



# Partnership Approach in Water and Sanitation

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The WatSan Partnership Project (WPP) is a unique partnership initiative of SDC to create sustainable access to water and sanitation facilities. The WPP has been working in the districts of Rajshahi and Chapai Nawabganj of Bangladesh since 1998. The prime focus of the WPP was on testing new strategic orientation and partnership for WSS service in particular and development in general. The Project aimed to develop mutual beneficial relationships among organizations, where roles, responsibilities, and accountabilities are clearly defined. The WPP partnership is based on three international NGOs - CARE, DASCOH and IDE - act as support organizations to facilitate the development of community level organizations and building their capacity in working towards sustainable community-based organizations. SDC plays an important role as the initiator of the approach and funding the project. It also extends its cooperation through co-ordination and management of the project partners and providing technical assistance through the Project Management Unit (PMU). The WPP is guided through a Steering Committee constituted from SDC and three major partners. The WPP has selected and trained 15 local NGOs to work as implementing/ facilitating organizations. The Project furthermore collaborates with local set-up of government line agencies of different ministries and the Union Council.

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## Introduction

This paper highlights the public private and community partnership approach in a rural water supply and sanitation project in Bangladesh. The methodology combined the literature review of the documents in the water and sanitation sector development and specifically in the implementation experiences of the Water and Sanitation Partnership Project popularly known by its acronym WPP.

The partnership is often defined as a situation where two or more groups join together in a working relationship to share resources and responsibilities on an equitable and sustainable basis, so that each party benefits from the arrangements. The basic principle of the partnership is parties involved trust one another and willing to work together in a spirit of cooperation. In the original concept of the WPP, the underlying aim was to achieve a synergy of the various partnerships.

## Bangladesh Context

Bangladesh is located in the northeastern portion of the Indian subcontinent, bordered on the west, north and east by India, on the southeast by Myanmar (Burma) and on the south by the Bay of Bengal. Most of the country is situated on deltas of large rivers flowing from the Himalayas. The Ganges unites with the Jamuna (main channel of the Brahmaputra) and later joins the Meghna to eventually empty into the Bay of the Bengal (Figure-1).



Figure - 1: Location of Bangladesh

Bangladesh has made great efforts in improving the lives of its people since came into existence in 1971, yet it remains one of the poorest countries in the world. Its progress over the past two decades is the proof of a great potential that is, however, still far from being realized. Bangladesh still suffers from desperate poverty and it remains a typical agricultural economy- nearly two-thirds of Bangladeshis are employed in the agriculture sector, with rice as the single most important product.

Significant improvements in health, education, reducing population growth rate, gender parity in school enrollment rates have been achieved in the recent years. The infant mortality has reduced by half in the past decade a faster rate than any other country.

The nongovernmental organizations (NGOs) are the most active, and successive governments have developed effective partnerships with them to improve services - such as micro-credit, non-formal education and assistance with social mobilization - in particular to the poorest people.

Since independence, the efforts of Government, NGOs and donor organizations had succeeded in creating a "water miracle" that has often been highlighted as a global success. Taking advantage of the shallow water aquifers, and aided by a public sector campaign encouraging people to shift from surface water to ground sources, the introduction of shallow tube-wells enabled 97% of rural households access to clean, drinking water. The tube-wells produced by the private sector and purchased directly by households created, perhaps, the largest private sector supported (safe) drinking water program in South Asia. The arsenic contamination, however, is threatening to undo this success. Unless household level filtering systems or alternatives become affordable and convenient to use, and preferably easy to link to the shallow tube-wells, the "water miracle" may well be reversed.

The Government objectives for the sector are to improve the health status of the population and the environment through improved access to safe water and sanitation facilities. In line with this, United Nations Fund for Children (UNICEF), jointly with the Government of Bangladesh (GoB), formulated and implemented a number of rural water supply and sanitation programs (RWSSP) from 1972 and up to the present. Local government authorities, NGOs and the private sector have been actively involved in the implementation activities.

The statutory responsibility for water supply and sanitation (WSS) is vested in the Ministry of Local Government, Rural Development and Co-operatives (MLGRD&C). The ministry is responsible for policy formulation and preparation of budgets for the physical infrastructure of WSS as well as drainage and solid waste management. The related important issues such as water resources management, and general health are responsibilities of Ministry of Water Resources (MoWR), and Ministry of Health (MoH), respectively.

Promotion of health, however, is seen as an integrated part of WSS. The functional responsibility of WSS is delegated to the Department of Public Health Engineering (DPHE) under MLGRD&C in all rural and urban areas except Dhaka and Chittagong cities. The responsibility includes planning, design and construction of water supply and sanitation services. Consumers/users in rural areas are contributing to the investment cost of water supply installations and are covering most of the investment cost for sanitation and all operation and maintenance costs in relation to WSS.

Considerable donor support has been given to the sector. The main development partners are UNICEF, WHO, UNDP-World Bank, Denmark, Switzerland, Islamic Development Bank, and NGOs.

With regard to the Rural Water Supply Sanitation Projects the Danish Government through Danida and the Swiss Government through Swiss Agency for Development and Co-operation (SDC) have been the largest contributors. Also GoB and UNICEF have provided funding. The total investment in the sector during 1972-97 is estimated at US\$ 175 million, of which Danida and SDC account for approximately 23 percent and 18 percent, respectively. In recent years however, the GoB has become, through its National Program - GoB-4 - the most important single source of finance for rural WSS (Danida, 1999).

## The Project

The GoB, Danida and SDC carried out a joint mission in rural water supply and sanitation sector in 1996. The mission pointed out some areas in the sector where improvements were necessary. These include:

- Genuine participation of the user communities through representative committees;
- Development of affordable hand pumps for deep water table areas;
- Active promotion of products through private sector;
- Behavioral change education through health and hygiene practice; and
- Institutional Development and partnership with all stakeholders involved in the sector.

The WatSan Partnership Project started in February 1998 and is based on the SDC report "New Concepts for a Partnership in Rural Water Supply and Sanitation for the Low Water Table Areas of Bangladesh" of July 1997. The new concept emphasized on a participatory project design based on the following components and main activities:

- A marketing strategy and plan for selected water and sanitation facilities would be developed and tested by specialized marketing agencies. One of the key complementary measures would include subsidy reductions by both government and NGOs.
- Intermediary organizations such as NGOs and local government bodies would be strengthened through networking, promotion and advocacy for the project purposes. This would be complemented with the promotion and provision of application-friendly training packages to be developed by experts in sector specific "weakness" such as (i) social mobilization for sanitation, (ii) hygiene behavior development, (iii) local and village level organization, and (iv) enhanced use of existing and credit and savings programs for the project purpose.
- Through participatory research and development, low cost options of hardware, namely LWT handpumps and latrine parts, would be further developed and marketed. Total cost recovery of hardware would be central, but linked to the availability of low cost options.
- Special emphasis would be put on the policy dialogue through creation of specific platforms that would contribute to enhance a more concentrated policymaking among a wider range of government and non-government stakeholders (SDC, 1997).

