribution should be encouraged. NGOs and nationalized commercial banks may consider providing micro loans for the purchase of *Tara* pumps. This must be complemented by improved capacity building in operation and maintenance, developing private sector marketing strategy for the hardware and spares, and monitoring their social acceptability.
3. Cost sharing rather than flat contribution sum, as is the case now, should be introduced for HTWs (including the more expensive ones). This, along with the earlier recommendation on *Tara* pump distribution policy, is likely to support gradual replacement of ordinary HTWs by *Tara* pumps in the LWT area.

4. Water sharing for domestic purposes should be formalized for all irrigation DTWs. Each DTW may construct small overhead tank and a few pipe connections at the site for the benefit of HTW users during the dry season. Cost for irrigation water is still the lowest compared to all other sectors, as people only pay for operation and maintenance of public system and a little more to include capital costs under private system. Irrigators should, therefore, easily accept the sharing of ground water for domestic use during the lean period. Besides, as a finite and unitary resource, subtractability of welfare by one group is possible and irrigators should be made aware of this.
5. Policy support for changes in cropping pattern should be seriously considered. This would greatly reduce the water needs for crops and thus allow additional water to be diverted for domestic use.
6. Finally long term investment projects with possible donor assistance will have to be negotiated to replace the increasingly inoperable HTWs with deeper reaching *Tara* pumps and other alternatives.

### **Conclusion and Agenda for Future Research**

Ground water is a common resource, neither under complete state authority nor in the private domain. It is now increasingly being used for productive purposes (mainly irrigation). It is also facing intense demand from other conjunctive uses such as drinking water, domestic use, and fisheries. Narrow sectoral development approaches exacerbate the conflicts arising out of conjunctive use of this resource, while the absence of a comprehensive water policy only furthers the sub-sectoral orientation to water use policies.

Water resources, although brought under some form of government control and regulation over the last hundred years or so, has always remained as a common community resource. New laws and institutional barriers have been created by the state to restrict their use by people. Bureaucratic traditions remind us that, once under their control, governments and their line agencies are very reluctant to relinquish authority over any resource.

The erosion of common property resources and its impact on the sustenance of poor households is a relatively well recognized phenomenon in Bangladesh. The dwindling forest resources of the Central Highlands are disproportionately affecting the Garo indigenous forest dwellers of Madhupur tract (Khaleque, 1984). Flood control embankments and other infrastructures are seriously affecting the income, nutrition and employment opportunities of poor households and fisher-folk communities in the flood plains (Sadeque, 1992). It is apparent that with increasing demands on ground water use, some regulations are needed to deal with the emerging conflicts. While policies and regulations are developed at the central government level, due considerations from the perspectives of all stakeholder are a critical need in order to formulate principles that are equitable and generally acceptable to all. The lessons from our rapid appraisal suggest that there are points of conflict as well as consensus in sharing the common resource. The future of cooperative use of this common resource hinges upon these points of conflict as well as consensus. Some of the policy options of dealing with seasonal (drinking) water shortage and their mitigation are becoming issues of grave concern for the water-sanitation sector. Essentially, in the absence of large scale replacement of handpumps by improved Tara pumps, cooperation among all users of ground resources must be encouraged. Irrigation sector can share some water with drinking water sector, while newer methods of demand driven Tara pump distribution mechanism need to be developed to ensure greater participation and ownership by all stakeholders.

First, people having no control or legitimate use rights of deeper water table abstracting technologies (DTW and Tara pumps) face real-life constraints in accessing safe water for domestic purposes during the dry months of February-May. Their rights and ability to harness the common resource is constrained by their lack of ownership or control over the required technology. Poor women, children and vulnerable groups outside the allotted group of Tara pumps suffer shortage of domestic water supply most. Due to their limited social network and linkage, they are often not in a position of strength to negotiate water from groups who have access to it during the period of scarcity. This raises the question of unequal access to a common resource, due to access to improved and more expensive technologies. The deprived community here becomes the victim of conventional exploitative development (CED) of natural ecosystems (Berkes 1989). As a common resource, ground water becomes only available to people having the deep extraction technologies, and increased exploitation of this common resource deprives others from harnessing the resource with simple existing technologies. Here, individuals' welfare is subject to subtractibility by others who have access to technology. This raises the questions of equity and the adverse effects upon users of HTWs arising out of unregulated conjunctive use of water. The mitigation measures of such CED activity must be found in the approach where points of conflicts are resolved equitably, and preferably with the participation of all stakeholder at the local level. Under such an arrangement, resources can be sustainably utilized with due consideration to welfare issues and consensus among all users forged with local level informal rules. New sets of rules may be developed to deal with the use of ground water whose extraction during the dry season becomes dependent upon technologies not at the disposal of all. Such attempts may resemble what is broadly known as Reform Sustainable Redevelopment (RSR), as explained by Berkes (1989).

