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REPORT  
ON  
NATIONAL SEMINAR  
"CHALLENGES IN WATER AND SANITATION"

*Prepared by:*

Qazi Mahbubul Hasan  
Information Officer

NGO FORUM

FOR DRINKING WATER SUPPLY AND SANITATION  
4/6, Block-E, Lalmatia, Dhaka-1207

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## EXECUTIVE SUMMARY

At the forty-seventh session in November 1992, the United Nations General Assembly adopted a resolution designating March 22 of each year as the "World Day for Water". To mark the day at the national level NGO Forum, the apex networking body of NGOs engaged in WATSAN sector, organized a National Seminar "Challenges in Water and Sanitation" in Dhaka.

The primary objectives of the Seminar was to critically analyze the WATSAN situation, to find possible ways and means to improve the situation and to share policy guidelines in this sector.

The seminar was inaugurated by the Chief guest of the Seminar, Minister for Environment and Forest, Government of the People's Republic of Bangladesh. State Minister for Social Welfare, Government of the People's Republic of Bangladesh, Representative of UNICEF, Acting Representative of WHO, Deputy Resident Representative of UNDP and Chief Engineer of DPHE were present as special guests. The Seminar was Chaired by Dr. Kazi Faruque Ahmed, Executive Director, Proshika Manobik Unnayan Kendra.

The Seminar was attended by 100 representatives from various government organizations, Diplomatic Missions, Donor Agencies, UN Bodies, World Bank, NGO Community and from mass media.

Director, NGO Forum for DWSS delivered the keynote address. Welcoming the resource persons and participants he hoped that through their thoughtful discussions the objectives of the Seminar will be achieved.

Mr. Zia-Us-Sabur, Sr. Programme Officer, NGO Forum presented the vote of thanks to all. The Seminar was facilitated by Mr. Qazi Mahbubul Hasan and Mr. A.R.M.M. Kamal of NGO Forum for DWSS.

The Seminar had two working sessions, two papers were presented in each session. The presentations were followed by open discussion.

## KEYNOTE ADDRESS BY MR. S.M.A. RASHID

DIRECTOR, NGO FORUM FOR DWSS



Though unpopular but spoken in truth that when we are performing the necessary task of drawing attention to human needs, unfortunately these well known words come to our mind that, "The developing world is like a stage on which falls no light but only tragic plays are staged".

Although the Secretary General of the United Nations while declaring the activities of this decade, had encouraged us in his speech by saying safe drinking water and basic sanitation system not only help to build a happy and healthy urban life but also play a great role in economic growth. Then even today, we are in the scene of the same tragic play due to lack of initiatives and resource limitations.

Surprisingly even today there is no provision for safe water for 181 crore people and no sanitary latrines for 220 crore people of the developing world where total population now stands at 262 crore. As many as 1.5 million people die of water-borne diseases only in the third world. In view of such alarming situation the activities of the second phase of the decade has been launched for the period 1991-2000. And stepping into this 2nd phase the United Nations at its 47th session of the General Assembly adopted a resolution designating March 22 as the World Day for Water.

The myopic activities of the human being has made this critical situation prevail in the developing world as well as in the developed countries. It may be cited here that as we are largely exploiting and polluting surface water we are to look for ways for using the ground water. Thus ground water level is going down gradually.

For this uneven distribution of resources, lack of proper policy guideline and planning our public health status has reached to a devastating position. According to World Health Organization a minimum of 70 litres of water is needed for a single person to meet his/her daily requirements. But it has been evident from a study

that the use of tubewell water in a day is 12.5 liters only. From these statistics only it is not possible to realize the severity of the situation. For instance, for 5 months the people of the coastal areas have to depend on rain water for meeting their basic needs of water. About 80% of the diseases in our country are borne by water, of which diarrhoea is one, and polluted environment works behind all these phenomena. Nearly 300,000 children under five die of diarrhoea every year in our country.

The Honourable Prime Minister Begum Khaleda Zia in a Seminar held on February 11, 1992 attended by 800 professionals working in Public Health Sector, called upon the people from all walks of life to take part in the "Social Mobilization for Sanitation" programme. In response to her call NGO Forum has enrolled its name in implementing the national programme entitled "Social Mobilization for Sanitation" NGO Forum with the support of its partner NGOs has achieved a great success in implementing the programme in 7 selected thanas during the first year April 1993-March 1994. From a baseline Survey conducted in these 7 thanas it has been found that there were 8-10% households under sanitation coverage while only after the intervention of NGO Forum, i.e. after one year, percentage of the coverage presently stands at 80-90%.

Adequate and proper supply of safe water, and its use in consonance with the environmental impact and hygienic sanitation for prevention of water-borne diseases should be the prime issues to be ensured. The Day has a great significance in raising mass awareness.

*Surprisingly even today there is no provision for safe water for 181 crore people and no sanitary latrines for 220 crore people of the developing world where total Population now stands at 262 crore.*

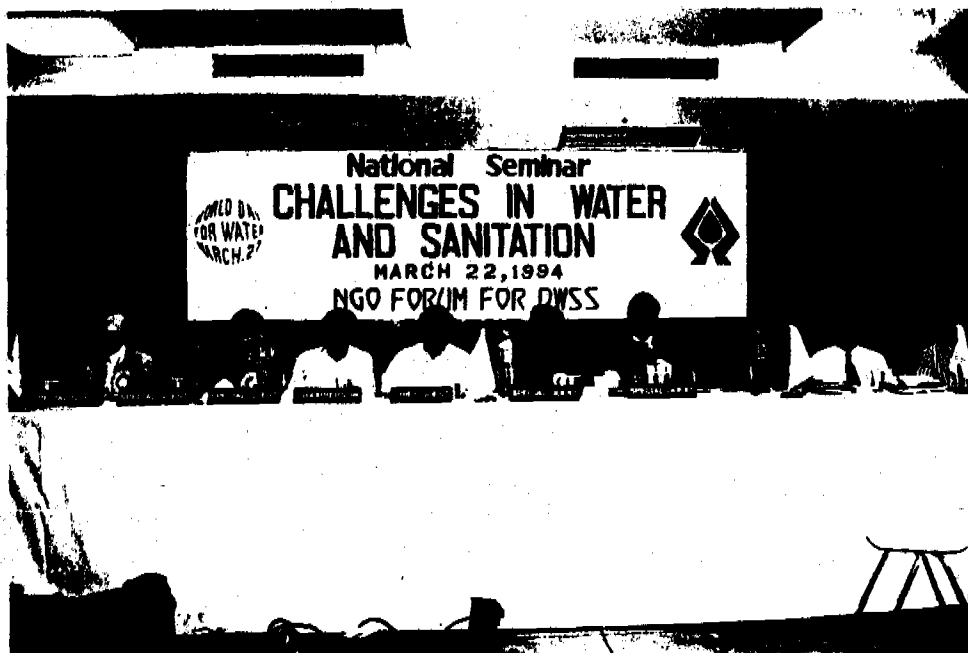
*From a baseline survey conducted in these 7 thanas it has been found that there were 8-10% households under sanitation coverage while only after the intervention of NGO Forum, i.e. after one year, percentage of the coverage presently stands at 80-90%.*

Let us make the promise today on the World Day for Water to make the sector more dynamic by ensuring environmental equilibrium which will result in an improved public health status.

The Forum hopes that through this seminar a National Policy on Public Health will be initiated where the sector professionals, policy makers and expert utilizing political commitment of the democratic government will be able to contribute.