The new concept recognized three key principles of the project. These are:

- Water and sanitation facilities are both considered to have social and economic dimensions.
- Users are the main players; all other partners have to act as supporters and facilitators to empower the users.
- All players in the sector contribute to a collaborative partnership of optimal functioning and avoidance of effort duplication (SDC, 1997).

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The project was formulated for a period of 3 (three) years starting from January 1999 - December 2001 to create a sustainable access to water and sanitation facilities in two Northwestern districts of Bangladesh.

The WPP contains the following main components:

- Mobilization of village based organizations to the extent they become development partners of governmental and non-governmental agencies alike.
- Development of affordable technology in the fields of drinking water supply.
- Health education to children and adults aiming at behavioral changes related to hygiene improvement.
- Team and partnership development between implementing and supporting organizations.
- Experimentation with new methods and products relevant to the Water and Sanitation (WATSAN) developments in the project areas; and
- Provision of processes and products developed in the Project to national programs.

The project followed a flexible planning approach, leaving capacity for the integration of new activities during the project phase. It has pursued a demand-oriented approach. Concept wise the project started a three-pronged approach comprising "community organization", "community managed hygiene behavior changes" and "marketing of appropriate low cost Watsan technology options".

WPP is active on the micro-, meso-, and macro-levels (eg. Village, thana/district, national policy dialogue). All partners reinforce their capacities, participate actively and maintain the actual dynamism of project implementation to reach improved efficiency and effectiveness.

The Arsenic contamination in groundwater in Bangladesh emerged as a serious problem that has led to adaptation of arsenic oriented activities. WPP has been trying to develop few low cost technologies that can make a positive impact on improved water supply (specially quality) and arsenic mitigation.

The declining water table phenomenon combining the problem of groundwater pollution by arsenic is the major challenges to face the crisis in the sector.

The project has been extended for another two years period (2002-2003). The focus of the phase is to complete of unfinished activities of WPP and Arsenic program in the two districts.

## The Partners

The implementation of the Project is facilitated by three International NGOs to whom specific project components have been assigned in their respective specialized fields of comparative advantage. The three NGOs are: CARE-Bangladesh, Development Association for Self-reliance, Communication and Health (DASCOH), and International Development Enterprise (IDE). They are expected to develop their efforts in a team with partnership spirit to produce the best possible convergence of benefits stemming from the diversity of the organizations.

The project has partnership network with 15 local NGOs based in two districts of Rajshahi and Chapai Nawabganj. The main functions of these NGO partners in WPP are facilitation of the project activities at the community level. The responsibilities of project management and facilitation have been gradually shifting from the international to local partners.

The 640 Village Development Committees (VDCs) are the partners at the village level. They are the institutions that carryout the project activities at village level. Through VDCs, the villagers formulate their needs and their demand at the village level, promote and monitor WatSan activities and mobilize local resources for buying non-subsidized but affordable handpumps (arsenic free areas) and sanitary latrines. They are partners as well as beneficiaries in the project.

A private sector network of producers, wholesalers, retailers and mechanics is instrumental to make available products and services needed to meet the demand of the villagers, private persons and the NGO sector. The members of the private sector are partners as well as beneficiaries of the project.

The government institutions i.e. Union Parishads have been included earlier as partners for sector relevant information, promotion, services etc. However, due to the changed scenario of arsenic problem, their roles have been prolonged as the key role players in the coordination of all arsenic related activities at the union and ward level. They have become the active partner of the project.

The ministry of health and family welfare is also the project partner to improve the hygiene behavior change programming. The skills of the field level staffs has been improved in delivering the hygiene education message with an objective in making the program sustainable by utilizing the existing infrastructure of GoB.

The project also has close coordination with the line organization DPHE and local (upazilla and district) administration for different project activities specifically in the arsenic program.

The project has been also benefited by the different back stoppers in the technological development and marketing approach. The major back stoppers are Handpump Technology Network (HTN), Swiss Center for Development Cooperation in Technology and Management (SKAT) and Swiss Federal Institute for Environmental Science & Technology (EAWAG/SANDEC).

The project has two action researches piloting with the NGO Forum for Drinking Water Supply and Sanitation and the Water and Sanitation Program (WSP) of the World Bank.

The project considers different working forces involved in a village, which plays an important role in the development of a village. The Figure - 2 highlights the key actors involved in a village.

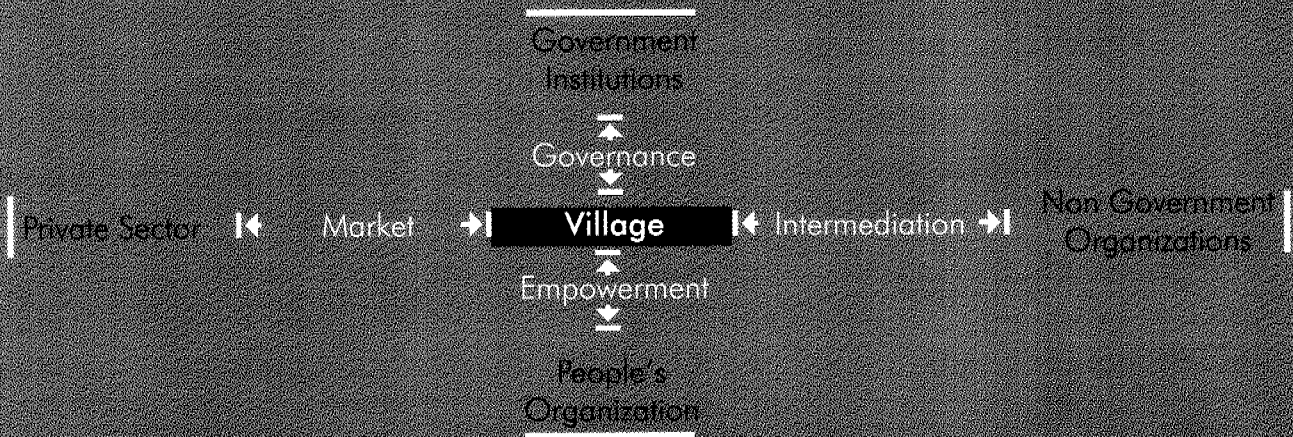


Figure - 2: Different groups involved in a village

The project is managed through a Project Management Unit (PMU), employed by the SDC, Dhaka. PMU is responsible for the coordination and management of activities taken by WPP. PMU has designed and managed the arsenic program. It has coordinated the laboratory activities and provided the necessary technical support in water and sanitation sector. The simplified structure of the project management is shown Figure-3.