Common and open access resources often come under over exploitation, as rights and allocation

principles are often not clearly defined and enforced excepting communal properties managed over generations with traditional rules governing its use and methods to deal with abuses. In the case of ground water in Bangladesh, the rights and allocation principles are still not defined. Historically it also never developed because of the abundance of water and unavailability of technologies that can radically alter the water balance, like the new deep tubewells. Although water rights are not yet defined by regulations in Bangladesh, evidence suggests that people are increasingly becoming conscious of its needs. There are numerous examples of self-regulation and cooperation in water use during the lean period, a few of which were reported in this study. As the conflict over water rights is still in an embryonic form, it is perhaps an opportune moment to come up with equitable water rights acceptable to all stakeholders.

Second, certain critical resources have multiple uses and the user groups have differential interests. When guidelines and priorities of several different entities govern the resource in question, conflicts are bound to arise. Under such conditions it is ideal to have uniform principles to guide actions. Ground water in rural Bangladesh is such a case. Different institutional control of this resource, along with the private sector as an important actor, use practices are no wonder often conflicting, resulting in different basis for negotiation and rule making. The choices left are several. Self-management for consensus as cited earlier is an option; self regulations as opposed to imposed controls are another option. Finally basin wide management integrating use rights of different groups is another option. However, we know little about these issues that can constitute the core and scope of future research.

\* The research for this paper was conducted during 1995-96 period, before the Arsenic contamination in ground water was comprehensively detected and publicized. However, despite the changed circumstances,

the main contention of the paper still holds, as ensuring supply of safe drinking water in rural Bangladesh has limited options other than ground water which is free of bacterial contamination, the major cause of infant mortality and morbidity of all age cohorts in Bangladesh. Recent advances in developing simple and cost-effective arsenic filters among all other alternative options holds the major potential for ensuring safe water supply in rural Bangladesh.

*The author would like to thank Professor Syed S. Andaleeb, the editor of JBS, and the reviewers for their helpful comments.*

## REFERENCES

Ali, Mohammad , George E. Radosevich and Akbar Ali Khan (ed.) 1987 Water Resources Policy in Asia, A.A. Balkema, Rotterdam, Boston.

Bangladesh Water Resources and Flood Management Strategy 1995, Government of Bangladesh and The World Bank, Dhaka, Bangladesh.

Berkes, Fikret (Ed.) 1989 Common Property Resources, Belhaven Press, London.

Department of Public Health Engineering (DPHE) Official Reports, Undated, Dhaka, Bangladesh.

Jodha, N.S. 1992 Common Property Resources-A missing Dimension in Development Strategies, World Bank Discussion Paper, Washington

Khaleque, Kibriaul 1984 Prospect of Social Forestry in the Garo Villages of Madhupur, Mimeograph, Department of Sociology, University of Dhaka.

Khan Amjad Hossain Md. and Akbar Ali Khan 1987 Surface water strategy, policies and laws in Bangladesh, in Mohammad Ali, George E. Radosevich and Akbar Ali Khan (ed.) Water Resources Policy in Asia, A.A.Balkema,

Rotterdam, Boston.

Narayan, Deepa 1995 The contribution of People's Participation, Evidence from 121 Rural Water Supply Projects, ESD Occasional Paper series No.1, The World Bank, Washington D.C.

National Water Plan 1990, 1991, Government of Bangladesh-UNDP-The World Bank, Dhaka, Bangladesh.

Ostrom, Elinor 1996 Private and Common Property Rights, Workshop in Political Theory and Policy Analysis, Indiana University, Indiana, USA.

Sadeque, Syed Zahir 1992. "Capture Fisheries and other common property Resources in the Flood Plains of Bangladesh" Journal of Social Studies, Vol.55, 1992, Center for Social Studies, University of Dhaka.

Sadeque, Syed Zahir and Susan Turnqist 1995 Handpump Financing issues in Bangladesh: An Exploratory Study, Regional Water and Sanitation Group - South Asia, The World Bank, Dhaka.