Besides, the Forum hopes that this Seminar will open up ways to reach the desired goal of the Programme by proper distribution of resources and collaboration and cooperation among various govt. and non-government organizations and donor agencies.

*Let us make the promise today on the World Day for Water to make the sector more dynamic by ensuring environmental equilibrium which will result in an improved public health status.*



*Guests of Seminar are seen in the picture.*

## SPEECH BY THE CHIEF GUEST

MR. AKBAR HOSSAIN

THE HONOURABLE MINISTER, MINISTRY FOR ENVIRONMENT & FOREST  
GOVERNMENT OF THE PEOPLES' REPUBLIC OF BANGLADESH

Owing to an unhygienic water and sanitation situation the security for the lives of children are being hampered, as a result, it is hindering our population control programme, that is, the entire development activity or planning process.

Human resources are the prime resources of this country and the importance of safe water for the development of this resource is unlimited. Because development denotes better health system, improved quality of life, in short, social development. And the role of safe water in all of these is unlimited. It is necessary to ensure proper sanitation system for proper water management.

The amount of surface water is rapidly declining due to disorders in nature created by man-made Farakka Dam and other factors. When the flow of the rivers decreases in the dry season, there is rapid increase in the saline water in the northern parts of the country. Saline water is now swallowing the sweet-water regions moving away from the coastal regions. As a consequence, the quality of the soil of these sweet-water regions is undergoing a change - the fertility of the soil is being destroyed, various plants and trees are dying. In the meanwhile, the Sundarbans has stopped expanding. The number of "Sundary" trees in the forest has decreased from 50 per cent to half of it. And due to the destruction of this forest resources, the sea level will rise under the influence of the Greenhouse effect on the environment. And a large area of Bangladesh will be submerged by saline water.

*When the flow of the rivers decreases in the dry season, there is rapid increase in the saline water in the northern parts of the country. Saline water is now swallowing the sweet-water regions moving away from the coastal regions. As a consequence, the quality of the soil of these sweet-water regions is undergoing a change - the fertility of the soil is being destroyed, various plants and trees are dying.*



The govt. is quite aware of this resultant situation. Some objectives in tune with the needs of the times have been determined in the Fourth Five Year Plan (1990-1995). Among the determined objectives are development of present technology, invention of still lower cost alternative method and research and development being undertaken by DPHE for use of appropriate technology in areas where unsuitable technology exists. UNICEF, WHO, and other organizations are providing assistance in this matter.

In Bangladesh the level of ground water is different at different places. In the perspective of this situation, the coastal region has been brought under the purview of research and development.

DPHE, UNICEF, and NGO Forum through their joint endeavours for the last 5 years have brought about a silent revolution in ensuring safe water supply and sanitation system in Bangladesh.

We naturally feel encouraged when we see the government efforts accompanied by the initiatives of the non-government voluntary organizations (NGOs) in attaining the goal of "Health for All by the Year 2000".

On the whole, the programmes and success of the NGOs for pure drinking water supply and sanitation system are praise-worthy.

I think that the significance the World Day for Water in Bangladesh has long-term implications. In Bangladesh this Day is being observed for the first time by the initiative of NGO Forum. I thank the organization to take the lead.

*The Chief Guest of the Seminar Mr. Akbar Hossain Honourable Minister for Environment of Forest is delivering the speech of Chief Guest.*



## **SPEECH OF THE SPECIAL GUEST**

**MR. FAZLUR RAHMAN**

**THE HONOURABLE STATE MINISTER FOR SOCIAL WELFARE  
GOVERNMENT OF THE PEOPLES' REPUBLIC OF BANGLADESH**

Today, on the World Day for Water NGO Forum by organizing this Seminar is performing a vital duty.

In the Fourth Five Year Plan of the Bangladesh Government, emphasis has been given on the universal access to safe water and the target for the use of sanitary latrines has been set at 35%. Even if 35% coverage is attained, the problem will not be totally solved. Here also, universal use of sanitary latrines have to be ensured.

As a densely populated country, in Bangladesh, the issue of safe water and water-related problems deserve to be considered with great importance. Ensuring adequate and regular supply of safe water, using water in consistent with the environment, and improving the sanitation system for prevention of water-borne diseases are all indispensable for Bangladesh.

The Govt. Bangladesh has taken up plans in its Fourth Five Year Plan to involve 15% of women in all sectors, in addition to their involvement in household work. The Fourth Five Year Plan has provisions for enabling the women to participate more actively in order for the safe water and sanitation programme to achieve its desired results.

Under the purview of the Fourth Five Year Plan for the period (1990-1995) DPHE, the implementing body of WATSAN activities of the govt. of Bangladesh, has plans to install 60 thousand shallow hand tubewells, 15 thousand deep handpumps, 60 thousand deep-set tara pumps in rural areas. And 75 thousand inoperative tubewells will be replaced or repaired. For improvement of the environment, 12 lacs water-sealed sanitary latrines will be produced with UNICEF assistance for sale.

Here also, alongside the plans and programmes of the Govt., the Non-Government Voluntary Organizations (NGOs) continue to devote their untiring efforts for ensuring safe water and sanitation system.

One of the conditions for ensuring the health of this huge population is to ensure the adequate and regular supply of safe water and basic sanitation system. If the public health system is not ensured then just as development and progress is not possible, similarly the rate of all development at national levels is bound to be hindered.

Let us spread the significance of this Day upto the grassroots level through observing the World Day for Water in a wider perspective by considering the very importance of water for the existence of human beings. And let us initiate a social movement for use of safe water for all purposes and use of hygienic latrines. In this way the slogan of "Health for All by the Year 2000" will achieve its success.



*Special Guest of the Seminar  
Mr. Fazlur Rahman, Honourable  
State Minister for Social Welfare  
is delivering his speech.*

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enabling the women to  
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results.*

## **SPEECH OF SPECIAL GUEST**

**MR. ROLF C. CARRIERE, REPRESENTATIVE, UNICEF**

Although we are gathered here to mark the UN declared "World Day for Water", I am pleased that the theme of this National Seminar is "Challenges in Water and Sanitation".

The major challenge in the water sector in Bangladesh is the water table declining below the suction limit. As a result, large numbers of suction pumps become non-functional for several months prior to the monsoon rains. In collaboration with DPHE, we have commissioned a study to forecast future water table trends through mathematical modelling.

Every day, over 700 young Bangladesh children die of diarrhoeal diseases. This is unacceptably high and represents a tremendous loss to the bereaved family and to the nation as a whole. As a result, the nation needlessly adds further to the unhealthy and less productive work force, which has serious implications on national development.

Use of digested human waste as fertilizers should be promoted in Bangladesh for both environmental and economic reasons at the family level. The use of bio-gas plants at institutions would also seem to be a viable technology.

We need to give much higher priority to hygiene education, and particularly to proper hand washing before handling food and after defecation.

Unless a sound package of sanitation, hygiene education and safe water use is promoted, and people adopt hygienic practices, impact on health is likely to remain in significant.

I have the strong sense that the NGO Forum is well underway to producing a breakthrough.

The seminar today is a reflection of our concern, and the desire to make a difference.