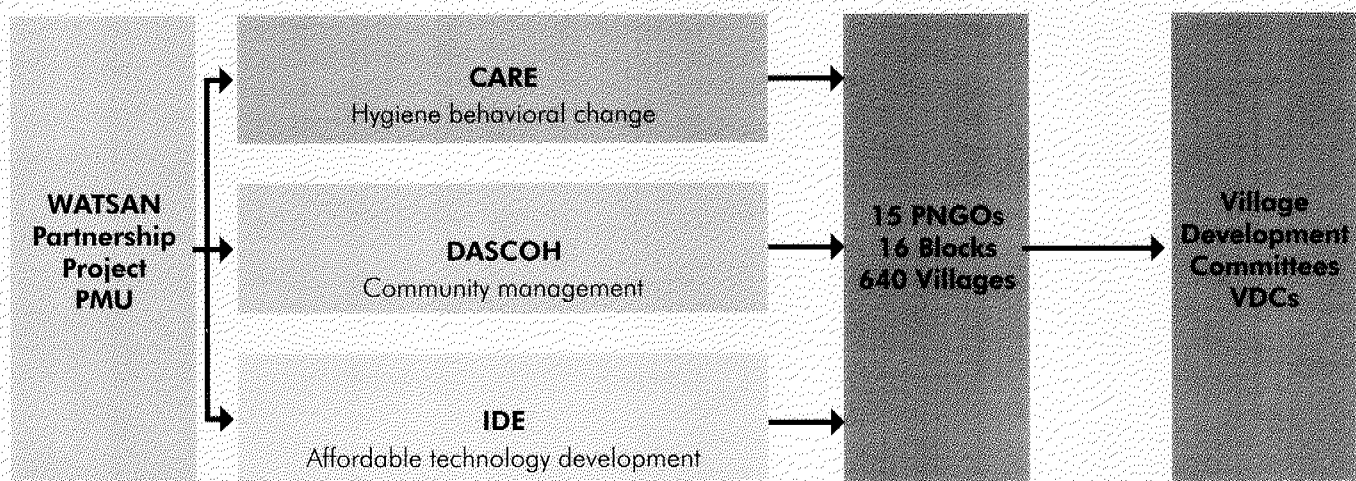


Figure - 3: Project Management Structure

## Community Management

Community management means that communities have the capacity and are in charge for management of their development activities. To increase this self-help capacity the highest level of participation is required. Participation is an instrument in the promotion of ideological or normative development goals such as social justice, equality and democracy. It is interpreted as a means to efficiency in project management. The objective of the community management component of the WPP is to achieve the self-help capacity of the community organizations, whereby people are no longer dependent on the benevolence or assistance of third parties to secure individual or common interests.

DASCOH has acted as the facilitators of the community management approach and developed a series of promotional tools as part of the community management promotion process. The partner NGOs have been assigned to work directly with the community by facilitating in the formation of the Village Development Committee (VDC).

The VDC is the institutional framework for individuals or households of a village who have agreed to cooperate on a continuing basis in order to pursue their objectives. It is a membership organization, which implies that the organizational risks, costs and benefits are shared amongst its members on a fair and reasonable basis. It also implies that VDC members are liable to be called to account by the villagers for the actions and decisions taken.

The project approach is based on the belief that people are capable of improving their condition if the circumstances and opportunities allow them. To create the right circumstances, and to create opportunities, carefully identified groups are supported to increase their self-help capacity. The criteria of VDC members are shown in Figure - 4.

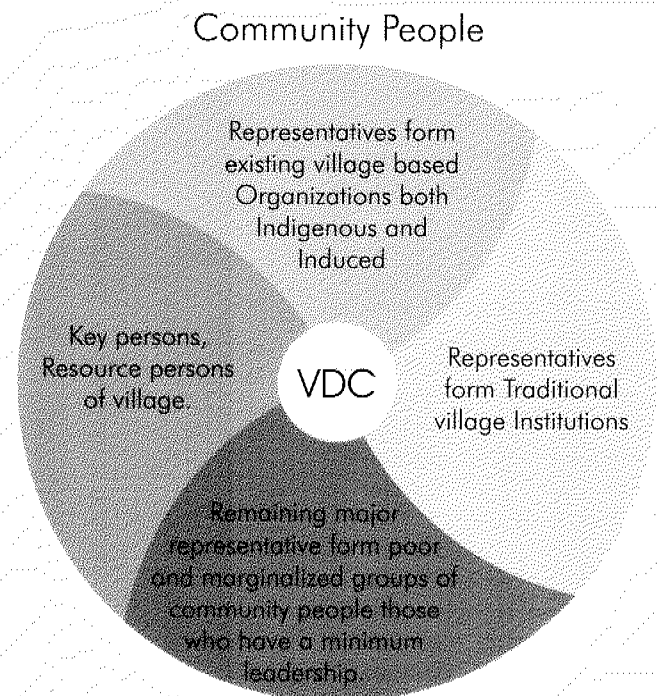


Figure - 4: Criteria of Selecting VDC Members

The project facilitates the gradual increase of the level of participation of community organization through capacity building exercise. The process can be divided into two major parts. Firstly, WPP has practiced interactive participation: VDCs have been involved in analysis, needs assessment and planning, and have a stake in maintaining their structure and practices. Secondly, VDCs are supported to reach the highest level of participation called self-mobilization: VDCs are supposed to take initiatives independent of outsiders and are in control of the process cycle. A schematic diagram of the process leading to community management is shown in Figure - 5.

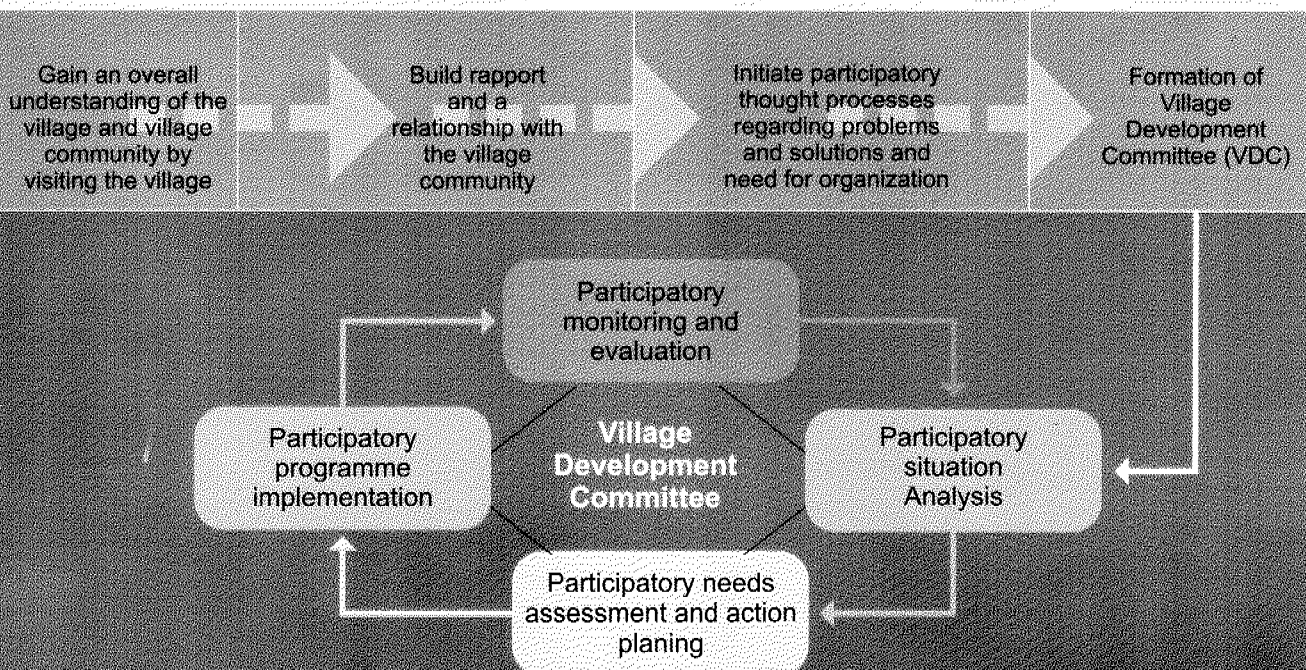


Figure - 5: Process Leading to Community Management

The VDCs have gained the momentum and do conceive themselves as integrated development organizations for the betterment of the village. All the VDCs are operating bank account, conducting monthly progress meeting, arranging village action planning & evaluation, organizing and participating different social and income generating activities. They have been linked-up with the exiting extension services and organizations and started in participating in different activities especially national immunization days.

DASCOH and the partner NGOs have facilitated the capacity building of the VDCs through inter-linkage of various departments and NGOs on livestock, fishery, poultry, children/adult education, woman legal rights, nursery development, disaster awareness etc.

The project has planed to support different VDCs as per their requirement to make them as self-help organizations. The capacity and the performance of the VDCs have been judged by the twelve selective criteria. The criteria are shown in Box-1.

Criteria 1:	Level of organization of the VDC
Criteria 2:	Values and beliefs
Criteria 3:	Long-term motivation
Criteria 4:	Management capacity
Criteria 5:	Participatory assessment and planning
Criteria 6:	Implementation capacity
Criteria 7:	Monitoring, evaluation and action
Criteria 8:	Resource mobilization
Criteria 9:	Resource provision
Criteria 10:	To share and to generate knowledge
Criteria 11:	Mutual linkage building
Criteria 12:	Process initiation and movement building

Box - 1: Criteria for VDC Assessment (DASCOH, 2002)

All the criteria are not provided the same weight. Those have been classified into three groups: Most important (criteria 1, 4, 6, 8, 11), Medium important (criteria 3, 5, 7) and Normal important (2, 9, 10, 12).

The scores have been converted into three final grades:

A (score > 80%): VDC is usually capable, no weak areas in need of additional support.

B (score 51 - 79%): VDC is not fully capable and needs support in some specific areas.

C (score < 50%): VDC is less capable and need additional support from PNGOs. The VDCs assessment have been carried out in July-August, 2002 and the results are shown in Table: 1.

Table -1: VDC's Status

Grade	Percentage
A	10.40%
B	71.35%
C	58.18%

## Hygiene Behavior Change

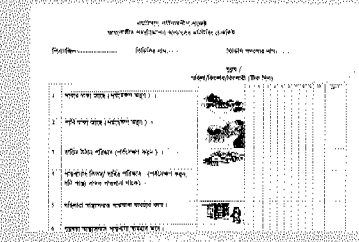
Behavioral change is essential and requires major efforts in any water supply and sanitation project. The energies of all parties need to be harnessed to promote and support changes in household hygiene behavior to achieve a cleaner and healthier lives. Hygiene behavior change is an important project component where all activities have been aimed at encouraging behavior and conditions in preventing water and sanitation-related diseases. Within the broader context of the partnership in WPP the mandate of CARE is to bring about behavioral change through promotion of hygiene and sanitation; and capacity building of PNGOs, VDCs and local counterparts of MoHFW in promotion of hygiene and sanitation.

The MoHFW of the GoB is the primary provider of health services and have an extended network of outreach system. The MoHFW has different field staffs- Sanitary Inspector, Health Assistant, Family Welfare Assistant etc. Despite the good track records in the areas of Expanded Program on Immunization (EPI) and Family Planning, the MoHFW counterparts in the areas of water, sanitation and hygiene were not unfortunately active enough. The project has facilitated the skill development of the MoHFW field staffs to best utilize the existing infrastructure of GoB to cover larger area and to follow a sustainable approach in hygiene behavior change. Besides the skill development of the MoHFW counterpart, the project facilitated the capacity building of the partner NGOs and VDCs by providing technical assistance and joint work plan.

The process of sanitation and hygiene promotion has started with a participatory training needs assessment at different levels. An ethnographic study has complemented the needs assessment. CARE-WPP has prepared six training modules for different levels.

The earlier promotional materials underwent changes in response to inputs from field tests. The messages are simple and presented in flash cards, games, songs, stories or participatory action learning (PAL). The emphasis is on behaviors that impact health most. The approach has followed a multi-channel dissemination involving child-to-child, adolescent, adults, men and women, village leaders such as imams and teachers, gamvira (folk drama), jarigan (folk songs) and video shows. The Figure - 6 shows the channels followed in message dissemination.

# Multiple Channel Dissemination



**Involving Key community person**  
 Imam, school teacher,  
 TBA, village doctor,  
 kabiraj etc.

Figure - 6: Multiple Channels of Dissemination

The hygiene behavior change process has started with the training of the CARE field staffs, which in turn facilitated the capacity building of PNGO staffs and MoHFW field staffs through training and on job orientation. The PNGOs has trained selected VDC members as facilitators to conduct tea-stall sessions, courtyard sessions and other related activities. The project field facilitators (FF) closely supervised and monitored the initial training and sessions PNGOs, MoHFW and VDCs conducted. The implementation strategy of hygiene behavior change can be shown as Figure - 7.

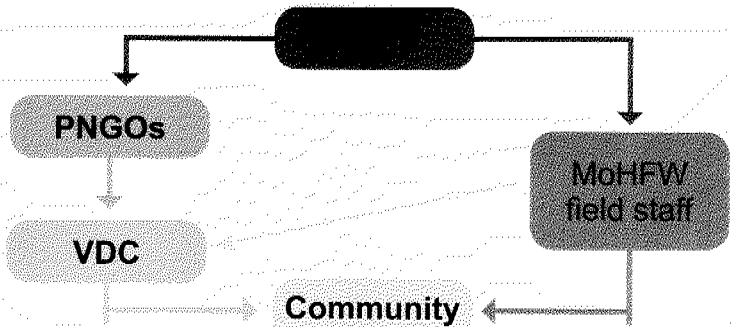


Figure - 7: Implementation Strategy of HBC program

The adolescent girls and boys have played an important role in the process of hygiene behavior change and conducted the periodic participatory monitoring and evaluation on hygiene behavior change indicators.