## SPEECH OF SPECIAL GUEST

PROF. MYO THWE, ACTING REPRESENTATIVE  
WORLD HEALTH ORGANIZATION (WHO)

Water is a basic human need for health i.e. the basal metabolism in the body - indeed for survival: and therefore it is not an exaggeration to call it one of the basic human rights. Without safe water and sanitation there is no real development. Safe water is the doorway to health and health is the pre-requisite for progress, social equity and human dignity. The basic needs for water and good sanitation was recognized and endorsed by the WHO/UNICEF International Conference on Primary Health Care in Alma Ata 1978. Subsequently the International Drinking Water Supply and Sanitation Decade IDWSSD (1981-1990) was declared with two main objectives:

- |  |   |
|--|---|
| <p>01. To support governments in strengthening health agencies in their roles of monitoring the health impacts of drinking water supply and sanitation programmes, promoting improvements, and coordinating these programmes with other components of primary health care; and</p> | <p><i>Water is a Basic human need for health i.e. the basal metabolism in the body - indeed for survival: and therefore it is not an exaggeration to call it one of the basic human rights. Without safe water and sanitation there is no real development.</i></p> |
| <p>02. To cooperate with governments in the establishment of appropriate quality standards for drinking water, in the organization of national drinking water quality surveillance programmes, and the protection of drinking water sources.</p>                                   | <p><i>Without safe water and sanitation there is no real development.</i></p>   |

The importance of water as a vehicle for the spread of disease has long been recognized. Most of the disease which prevail in developing countries when water supply and sanitation are deficient are infectious diseases caused by bacteria, amoebic viruses and various worms. Depending on the prevailing transmission pathways different interventions in Water Supply and Sanitation are required. Bacterial diarrhoea, and epidemic of cholera and typhoid are often transmitted in drinking water. On the other hand countries in the developed and developing world are facing chemical water quality problem, which could be either natural or man made.

The inevitable consequence is high diarrhoeal and skin disease incidence. Four major indicators should be used to assess adequacy of water supply - (a) Coverage, (b) Continuity, (c) Quality, and (d) Quantity.

Despite the achievement of 1990's where 1600 million people were served safe water supplies estimated 1200 million people in developing countries still do not have proper access to safe water. They are at constant risk of contracting water and sanitation related diseases.

Let us make the remaining years in the 1990's where all the countries and international community working together with the aim to provide all the people of world with enough good water for their need and improve the sanitation in order to wipe out the water and sanitation related disorders.

*Despite the achievement of 1990's where 1600 million people were served safe water supplies estimated 1200 million people in developing countries still do not have proper access to safe water. They are at constant risk of contracting water and sanitation related diseases.*

## **SPEECH OF SPECIAL GUEST**

**MR. MICHAEL CONSTABLE  
DEPUTY RESIDENT REPRESENTATIVE, UNDP**

Bangladesh has sufficient amount of water. The public life has been disrupted by huge floods. But the supply of safe water could not be ensured. In sanitation the situation is more mournful a report published from the central office of UNDP says that out of 173 countries Bangladesh's rank stands at 147. In the rural areas the situation is more vulnerable. The deadly health problems have been happening to a great extent for the water pollution. From a survey conducted in 1992 it is evident that women, the half of the total population, are the main user of tubewell water. A programme should be launched in this regard emphasizing the role of women. UNDP and UNICEF have been assisting various safe water and sanitation related projects in Bangladesh. FAO and UNDP have been providing assistance in conducting research activities in this sector.

## **SPEECH OF SPECIAL GUEST**

**MR. AMINUDDIN AHMED, CHIEF ENGINEER, DPHE**

As we all know that Bangladesh is a poor country so we have to utilize our resources judiciously. Huge success have been achieved in water sector during the previous years. Presently 96% of the total population drink tubewell water while only 16% use tubewell water for all purposes. We drink tubewell water but wash cloths with the polluted pond water. For the well being of the people, it needs public consciousness on water issues.

The sanitation situation of the country is even mournful. Only 33% people are using sanitary latrines and the rest of that is 67% are either using open spaces or unhygienic latrines which pollute the environment. For this reason diarrhoea situation is not improving. From a recent survey it appears that about 300,000 child deaths occur due to diarrhoeal diseases, and about 1 million people are attacked by these diseases. We have to take necessary measures to mitigate this grim scenario. Recently a problem has arose tremendously, that is declining of the water table. Owing to this problem about 60% of normal tubewells now do not function. So we have to think of preserving water which is in abundance during rainy season e.g. in dams, reservoirs, etc. For the success of this challenge we have to involve the community people in planning and implementation process.

Another important issue is disparity in different regions in water coverage. This issue must be given a serious thought. The objective of the World Day for Water would be achieved if we give these issues priority.

## **SPEECH OF CHAIRPERSON**

**DR. KAZI FARUQUE AHMED**  
**EXECUTIVE DIRECTOR, PROSHIKA-MUK**

We are asking to preserve the environment but we are still using the pesticides which have been banned in the developed countries and which is very much harmful. We should prohibit these in order to save the environment and also before it turns to threatening human life. There are 18 such pesticides. Water becomes contaminated by these because of mismanagement of sanitation. The wastes from tanneries are also polluting water to a great extent.

There are two steps to develop the situation. The steps are: increasing of resource allocation in water and sanitation sector and raising of public consciousness. Declining water table is not a big factor. The main problem is to ensure the proper use of water. Preservation of the rain water on the roof in rainy season has been proved very effective. That water can be drunk after boiling properly. If such type of water management comes up people of the urban areas will not need the WASA water for six months.

"Everyday is counted as World Day for Water". The problems of Farakka has been realized in great specially during March-April, when the ground water level start declining.

*The Chairperson of  
the Seminar Dr. Kazi  
Faruque Ahmed is  
delivering his speech.*







*Prof. Myo Thwe, Acting Representative, WHO, delivers his speech.*



*The participants in informal gathering*



*The guests in informal gathering.*

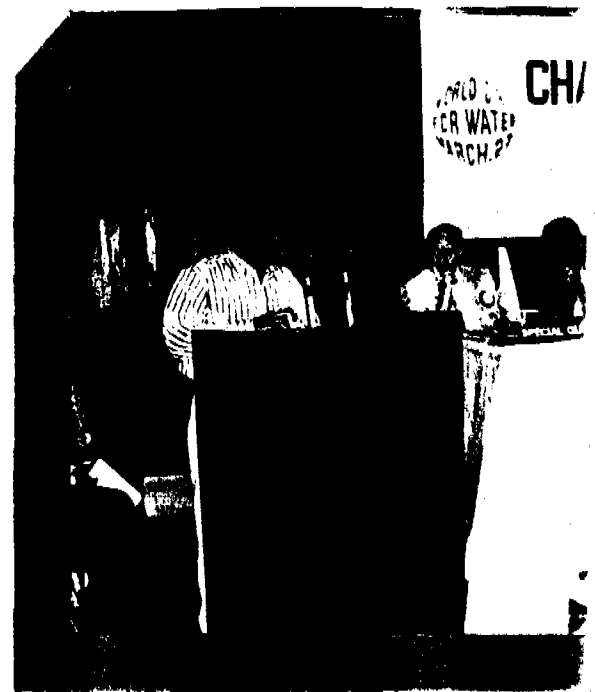


*Mr. Zia-Us-Sabur, Sr. Programme Officer, NGO Forum, is giving the vote of thanks.*



*Mr. Aminuddin Ahmed, Chief Engineer, DPHE, is speaking on the occasion.*

*Mr. Roll. C. Carriere, Representative, UNICEF, is delivering his speech on the occasion.*



## WORKING SESSION - 1

Chairperson : Mr. Jeffrey S. Pereira  
Executive Director, CARITAS - Bangladesh

The first working session was scheduled for presentation of papers on two vital issues in this sector by the resource persons. Presenters of the session were Dr. Mohammad Ali Bhuiyan from Bangladesh University of Engineering and Technology (BUET) and Dr. Bilqis Amin Hoque from ICDDR,B.