The monitoring results show some significant improvement in hygiene behavior change. In 2002 92% of the households have covered food; 82% have covered water pots; 84% have kept homestead clean and 68% have kept their latrines clean compared to 62%, 55%, 36% and 20% respectively in 1999. Fixed places for defecation of children have increased from 8% in 1999 to 44% in 2002. For some of the behavioral changes baseline information has not been available but in 2002 hand washing with soap or ash after defecation has been over 60% among both males and females(CARE, 2003). The above information is shown graphically in Figure - 8.

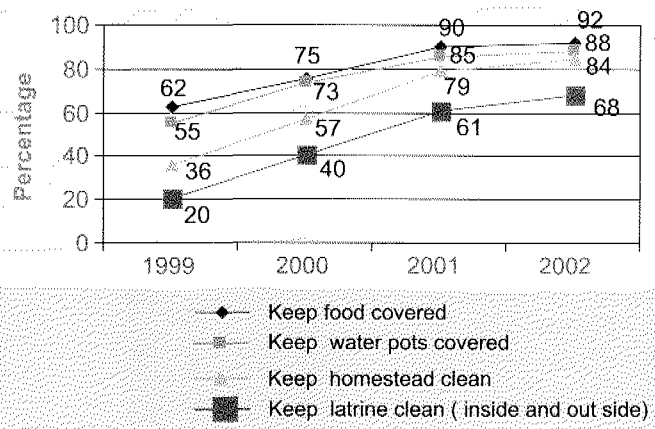


Figure - 8: Trend of Hygiene Behavior Change

## Affordable Technology Development and Marketing Promotion

There is a distinct dry season in Bangladesh, when temperatures are high, precipitation very low, demand for irrigation water high, surface water flow reduces considerably. Resultant impact lowers the groundwater table and seasonal crisis affects the millions of people. The project area is a part of the low water table areas of Bangladesh.

After 1981, gradual expansion of low water table area led to development of deep-set handpump. A direct action Tara handpump tubewell was developed to lift after at depth of up to 12 meters.



During 1993-97, the Danida funded DPHE Handpump Training and Monitoring Project (HTMP) was implemented with technical assistance from UNDP/WB Water and Sanitation Program. The HTMP revealed that the main problem was the non-availability of complete Tara handpumps in the open market. The technical problems were identified as water in pump rod, lever handles were preferred by women users and quality assurance of materials and design dimension (Motaleb et. al., 2000).

To meet the demand of a low cost pump and at an affordable price, the affordable technology development and private sector marketing promotion component has been designed and planned. The IDE has been given responsibility to facilitate this component considering significant success in marketing low-cost irrigation handpump (Tradle pump).

### Jibon development

In 1997, the Jibon deep-set pump was developed based on the Goals, Approach and criteria.

<b>Goals:</b>	Price range US\$ 70--100, Provision at Household and Community
<b>Approach:</b>	Customer Driven [Not the recipient of Charity]
<b>Criteria:</b>	Low cost, Affordable, Easy Installation and O&M, Readily available, User friendly, Efficient

The following organizations were involved in the developed of the above mentioned goal, approach and criteria.

- Swiss Agency for Development and Cooperation (SDC)
- SKAT/HTN Handpump Training Networks
- Mirpur Agricultural Workshop Training School (MAWTS)
- United Nations Children Fund (UNICEF)
- International Development Enterprises (IDE)
- Local Manufacturers

In August 1997 the first pump drawings were ready and at the end of 1997 the first batch of pumps were installed. Since that time many experiments have been made and fine-tuning of the pumps have brought the Jibon Deepset pump to the current standard. The Figure - 9 explains the partners involved in different stages of the Jibon pump.

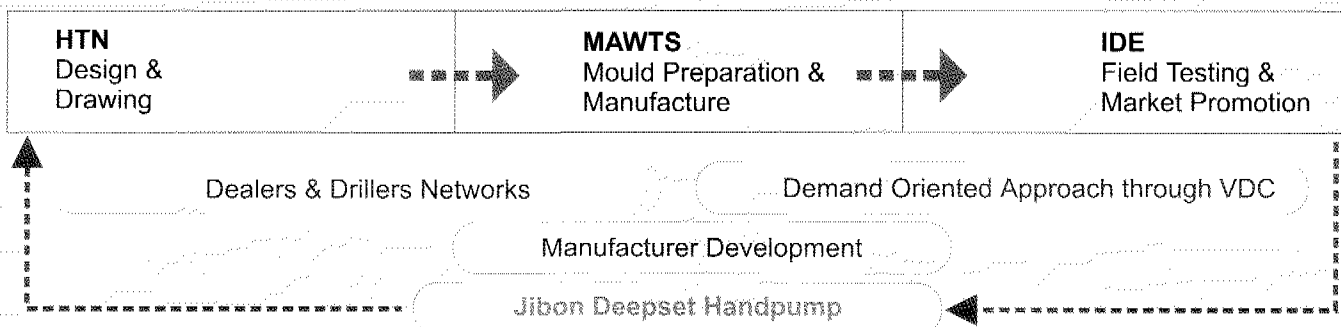


Figure - 9: Partners involved in Jibon Pump

### Jibon specification

The Jibon deepset handpump specification contained a full product definition including:

- manufacturing processes and inspection;
- requirements for compliances with international standards;
- assembly and part drawings including parts list;

The specification document covered scope, nomenclature, drawing summary, standard parts, design options, general requirements, anti-corrosion treatment, testing, guarantee, marking, supporting documents and engineering drawings. The specification intended to assist all users of Jibon, but primarily aimed at purchasers, manufacturers and inspectors. The project has built-up a private marketing network within WPP area. It has identified and trained 5 pump producers including 1 at Rajshahi. Eventually, with a supply chain established and market promotion done, there was an increasing trend of demand for the pump. The project has promoted the pump with a subsidy, which gradually has been withdrawn in January 2000. The private sector started selling pumps at market price. All of the 1215 JIBON pumps installed in the project area have been arsenic tested and by applying the WPP tubewell sinking policy. However, the emphasis on promoting the Jibon pump has been slowed down in mid 2000 due to the consequence of arsenic contamination.

Besides pump marketing, the project also introduced low cost drip irrigation system (DIS) as a complementary income generating technology in the project area. Different kinds of training and workshops were organized at INGO, PNGO, VDC, and supply chain levels with a view to creating awareness, building up capacities in terms of production, distribution, installation, usage, repair and maintenance, access to information and sources of supply, etc. Linkages have been established with relevant Local Government Engineering Department (LGED), NGOs, VDCs and private sector stakeholders.

## Arsenic Program

Arsenic was first detected in the groundwater of Bangladesh in 1993. Since then it has created the single most problem in the access of safe water supply especially in the rural areas. Estimation shows that over 30 million people are likely affected by the arsenic contamination in groundwater. The tasks of arsenic mitigation and exploring alternative arsenic-safe water source of drinking water was given responsibility to the Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP), which SDC co-funds with the GoB and the World Bank. Arsenic awareness was a small part in the initial project design of the WPP. However, the progress of the BAMWSP was not as expected, which has created a strong demand at the field level for arsenic screening. To address the field demand, SDC has changed its focus in mid 2000 and concentrated absolutely on addressing the arsenic issue within the project area. The three-pronged approach comprising 'community organization', 'community managed hygiene behavior changes' and 'marketing and development of affordable technology options' merged into a single, unified approach of arsenic screening and mitigation.

The objectives of the WPP Arsenic Program is to create general awareness on arsenic issues, testing all the operational groundwater sources, identify the arsenicosis patients, provide support for emergency mitigation (treatment and safe water), capacity building of the community for arsenic testing, community action planning and self monitoring in its 640 VDCs working area. The WPP has followed a flexible approach in designing the arsenic program. After the detail consultations with the partners, a strategy has been formulated and tested in 16 villages. After reviewing the feedbacks, the program design has been strengthened to overcome the gaps/weakness. Seven areas have been given priority in designing the arsenic program. These are: i) Training, ii) Monitoring and Quality Control, iii) Logistics, iv) Communication and Information Dissemination, v) Laboratory and Quality Control, vi) Data Management and vii) Mitigation.

The WPP Arsenic Program has established a sound procedure for screening and validation of results and sharing of results. The local government bodies have been involved and actively contributed in the arsenic issue through regular coordination meeting and supervising the program at the field level. The local administration at upazilla and district are closely coordinated with the progress of the program. The VDCs and villagers actively participate in the process. A three members team of potential villagers whom VDCs have identified and trained by PNGOs has carried out the screening and survey. Other activities such as building awareness on arsenic, identifying arsenicosis patient, publicity materials, training have successfully completed. The project has oriented the local journalists on the different perspectives of the arsenic issue to utilize properly the local media in creating awareness among the people. The project also has trained the Medical Officers of the Upazilla Health Complex for the management of the arsenicosis patients.

The Figure 9 and Figure 10 respectively show the community action planning and screening activities.

Figure - 9: Community Action Planning

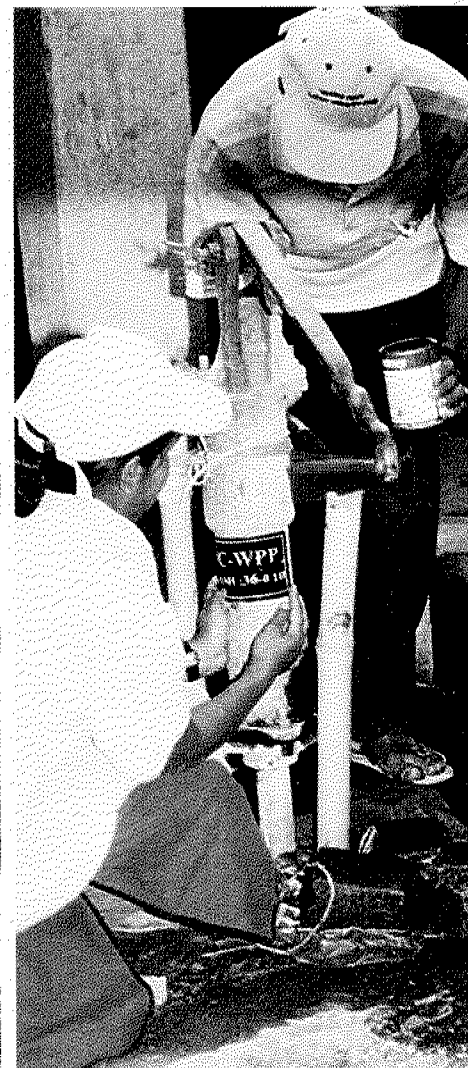
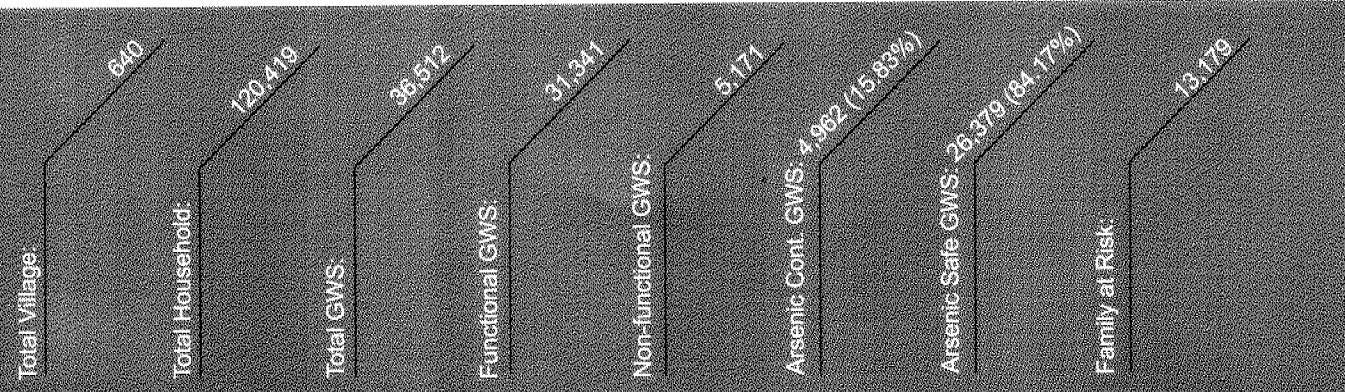


Figure 10:  
Arsenic Screening (marking handpumps)

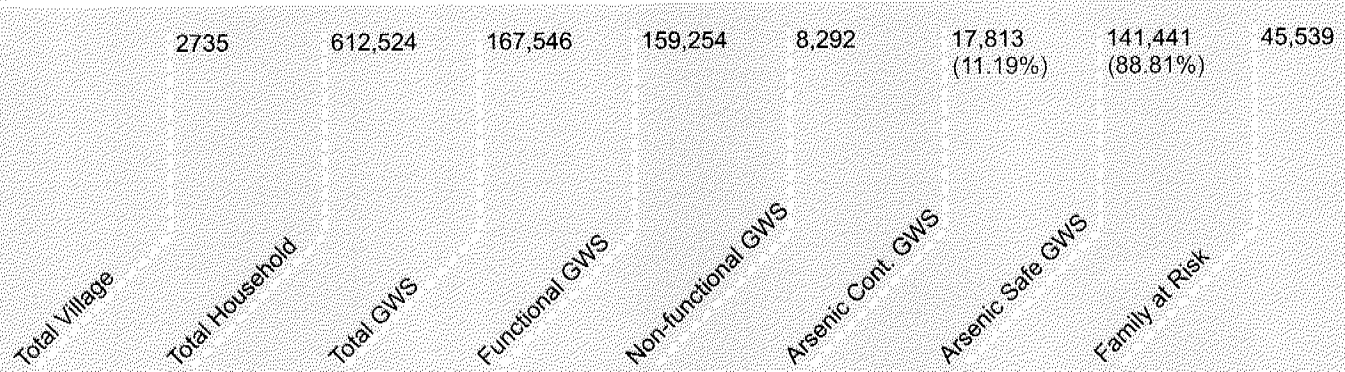
The summary result of the Arsenic Program in 640 VDC working area is shown in Box - 2.