The presentations were followed by open discussion:

Prepared by:

Dr. Ainun Nishat  
Professor  
and  
Dr. Mohammad Ali Bhuiyan  
Asst. Professor  
*Department of Water Resource  
Engineering  
BUET*

Paper:

Water Resources Development in  
Bangladesh with Focuses on  
Drinking Water Supply.

INTRODUCTION:

Bangladesh is encoded with uneven distribution of water with respect to time and space. The extremities influence the planning for water resources development in Bangladesh with severe emphasis on flood control, irrigation and drainage. This trend in water resources infrastructure development for mostly single purpose objective of increasing agricultural output has led to neglect other water sectors such as fisheries, navigation, salinity, potable water supplies to urban and rural homes, etc. Failure to utilize the water resources in an integrated, balanced and comprehensive manner will not only cause stagnation in economic growth, but also will give rise to many environmental problems.

The National Water Plan Project (NWPP), a three party master planning project started in 1983 by the Government of Bangladesh (GOB), the World Bank (IBRD) and the United Nations Development Programme (UNDP). Bearing in mind the need for integrated development, the NWPP formulated a perspective water development plan for the period 1985-2005 based on a comprehensive assessment of all land and water resources potential in harmony with the demand for water by the competing users and environment. Detailed project planning has been based on the 173 hydrologic catchments and 60 planning units into which the country has been delineated.

The proposed National Water Plan (NWP) aims at development of water resources to -

- \* maximize the net value added in agriculture and fisheries and to contribute to economic growth; and
- \* provide adequate water supplies in time and quantity for domestic and industrial use, navigation, salinity control and environmental management.

Water becomes really a scarce resource in Bangladesh during the dry months of the year and maximum water demand occurs in March. Gross water demand is based on the requirement to irrigate the total irrigable area (7.56 Mha), salinity control along the coastal belts, riverine fisheries, inland navigation, domestic and industrial uses. In 1988, groundwater development control have been changed from public to private sector which instigated an installation of STWs at a rate of 40,000 per year and foodgrain output expansion by nearly 10 percent at that period (MPO, 1991). Out of the total irrigated area 55 percent are under the command of shallow (34 percent) and deep (21 percent) tubewells. Essentially groundwater are the source of these equipments. An incremental area of 2.3 Mha is recommended for irrigation development during the next 20 years (i.e. up to 2010). About the third of this development will be contributed by surface water schemes of which majority are FCDI projects, mainly concentrated in the NW, SE and SC regions. The remaining irrigated area will be developed from groundwater resources. Most of these development is concentrated in the NW and NE regions.

Municipal, rural domestic, and industrial water demands were assigned the highest priority claim to water resources by MPO in

its planning procedures. Water sufficient to meet projected requirement of this sector at the end of the planning period (year 2010) was reserved in each planning area before allocation of waters to other purposes (MPO, 1991). This is especially true for potable water use.

#### POTABLE WATER USE:

As a policy guideline MPO in its planning accorded highest priority to the domestic and industrial water sector (MPO, 1991). The guiding principles were:

- water sufficient to meet projected requirement of this sector at the end of plan period (year 2010) is to be reserved in each planning area before allocation of water are made for other uses.
- water table depletion to a maximum limit of 15m below the village mound was analyzed as an alternative in determining the groundwater availability for various developments.

#### PER CAPITA WATER DEMAND AND CONSUMPTION:

Per capita water demand is variable with the type of areas (municipal or rural) it served and the type of services it provided. The services provided to the people are through pressurized pipe system and hand tubewells. The remaining population, not fully served, is assumed to use water at a lower rate is classified as under served. These three categories have been used in MPO's calculations. Per capita water demand is also expected to increase in the future with the growth of sanitation facilities.

#### MAJOR ELEMENTS (URBAN AND RURAL):

The quantity and quality of water are prime considerations in the selection of any source of supply. Cost of development and operation of water supply are also significant. In surface water, high bacterial count is of great significance from public health

point of view. Surface water in ponds, lakes and rivers in Bangladesh often show coliform counts between 500 and 2000 per 100 ml (Ahmed, 1988) exhibit its higher degree of treatment requirement before domestic use. Groundwater, a vital source of water supply for Bangladesh, generally requires no treatment. The country is almost entirely underlain by water bearing formations at depths within a few meters below ground surface (MPO, 1986). Therefore, the underground sources are preferred for domestic water supplies. The two sources are interrelated, and use of one for irrigation of domestic supply may affect the water available from the other. Surface and groundwater are considered jointly in planning for the development of water supply systems.

Groundwater, in many areas of Bangladesh contain large amount of dissolved minerals which they gather during the course of their slow long travel through underground soil strata. The presence of chlorides, iron and hardness in groundwater in excess of acceptable limits restricts the per capita consumption of tubewell water in the rural areas (UNDP, 1982).

Leaving aside salinity the other naturally occurring chemicals are well within the acceptable limits set by EPCB and WHO, except iron and boron (MPO, 1987). The total iron content ranges from trace to more than 10 mg/l in a large area along the Brahmaputra river, and in smaller areas northwest of Dhaka, and between Khulna and Barisal. Whereas, the concentration of iron is less than 2 mg/l in most of the northeast and northwestern part of Bangladesh. The TDS are fairly low and constant throughout the country excepting the coastal areas where it is about 1000 mg/l, particularly in Khulna, Jessore, Faridpur, Barisal and Patuakhali districts. The TDS value for the rest of the country is around or less than 500 mg/l. The value of hardness of groundwater ranges from very soft (50-100 mg/l) in the northwest and northeast regions to very hard (400-500mg/l) in the coastal areas of the country. Also the western part of Rajshahi has a bit of more hardness than the rest of the country. Except the coastal areas, the rest of the country have a chloride content less than 500 mg/l. Low pH, that can affect the well screens have been found in Bogra, Mymensingh, Barisal, Comilla and Jessore. On the other hand high pH value has been found in Dinajpur.

The position of saline groundwater front is dictated by local seasonal recharge and regional groundwater throughflow from the

north. Saline water intrusion may take place by unbalanced excess withdrawal than recharge or by reducing the throughflow. Freshwater in coastal areas occur in two zones: shallow freshwater from within 10-20 m and deep fresh water from beyond 200 m. Localized pressure reduction by tubewell abstraction may cause upcoming of saline groundwater over and above the regional saline water interface. To mitigate salinization of the shallow aquifer, it is essential to control groundwater abstraction, adopt suitable well design and have a thorough knowledge of the hydrogeology of these aquifers (Michael, 1986). Groundwater flow in the lower aquifer is extremely difficult to assess or quantify, because the groundwater quality pattern is complex and the flow characteristics largely unknown (MPO, 1987a). It is thus, essential to conduct further studies in this area by test drilling and aquifer testing program supported by groundwater modelling studies to understand the groundwater regime and determine allowable rates of withdrawal.

#### GROUNDWATER AVAILABLE FOR DEVELOPMENT:

Taking account of the low confidence limit for the calculated values of potential recharge, usable recharge is set equal to 75 percent of mean annual potential recharge. Available recharge was determined by reducing usable recharge for geographic and physical limitations on groundwater use; eliminating areas where water needs are already met by surface water development; and deducting outflow to rivers from the start of the monsoon season to the beginning of the irrigation season. As a future aid to groundwater development planning has been prepared which classifies the maximum DSSTW suction-mode unconstrained development potential index into four categories depending on the portion of estimated usable recharge that can be developed in a given zone: less than 25 percent, 25 to 50 percent, 50 to 75 percent, and more than 75 percent. This identifies areas where force-mode pumps will have to be extensively used to attain reasonable levels of groundwater irrigation development. It is of interest to note that most of the country, falls into the extreme categories, with only narrow transition zones between them.

Available recharge ranges from about 100 mm to over 500 mm. Lowest values, 100 mm or less occur in the western SW region and the Rajshahi High Barind. Highest values (over 500 mm) occur in the lighter textured soil areas of Thakurgaon and Rangpur, at the

confluence of the Jamuna and Old Brahmaputra, and in the deeply flooded piedmont foot areas of the NE region. Future groundwater development potential is the difference between available recharge and the sum of present agricultural groundwater consumption, and reserve for potable and industrial water supplies to the year 2010. Based upon NWP irrigated area, cropping pattern and water duties, the national estimate of net agricultural groundwater withdrawal at 1989/90 status is 8806 Mm<sup>3</sup>. Potable water supplies and industrial withdrawal were estimated for the year 2010 to be 3,191 Mm<sup>3</sup>, and this quantity is reserved before planning any additional development. Comparison clearly indicate considerable remaining groundwater potential.

The groundwater model studies by MPO indicated that there are many places where current abstractions are approaching or exceeding the indicated potential, and the groundwater resources in such areas should be showing signs of stress. Two early symptoms of such stress would be:

1. Mass conversion of STWs into DSSTWs, and/or
2. Suction-mode tubewells going out of operation because of the decline of the water levels.

It is very clear that there is an increasing need for a comprehensive hydrogeological monitoring programme with its centre of gravity in the areas of heavy abstractions.

#### CONCLUDING REMARKS:

Water development in Bangladesh has arrived at a phase where it has to proceed progressively from easy-to-develop single purpose water schemes to more complex interrelated projects. This implies a beginning to plan for major infrastructure projects that would utilize unused water resources of major rivers. This implies a step which would need longer period for development. Choice will have to be made among alternative technologies, competing and conflicting usage and allocation. This would require careful monitoring of the land and water sector so as to mitigate adverse environmental consequences from such development.

The provision of domestic water supply fulfills a minimum essential human need for survival and thus claim the highest national



priority. There should be no restriction on the installation of handpump tubewells for this purpose. If any such tubewells go out of action because of water table decline induced by pumpage for irrigation, replacement facilities should be provided. Concurrently studies should be carried out to focus groundwater development in areas where best return can be obtained, to develop suitable technologies for the more difficult conditions, and to establish more accurate probable limits to abstractions with different pump technologies. In order to accomplish these studies, more accurate monitoring of groundwater development will be needed in terms of number of operating units, groundwater levels, actual abstraction characteristics. Existing studies have indicated that development may be constrained in areas of the eastern hills of Sylhet and Chittagong, and the Sylhet basin due to difficult aquifer conditions, and also the southern part of the SW, SC and SE regions due to salinity constraints.

Urban water supply should also be treated as of high priority, but development should be proceeded by optimization and feasibility studies. As a matter of priority, alternative and improved potable water supply systems should be investigated and introduced.

It is true that the imposition of present suction-mode constraint to protect potable supplies in rural areas would curtail groundwater irrigation development. The implication of the above is that from the point of view of unrestricted development of groundwater by the private sector, it would be desirable for the Government of Bangladesh to invest in force-mode technology for domestic supplies. The mechanized suction-mode shallow tubewells, the main stay of irrigation development in Bangladesh are in serious setback contributed by declining water table coupled with other complex hydrogeological conditions. Now it is high time to rethink whether there should be some sort of restrictions on private-sector installations of MOSTIs, STWs, DSSTWs and DTWs in congruence with the above suction-mode constraint!

Prepared by:

Dr. Bilqis A. Hoque and  
Dr. R. Bradley Sack  
*International Centre for  
Diarrhoeal Disease  
Research, Bangladesh (ICDDR,B)*

Paper:

Environment and Diarrhoea.

**Introduction:**

Environment refers to 'surroundings' and diarrhoea refers to an undesirable state of health.

In most of the preventive health impact studies in which a significant reduction in diarrhoeal diseases was detected, there was a significant association between diarrhoea and environmental variables, such as improved access to water supply and or adequate disposal of human excreta or personal hygiene practices.

Faecally contaminated environmental and disease causal variables are the main reaction components and diarrhoea is the product. Social factors also play a significant role in the system by confounding or interacting variables and affecting the product, thereby introducing complexity in the phenomenon. For example, access to safe water and latrines (environmental) might be associated with socio-economic status (social). On the other hand, personal hygiene (social behaviour) may be associated with the availability of water (environmental), behaviour, and knowledge and or socio-economic conditions (social) etc.

A large number of infective organisms indiscriminately excreted in faeces which invariably survive in the environment. These are ingested by consuming pathogens laden food or water or by oral contact with dirty hands or with contaminated objects. Water containing pathogenic bacteria, at doses below those necessary to infect humans, is also a potential risk.

**Implications for Diarrhoeal Disease Control Programme**

Diarrhoeal disease control programmes, in general, may be planned and implemented by considering the common strategies of (a) safe

disposal of excreta (man and animal), (b) using safe water, (c) practicing personal and food hygiene, and (d) disinfection of food and water.

There are two categories of water related infections. With respect to specific environmental and epidemiological features: low infective dose. A small number of the bacteria can multiply to form an infective dose if they find a suitable media.

Studies in Bangladesh have shown that safe drinking water alone was not enough to control cholera and even water used for other domestic purposes was important. It is likely that changes in excreta disposal technology will have little effect on the incidence of these infections in developing countries if such changes are unaccompanied by sweeping changes in personal cleanliness.

Facilities in themselves are not meaningful unless they are used properly. This requires change in the perception and behaviour of the users, and therefore personal hygiene should be an integrated component of any such project. Concurrent education to promote hand-washing and clearing of the home environment is also necessary. It is also important to note that animals are also a reservoir/carrier of some pathogens and therefore removal of their faeces should be considered also.

#### **Water Supply: Quality Vs Quantity.**

There are doubts whether improvements in the quality of drinking water alone can show a reduction in diarrhoea in areas where environmental faecal contamination is high. Any or all of the transmission modes can lead to diarrhoea. Studies in Bangladesh and Nigeria found little or no association between the quality of drinking water and diarrhoea in children.

When high quantities of water are available it is likely that people will be able to use it more for personal hygiene and food hygiene purposes. Of the 7 studies that examined the issue of increased amounts of water specifically, independent of water quality, the median reduction was 27 percent.

## **Water Supply Vs Sanitation**

The studies that compared the relative importance of water and sanitation, mostly reported that sanitation had the greatest impact on child health based on mortality, growth and morbidity indicators. Sanitation was most effective in reducing mortality among non-breast fed infants and infants of illiterate mothers than among breast fed infants or literate mothers.

An educational intervention to improve water-sanitation behaviours (such as lack of hand-washing before preparing food, open defecation by children in the family compound, and inattention to proper disposal of garbage and faeces) resulted in 26% fewer diarrhoea episodes ( $P < 0.0001$ ) in children. Hand-washing alone was reported to reduce shigella dysentery by 35 percent.

### **Water supply and sanitation and diarrhoeal morbidity in post-disaster situation.**

During a recent post-cyclone activity, as usual, relief personnel were trying to improve access to safe water by distributing water purifying tablets. But about 63% of these tablets were found to have lost potency. All of the tested water samples from flooded ponds were contaminated beyond acceptable standards for domestic water use. Even field clinics or shelters did not have sanitary latrines. A diarrhoea epidemic broke out after the disaster and hundreds of people died because of inadequate availability of treatment.