Box - 2: Arsenic Result of 1st Phase

The success in the Arsenic Program in 640 VDCs areas created the demand of arsenic screening in the neighboring villages of the two working districts. There is also a request from the local administration and BAMWSP to complete the total two districts. Under this situation, SDC in consultation with the partners has extended the scope of arsenic screening in whole two districts.

In the second phase, the three international NGOs divided the working area geographically and applied the earlier approach with more institutional role of the local government. Up to May 2003, the project has completed the arsenic screening in villages and the summary result is presented in Box - 3.



Box - 3: Arsenic Result of 2nd Phase

## Action Research

The arsenic contaminated in the groundwater has challenged the total water supply sector in the Bangladesh. The achievements made over last two decades are now under questionable due to detection of arsenic in the shallow handpumps. The screening of the groundwater sources created the demand of safe source for drinking water in two terms- emergency mitigation and long term sustainable solutions. The easiest alternative as the emergency mitigation options is source sharing i.e., use of 'green' marked (arsenic safe), if available in the nearby place. The long-term sustainable solution requires an affordable, technically sound and socially acceptable solution, which can compete the easiness of the handpumps.

To meet the challenge the arsenic program, WPP has taken different action researches. The mitigation technologies can be classified into three categories and different action researches have been carried out under those categories.

The action research principles of the project are to test potential technologies first at the laboratory scale. If the water quality results satisfy the requirements, then it is recommended for the field-testing. The technologies are recommended for the field application based on the field-testing result.

Besides, the project has started an extensive piloting with the NGO Forum on the rainwater harvesting system as an alternative to the arsenic contaminated water.

The project also has undertaken a piloting on rural piped water supply scheme in collaboration with the Water and Sanitation Program of the World Bank.

### Alternative Options:

- Rainwater Harvesting
- Dug-wells (open, handpump, rope-pump)

### Arsenic Removal Technologies:

- Three-pitcher filter
- Shapla filter
- Alcan Filter
- Bucket Treatment Unit
- Shafi Filter
- SORAS

### Bacteria Removal Technologies:

- Terra-Cotta Filter
- SODIS

### Piloting

- Rural Piped Water Supply

**Rainwater Harvesting:** Rainwater harvesting and storage do not constitute a new technology. It has been used for domestic, agricultural, runoff control, air-conditioning etc. for a long time in different parts of the world. However, rainwater harvesting is not a common practice in Bangladesh. In the backdrop of arsenic contamination in groundwater of Bangladesh, rainwater has been considered as a potential source of arsenic free water. Storage tanks with different design and materials have been considered to make it affordable for the rural communities of Bangladesh. Social acceptability, routine water quality monitoring and private sector development are the other key areas.

**Dug-wells:** The dug-well was an indigenous source of drinking water in many parts of Bangladesh prior to the 1970s. When installation of hand tube-wells started off at a large scale during 1970s, the once so-called safe source of drinking water 'the dug-well' condemned to disuse for causing water borne diseases such as diarrhea. As a result, most of the dug-wells were then abandoned. However, the different study reported the very shallow layers from where the groundwater is being extracted are mostly arsenic safe. It has created an opportunity to study the water quality of the dug-wells with different water abstraction designs.

**Three-pitcher Filter:** It is a filtering method consists of three pitchers stacked on top of each other firmly placed in a mild-steel or in a wooden frame. The system uses metallic iron (zero valent) fillings, sand, brick chips, and charcoal (wood coke) as the key ingredients for removing arsenic and other trace metals from contaminated drinking water. Raw water is placed in the top pitcher and arsenic safe water is collected in the bottom pitcher after water has passed through the second pitcher.

**Shapla Filter:** It is a household type arsenic removal filter unit that is manufactured at the local market using available technology and ingredients. The key ingredient of the filter media is iron-coated brick chips prepared by treating with ferrous sulphate solution. The filter device itself is a burnt earth pot of capacity of around 20 L. The filter has been developed and promoted by International Development Enterprises (IDE), Bangladesh, one of the INGO partners in WPP.

**Alcan Filter:** The Alcan is primarily a household-based filter medium that filters out arsenic and other undesired compounds from drinking water. The filter has been developed by MAGC Company of Canada and imported in Bangladesh by a private company. The filter has two compartments, made up of plastic buckets, the top one, which is connected through a plastic pipe with the bottom one, contains the filter medium and the lower bucket contains treated water.

**Bucket Treatment Unit:** The Two Bucket Unit (TBU) is a household based arsenic removal unit that works on the principle of coagulation-adsorption and co-precipitation process. It consists of two buckets, each of 24 L of capacity, placed one top of the other. The DPHE-Danida Arsenic Mitigation Pilot Project has introduced the technology.

**Safi Filter:** The Safi Filter, named after its inventor Professor Sayed Safiullah of Jahangirnagar University. The Safi Filter is a household type candle filter of standard (water holding capacity 20-22 Liters) and small (water holding capacity 10-12 Liters) size. The candle is made up of composite porous materials such as kaolinite and iron oxide on which hydrated ferric hydroxide is impregnated by sequential chemical and heat treatment.

**SORAS:** It is a low-cost arsenic removal method that uses sunlight and few drops of lemon juice to treat iron-laden arsenic containing water in a 1.5L PET or other UV-A transparent bottles. The action research was carried out in collaboration with SANDEC-EAWAG, Switzerland. SORAS removes arsenic in a two-step procedure. In the first step, arsenic (III), which only weakly absorbs to iron hydroxides, is oxidized in the presence of sunlight to strongly absorbing arsenic (V). In the second step, arsenic (V) is absorbed onto iron (III) hydroxide particles formed from naturally occurring iron.

**Terra-Cotta Filter:** 'Terracotta', meaning 'made of earth', filter was invented and developed in Orissa, India in order to treat surface waters for pathogen free drinking water supply in rural areas. This is a low cost technology made of ordinary pottery silt clay, sand and sawdust. The filter can be fitted into any water pot either metallic or non-metallic chambers, buckets etc., depending on the availability of them in local markets.

**SODIS:** It is a low cost water treatment method to improve the microbiological quality of drinking water at household level. In this process, PET plastic bottles are filled with contaminated water and exposed to sunlight for a day.

**Rural Piped Water Supply:** A piped water supply system having the safe source either from underground or treated surface water with a distribution network to provide easy access to users/consumer. This piped water supply has the advantage in the provision of water supply over the handpump tubewell but have a challenge to manage efficiently with community contribution.

## Program Design

**Impacts:** The overall objective of the WPP is to improve users sustainable access and use of affordable arsenic safe water (arsenic and bacteriological) and sanitation facilities and services. The project is to implement and test strategic orientations of demand driven and partnership options to improve users sustainable access and use (hygiene behavior) of affordable water and sanitation facilities and services. The complex design of the project with the risk of high user contribution for water and sanitation services has affected the project goals. The ultimate goal for improving sustainable access and use of safe water and sanitation has not realistically achieved due arsenic problem. The major impact at the community level has been achieved as great awareness regarding the safe water, general hygiene, arsenic contamination in groundwater sources and several mitigation measures. The total sanitation approach with initiative taken by the VDC with the contribution of the project partners, private and public sector participation has been successfully achieved to cover more than 100 village 100% sanitation. This progress of sanitation has been praised and well recognized for health impact and as protecting the freshwater resources for domestic use facing the challenge of arsenic pollution in groundwater.