It has been often argued that water supply and sanitation projects are costly, but Briscoe has shown that when short term and long term benefits are compared with other primary health care strategies it provides higher health benefits. There is little doubt that research is needed to develop cheaper and more appropriate water-sanitation technologies. For an example, a recent study found that about 80% of the rural people in Bangladesh could not afford to buy soap. But an experimental study in rural Bangladesh reported that local washing agents, such as, soil, ash or soap, have similar potentials to reduce bacterial contamination from hands.

## Summary and Conclusions

In spite of the significant accomplishments of the U.N. International Drinking Water Supply and Sanitation Decade (1981-1991), in bringing water and sanitation coverage to more people, at the end of the decade, 254 million urban and 880 Million rural dwellers were still unserved with a safe water supply. About 1.5 billion in rural areas and 4000 million people in urban areas did not use sanitary latrines. Therefore, there remain a number of questions about the timing, level, and mix of water supply, sanitation and personal practices to be promoted in order to maximize health benefits with limited resources.

Although several parallel routes for effectively transmitting faecal-oral pathogens exist in many developing countries, studies in different parts of the world have shown that improvements in water supply and sanitation played a significant role in reducing diarrhoea. The impacts are dependent on the type or level of intervention, the level of pathogen exposure in the area, and the presence or absence of certain risk factors. Excreta disposal appears to consistently play a more important role in determining children's health in developing areas than do water supplies, especially where the prevalence of diarrhoea is high. But it may be noted that in all of these studies adequate use of sanitary facilities were ensured.

For success of any programme for improving environmental sanitation, user participation in planning and implementation phases of the programme is absolutely essential. As women are the main drawee of water and caretakers of children their involvement in water supply and sanitation programmes should be emphasized to maximize the health benefits from water supply and sanitation programmes. However, effective involvement of user and women requires participation from every level of the community; political leader, social leaders, institutions, etc. Literacy or lack of it is not a barrier in implementing these programmes as shown by Mirzapur study.

Other preventive strategies recommended to control diarrhoea in addition to improving water supply and sanitation and personal hygiene include: promotion of breast feeding, weaning education, immunization and use of ORT. The effectiveness of ORT in reducing mortality from chronic or dysenteric diarrhoea is believed to be

low and, in addition, ORT can be expected to have little impact on diarrhoea morbidity rates. If we look carefully none of these suggested options are exclusive of each other but related, complementary and essential if we want to target children at all ages and at all times of the year.

Therefore, the potential of environmental intervention through improved water supply and sanitation, and personal hygiene is immense. Studies are required to identify environmental risk factors for diarrhoea mortality, to develop plans to appropriately handle post-disaster environmental health problems, to prioritize the importance of immediately feasible related intervention variables, to make alternative water supply and sanitation technologies affordable, to identify methods to maximize the adequate use of facilities, to identify approaches to incorporate effective community participation in the programmes and to develop or identify appropriate monitoring indicators to effectively implement the projects.

## FROM THE FLOOR

From the floor Mr. A.M. Khan of RDRS pointed out an error in the 5th page of Dr. Bilqis Amin Hoque's paper. He said that it would be human excreta instead of men excreta. The writer gladly accepted that. In another answer to a question, she informed that excreta of animals were the main reason for diarrhoea, she also informed that the results became same even if people washed their hands by these polluted water with soap, soil or ashes. On a question asked by Mr. Mosharraf Hossain of PROSHIKA, Dr. Mohammad Ali Bhuiyan answered that the amount of vaporization was made on the basis of water level value, which was very technical. In an answer to a question on the relation between echo-bacteria and cholera Dr. Bilqis said that there were such case studies during disasters periods. In reply to a question on fanciful research in the low water table of Farakka Dr. Hoque said that it was very much expensive. In reply to a question raised by Ms. Selina Shelly of Training Task Group about transformation of water from one place to another Dr. Ali informed that except the rainy season sufficient amount of water could not be found in real. But joint River Commission has been working on water transformation abroad.



*The participants  
of the Seminar  
are in the lively  
session.*

## WORKING SESSION - 2

Chairperson : Mr. Aminuddin Ahmed  
Chief Engineer, DPHE

The session included two important papers. One concentrated on the importance of north-south cooperation in environment and development, while the other paper denoted the significance of the role of NGOs in water and sanitation activities.

Prepared by:

Dr. Saleemul Huq and  
Dr. A. Atiq Rahman  
*Bangladesh Centre for  
Advanced Studies*

Paper:

North-South Dialogue in  
Environment and Development.

### Introduction and Background

Environment became a global issue in the early seventies following the World Conference on Environment held in Stockholm Sweden in 1972. This led to the creation of the United Nations Environment Programme (UNEP) based in Nairobi. During the seventies a number of international treaties regarding environmental issues came into being including the Ramsar Convention on wetlands, the Basle Convention on international transport of hazardous chemicals and CITES treaty on endangered animals.

This period also led to a number of initiatives to bring together leaders from north and south to deliberate on global environment and development issues such as the Brandt Commission and later the Brundtland Commission which brought out the interlinkages between the north and south both in terms of development as well as for environmental protection.

The discovery of the hole in the ozone layer over the South pole being caused by man made chemicals, namely Chlorofluoro carbons or CFCs led to the Montreal Protocol to limit production and use of CFCs which, for the first time involved a truly north-south dialogue and exchange in order to solve a planetary problem.



## Global Warming

The discovery of the possible runaway greenhouse effect due to man made emissions of certain gases such as Carbon Dioxide and Methane which cause heat to be trapped in the earth's atmosphere caused a great deal of international concern during the eighties. This culminated in the creation of the Intergovernmental Panel on Climate Change (PCC) by UNEP and the World Meteorological Organization (WMO) who brought together hundreds of the world's best scientists from north and south to assess the likelihood of global warming. This unprecedented, cooperation amongst the international scientific community lead to an assessment that global warming was real and that action was needed to prevent it becoming worse. This lead to intense negotiations over several years to finalize the Framework Convention on Climate.

## UNCED

The culmination of these international activities occurred in 1992 when over 100 heads of state and government met in Rio de Janeiro, Brazil during the Earth Summit to sign two international treaties, namely the Climate Convention and the Biodiversity Treaty as well as two non-binding documents, namely Agenda 21 and the Rio Declaration. All these documents were produced by consensus after years of intense negotiations between north and south.

## Water Issues

Water related issues played a central part during all the international negotiations with a number of international meetings being held prior to UNCED including the meeting on Rivers in Orleans, France and the International Conference on Water in Dublin, Ireland. All these meetings and dialogues gave input into the chapter on water in Agenda 21 which addressed the issue in a comprehensive manner.

## Present Status

The result of the last three decades of international concern and activity on global environmental problems has resulted in a major north-south dialogue on many of these issues which has lead to a number of healthy developments some of which are mentioned below:

- \* The South has developed the capacity to prepare its own positions and become a genuine negotiating partner with the north to solve global environment problems.
- \* The NGO and research communities have developed major strengths in terms of analytical, policy and negotiating capabilities and are now significant players in the north-south debate.
- \* The issues of north-south debate on different environment and development issues have received major media attention so that they have become of truly global concern to citizens of all countries.
- \* The realization amongst both north and south that some problems are truly global and cannot be solved by either the north or the south on their own.
- \* The general realization (still not complete) that solving the south's development problems is necessary in order to solve the planet's environmental problems.

### Conclusion

The prospect for the remaining few years of this millennium is that we are becoming more and more a global village in which every human being is a citizen of planet earth and that the divisions between east and west, north and south, rich and poor will have to gradually diminish in importance and the twin problems of environmental degradation and large scale human misery need to be tackled as environmental problems of all mankind. The North-South dialogue will remain a central avenue for articulating these views and devising strategies to solve them.

Prepared by:

Mr. Philip Wan  
WES Section  
UNICEF

Paper:

Intensifying Good Sanitation  
and Hygiene Practice: NGOs  
can make a Substantial  
Difference.

Every day over 700 children under five years of age still die of diarrhoeal diseases. It represents a tremendous loss to the bereaved family and the nation as a whole. These deaths can be avoided. A major contributing factor is the highly polluted environment caused by high pathogenic load from exposed human excreta. The problem is aggravated by crowding in the home, rapidly growing population and poor hygienic practices. As sanitation and hygiene receive higher priority at the political and policy levels, can NGOs make a substantial contribution in this sector to improve the quality of life of the people?

It is well recognized that NGOs, compared to many other implementing agencies, generally have a strong rapport with the communities through their field presence. Credibility, trust and better mutual understanding characterize the relationship between the community and the reputable NGOs. As such, a greater responsibility also rests on the shoulders of these NGOs to transform the life of the people.

Over several thousand NGOs, large and small, are operating all across the country. The majority are associated with the empowerment of the community through various developmental and health related interventions. A smaller number have specific projects related to the promotion of safe drinking water, safe excreta disposal and good hygiene practices.

Unless the development activities are formulated with a more holistic approach, whatever short-term gains that are achieved can be negated by physical weakness and ill health. To promote a health environment and a healthy human being, both physically and mentally, is a corner stone of sustainable development.

The Government of Bangladesh has achieved remarkable success in providing easy access to water supply. In the recent years, accelerated progress was achieved in the construction and use of sanitary latrines, particularly in the rural areas where access to

sanitary latrines increased from 16% in 1990 to 33% in 1993. The wider use of sanitary latrines, particularly of the do-it-yourself (homemade) type which is self-financed, was the turning point. A recent WHO study on homemade sanitary latrines, sponsored by DPHE-UNICEF (1993), indicated that families with varied educational and economic background chose this technology. Over 50% of the consumers spent less than Tk. 125 on the latrine construction. All across the country, consumers can also buy water-seal latrines from the fast growing numbers of private latrine producers, the Department of Public Health Engineering (DPHE), or NGOs, thus giving them a choice in technology.

To complement the promotion of safe excreta disposal, hygiene education related to proper hand washing before handling food and after defecation are also promoted by various implementing agencies with different levels of intensity. Unless a sound package of sanitation and hygiene education is promoted, and people adopt good hygiene practice, impact on health is unlikely to be significant.

Sanitation success has been achieved in some parts of the country through social mobilization and partnership with local allies and community members. The experience in certain Thanas of Barisal and Jhalokati districts and Dhamrai Thana of Dhaka district where sanitation coverage has exceeded 80%, combined with significant improvement in hygiene practices should be expanded throughout the country. The lessons learnt showed that women can play an effective role to influence other women in the community. The recent efforts of NGO Forum in achieving sanitary latrine coverage ranging from 60% to 85% and proper hand washing among 40% to 70% of the population in seven Thanas of the country within one year demonstrate that people are very receptive to change. The construction of the homemade latrines along with water-seal types, the holding of courtyard meetings, group discussion and interpersonal communication on hygiene education with systematic follow-up, the support and active involvement of the Thana and Union officials, schools and other allies were crucial to the success.

The thrust on accelerating sustained use of sanitary latrines and proper hygiene practices is gaining momentum. As partners in development, the NGOs have a responsible and important role in this venture. Within the framework of their developmental activities,

NGOs can contribute significantly to the sanitation and hygiene drive without additional financial inputs. More specifically, the NGOs can consider the following interventions to contribute to the national programme:

01. Motivate all family members belonging to the NGO target groups to construct and use a sanitary latrine, and improve their hygiene practices. The lack of sanitary latrines also deprives women and girls of a convenient and private place to fulfill their needs. The choice on the type will depend on their preference and affordability, ranging from the homemade to the water-seal type. With respect to a homemade latrine, the constraint normally posed by poverty or cash flow is not relevant for most families who can use building materials available in their backyard. All children should also be motivated to use the facilities.
02. Motivate all NGO-target families who use a sanitary latrine to motivate, in turn, at least three other neighbours not under the NGO programme to adopt the same practice by constructing their own sanitary latrines.
03. Promote the use of human excreta, after natural digestion, as fertilizers. The Indian experience has shown that, despite earlier resistance to this practice due to cultural factors, the economic value of the digested sludge as natural fertilizers is increasingly recognized. After the excreta has been left buried for about 18 months and the pathogens dead, the sludge can be safely handled.
04. Promote proper hand washing with soap or ash before handling food and after latrine usage. This practice will break a major route of disease transmission.
05. Motivate the local primary and high schools to participate in the sanitation and hygiene promotion. Orientation of the headmasters and teachers can be undertaken. The teachers can in turn motivate the students to adopt improved hygiene practices and the use of sanitary latrines. The teachers can adopt the model used successfully in many areas where villagers in the school catchment are divided into sectors, each assigned to a teacher and some students who would

motivate the family members on a regular and sustained basis. With the support of other local partners, such as the union chairman, DPHE engineer, practically whole villages have adopted safe disposal of human faeces, and people practice proper hand washing practices.

With the large number of personal and group contacts as well as through other channels to interact with the community members, the dedicated NGO field staff are in a most advantageous position to motivate family members for behavioural change. Intensifying sanitation and hygiene education will add a new dimension to the existing mandate of many NGOs. The task is vital and challenging. If the NGOs do not take up the challenge and assist in redrawing the sanitation map of Bangladesh, who will?

## FROM THE FLOOR

From the floor Director of NGO Forum Mr. S.M.A. Rashid opined that the North-South assistance was very much needed. But before that it needed mutual understanding among the forces in south itself, and in that regard some measures should be taken up. Along with this he said that environment was not confined within limits to any area. It was spread in the whole universe. But though it needed to take necessary measures at the local and national levels. In response to the comment of Mr. Rashid, Dr. Saleemul Huq said that the importance of south-south cooperation was undeniable. But the world situation was different. He said that it was more easy to communicate with the countries of North rather than of South just because of geographical stand. To reach to the latin American countries people needed to go to New York or London, the northern part. He also said that the South could not go beyond the poverty even if there was no Global forum for environment and poverty. Though poverty was not the only problem in South, it appeared in North also. He opined that Bangladesh was not liable for the crucial danger of the world environment.

Mr. Ali Azam of Department of Public Health and Engineering articulated that if Farakka was used as political issue then the SAARC might break down. The Farakka problems could be used as environment issue side by side he raised a question on using banned pesticides produced in Holland. Although in Holland use of these pesticides were banned but the production of those were not banned. If the discussion on north-south took place keeping aside these issues it would not bring much fruit. Mutual understanding on environment needed to be thought, he added.

Dr. Saleemul Huq said that the NGOs have been maintaining the communication both with North and South regarding environment. In this situation if the academic community agreed with this matter than easy result could come out from that. NGO Forum was not only working on the quantity of water but also on water quality. The rational people did not want only the Farakka problems to be solved for bringing brought good result for Bangladesh only but the problems of India should also be thought, because they have also some regional problems. In response to a question of Mr. Mazharul Islam, Dr. Hoque answered that Bangladesh did not produce CFC but some companies imported that from abroad to manufacture mosquito

killers and for other reasons. In response to a question by Mr. Mahfuzul Hoque of Department of Public Health and Engineers, Dr. Saleemul Huq informed that the National Management was working on the Action Plan. And because of that public awareness had increased. Public had heard about the environment destruction. In this same discussion Mr. Zia-Us-Sabur and Mr. Enamul Hoque Mondal of NGO Forum and Mr. Mosharraf Hossain Bhuiyan of PROSHIKA participated.

*the North-South assistance was very much needed. But before that it needed mutual understanding among the forces in south itself, and in that regard some measures should be taken up.*



*The participants of the Seminar are seen.*



## WINDING-UP SPEECH

In the winding up speech Director of NGO Forum Mr. S.M.A. Rashid thanking the participants for attending at the Seminar said that the learnings of the Seminar will play a precious role to develop future programme on water and sanitation and above all on environment. Discussion on human and water resource management had received due importance in the Seminar. Public health management issue was also discussed. The objective of the World Day for Water was to ensure the environmental equilibrium and better health by focusing on specific action plan. It had been understood that resource allocation should be increased in public health management.

He articulated the importance of inter-agency collaboration in expediting the success.

He added that thoughtful planning needed to be formulated. He said that NGO Forum would like to extend multi-dimensional WATSAN and environment related activities all over the country. He sought cooperation from all corners in this regard.

He again thanked the participants and the SPARRSO authorities for their whole hearted cooperation for making the Seminar success.

## LIST OF PARTICIPANTS

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01.	Mr. A.K.M. Nashirul Huq	PS to Minister	Ministry of Env.&Forest
02.	Mr. Md. Fazlul Huq	PPC	Proshika, Dhaka
03.	Mr. Kazi Ali Azam	Executive Engineer	DPHE, Kushtia
04.	Mr. Munir Panna	Reporter	The Bhorer Kagoj
05.	Dr. Md. Ali Bhuiyan	Asst. Professor	BUET
06.	Mr. M. Nokul	Eva. & Monitoring Off.	CHCP
07.	Mr. M.H. Bhuiyan	Programme Coordinator	Proshika-MUK
08.	Mr. N.C. Shil	Asst. News Controller	Radio Bangladesh
09.	Mr. Harunur Rashid	Programme Administrator	Save the Children - USA
10.	Mr. Moniruzzaman	Programme Dev. Officer	CARE Bangladesh
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12.	Mr. Abdus Samad Mallick	General Manager	PKSF
13.	Ms. Jahanara Sadeque	Dy. Director (Admin.)	BWHC
14.	Mr. Philip Wan	Chief, WES Section	UNICEF
15.	Mr. H. Rashid	Consultant	UNDP-World Bank
16.	Mr. Alex Redekopp	WHO Sanitary Engineer	WHO
17.	Mr. Sk. Abu Jafar Shamsuddin	NCO RWSG-SA	World Bank
18.	Mr. Dawood Farhan	Development Officer	Australian High Commi.
19.	Dr. D.A. Quadir	Chief Scientific Officer	SPARRSO
20.	Dr. A.M.S. Hoque	Project Director (SOCMOB)	DPHE
21.	Mr. M. Mofazzal Hoque	NFPO	WHO
22.	Dr. Saleemul Huq	Executive Director	BCHS
23.	Ahmed Mofazzal Huq	Executive Engineer	DPHE
24.	Dr. Qazi Faruque Ahmed	Executive Director	PROSHIKA
25.	Mr. Md. Yakub Hossain	Dy. Director	VERC

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30.	Ms. Yasmin Ahmed	Head	NOVIB Cons. Bureau
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32.	Mr. Glaysius Milar Khan	Communications Manager	RDRS
33.	Mr. Benedict Poresh Sardar	Programme Leader	MCC
34.	Mr. Md. Obaidul Quadir	Principal Scientific Off.	SPARRSO
35.	Mr. Bayazid Milky	Reporter	UNB
36.	Dr. Rokeya Khanam	Communication Adviser	JSI/USAID
37.	Dr. Sazzad Hossain	Professor	Dhaka University
38.	Mr. S.A. Karim	Sr. Programme Officer	SDC
39.	Mr. A. Hannan Sk.	Research Associate	CWCD
40.	Mr. Selim Omrao Khan	Reporter	Bichitra
41.	Ms. Samia Ahmed	Programme Assistant	Terre-Des-Hommes (N)
42.	Mr. Rashidul Islam	Staff Reporter	Sakaler Khabar
43.	Mr. Md. Nazrul Islam	Administrative Officer	Rabita Bangladesh
44.	Mr. Nurul Islam	Reporter	The Morning Sun
45.	Mr. S. Rahman	Journalist	The Bhorer Kagoj
46.	Mr. Muktaruzzaman	Project Officer	Ministry of Agriculture
47.	Dr. Pearl Veronica Anthony	Programme Officer, Health	CCDB
48.	Mr. Shafiqul Islam	PRO to Minister	Ministry of Env.&Forest
49.	Mr. Shamsuzzaman	Executive	UNAB
50.	Dr. Sayyadul Arafin	Chief Scientific Officer	B.desh Petroleum Inst.
51.	Mr. Mollah Amzad Hossain	Staff Reporter	The Banglabazar Patrika
52.	Mr. Salahuddin Lavloo	Executive	Stride

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53.	Mr. Corinne Hinbpen	Hygiene Edn. Consultant	DPHE (Dutch Project)
54.	Mr. Muksudul Haider Chow.	Senior Reporter	The Ajker Kagoj
55.	Dr. Malejasul Huq	Chairman	Society for SRAVAN
56.	Mr. Nair Mahmud	TV Representative	BTV
57.	Mr. Ziaur Rahman	Sr. Staff Correspondent	Daily Financial Exp.
58.	Dr. Rezaur Rahman	Asst. Professor	IFCDR, BUET
59.	Ms. Rashida Kanchwala	Ex. Information Officer	NGO Forum
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63.	Ms. Selina Shelley	Programme Officer	TTG Bangladesh
64.	Mr. A. Muqueet	Chief Engineer	Dhaka WASA
65.	Mr. Serajuddin	Executive Engineer	Dhaka WASA
66.	Mr. Reazuddin	Reporter	The Daily Star
67.	Mr. Mazedul Islam Azad	Correspondent	The Daily Financial Exp
68.	Mr. Masood Kamal	Reporter	The Daily Jana Kantho
69.	Mr. Md. Abu.....	TV Representative	BTV
70.	Mr. Shimul Mahmood	Reporter	Bangladesh Patrika
71.	Dr. Bilqis Amin Hoque	Coordinator	ICDDR.B
72.	Mr. Md. Shafiqul Islam	-	ICDDR.B
73.	Dr. M.I. Talukdar	Divisional Chief	Planning Commission. GOB
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80.	Mr. Anup Kumar Sarker	Asst. Programme Officer	NGO Forum - Rangpur
81.	Mr. Ziaul Haque	Asst. Programme Officer	NGO Forum - Rajshahi
82.	Dr. M. Feroze Ahmed	Professor	BUET
83.	Mr. Kamal Nasir	Senior Sub-Editor	The Daily Star
84.	Mr. Enamul Haq Mandal	Programme Officer	NGO Forum - Chittagong
85.	Mr. Mokhlesur Rahman	Asso. Programme Officer	NGO Forum - Dhaka
86.	Mr. Azahar Ali Pramanik	Programme Officer	NGO Forum - Jessore
87.	Mr. Suzauddoula	Asst. Programme Officer	NGO Forum - Mymensingh
88.	Mr. Yeaminul Islam	Asso. Programme Officer	NGO Forum - Barisal