**Lessons:** The WPP design has a unique characteristic of adaptive change as per field demand. The arsenic screening and mitigation, the total sanitation approach for 100% sanitation village is not precisely included in the project activities. But as per field demand, these activities have been carried out successfully. The participatory process have encouraged and enhanced the confidence among the villagers as the experiences and knowledge remain with them.

## Partnership

**Impacts:** WPP has brought together three INGOs [CARE, DASCOH and IDE] each with diverse expertise and administrative culture into a partnership to work in unison and advance the cause of development. Despite flaws the partnership has worked well and has been at its best in arsenic screening and mitigation. Partnership based on one proposal as in addressing arsenic has brought in greater ownership than ever before. This is an example for similar initiatives in future. The partnership has developed village organizations and demonstrated innovative ways of bringing people into the mainstream of development as active partners. The experience offers many lessons. Formal and informal micro-macro linkages are essential for sustainability of village level organizations. Physical achievement and products aside, WPP leaves behind an innovative people-centered approach to local development. The skill and competence at VDC, PNGO and among tube well mechanics; masons and people are there to remain in project area.

**Lessons:** The consolidation of an institutional partnership that includes non-governmental organization (NGO), community based organization (CBO), local government and private sector to achieve synergies has been commendable but it requires great coordination and management effort and conflict remediation.

## Community Management

**Impacts:** Community management is essential in a client-centred development initiative such as the WPP. Probably the most important area of the project inputs is its support in the formation and development of community organisation, the VDCs. This support is through the PNGOs that need organisational and staff development training. From the initial nine PRA sessions prior to forming a VDC, WPP can now form a VDC after only four sessions. The reduction in the number of PRA sessions has crucial implications on scaling-up of the WPP model for development. Organisations or programs in search of workable development models will find four instead of nine PRA sessions more acceptable. WPP also prepares and publishes manuals that describe the community mobilisation process. These manuals will be important in future scaling-up of the community-based model of development. The evaluation of the VDCs and the PNGOs, has showed positive results. The comparative study has been carried out with other similar type of people's organization projects has revealed that WPP is cost effective. Community mobilization has contributed significantly to the development of water and sanitation services, but the sustainability of VDC still a question?

**Lessons:** The approach is pre-dominantly non-governmental organization (NGO) driven and needs continuous support. Formal and informal micro-macro linkages are essential for the sustainability of the village level organizations. Future people centered development must consider and proactively seek linkages of village groups with permanent entities such as local government institutions and government agencies.

## Hygiene Behavior change (HBC)

**Impacts:** The HBC component has by and large met its objectives. It has built on the community management component of WPP in promoting sanitation and hygiene and creating awareness on arsenic. WPP has met the physical targets and created the intended impact in the community. The most prominent impact of the WPP-CARE activities is the increase in the sanitation coverage in the project area. The number of latrines increased more than four-fold between 1999 and 2002. The pervasive cleanliness in the WPP villages when compared with the non-WPP villages is evident even to a casual observer. The villagers record a significant change in hygiene behavior in terms of covering food, water, washing hands after defecation, before meals and also in the use of safe water for domestic purposes. The capacity of PNGOs and VDCs in conducting hygiene behavior promotion sessions has perceptibly improved. The confidence and competence with which VDCs conduct the sessions are indicative of the improvement. The number of the sessions the local counterparts of the MoHFW have organized and conducted reflect the positive impact of the training and orientation sessions with them. WPP activities have resulted in a good rapport between the VDCs and local functionaries of the central government. This has provided the health workers an instrument to work with at the village level and has provided the VDCs a linkage to easily access health services. The HBC component also offer lessons that could be useful for development in general and specifically working with MoHFW counterparts provides a linkage between the informal VDCs and the formal government organizations. Similar linkages with union parishads, other government agencies like DPHE and local administration. Significant improvement has been made in capacity building to deliver quality hygiene education with concentrated efforts.

**Lessons:** Intensive and continuous effort are required for behavioural change in the community. Public-Private- NGO sectors have important roles to play in capacity building in the community and to implement hygiene behavior promotion and sanitation program through social marketing and network building.

## Affordable Technology Development and Marketing Promotion

**Impacts:** The skill and competence to deal with the WPP products at different levels are an indication of the impact this component of Affordable technology development and private sector promotion, the training sessions and workshops with manufacturers, dealers, tube well mechanics, caretakers VDCs and PNGOs. Installation, operation and maintenance of the Jibon pump, Drip Irrigation System (DIS), Rope pumps and RWHS pose no problem at the user level. The dealers are fully aware of the potential and limitations of the Jibon pump and the tube well mechanics are competent in installation and repair of the Jibon pumps. The skill of the tube well mechanics is commendable. The DIS can be locally installed given the availability of the essential components such as pipes and nipples. Local masons can build and fabricate Rainwater Harvesting System and the users have the competence to take care of the options. Local potters in Rajshahi are producing the containers for the Shapla Filters. The increase in demand for the Jibon and the Drip Irrigation System following its testing speak of the success of WPP market promotion and demand creation. The impact of the promotional effort has spread beyond WPP. DIS has contributed to the increase in income, albeit marginal, of the participating households. The concomitant withdrawal of support to Jibon pump and DIS, on the other hand, has almost wiped clean the gains in marketing of Jibon and development of the DIS in WPP. Evidence suggests that the withdrawal was too soon and too sudden. The market has not attained a dynamic equilibrium of demand and supply to consolidate and sustain the marketing network. The Rainwater Harvesting System, Rope Pump and the Shapla Filter are still at the testing stage. It is too early to draw conclusions but results so far are encouraging and bode well for the future. The introduced technology options are providing hope among people exposed to the risk of arsenic poisoning.

**Lessons:** A timeframe is required to attain a dynamic equilibrium of demand and supply to consolidated and sustained the marketing network. Quality water and sanitation products at affordable cost are essential for developing a strong market network.

## Arsenic Program

**Impacts:** The focus of arsenic program of WPP is more on screening than on mitigation. Major achievements have been made on screening of groundwater sources, awareness building and patient identification rather than mitigation. Arsenic mitigation options are alternate sources, arsenic treatment technologies and bacteriological treatment and finally with the provision of safe water through piping networks system. Active involvement of Village Development Committee (VDC) and Union Parishad are the main achievement in carrying out the program in effective and efficient way. The support provided by Upazila and District administration is also commendable.

**Lessons:** Strategic planning with proper facilitation for arsenic program is very useful supported by the Government Notification from the relevant ministry describing the importance and priority with guidelines for implementation. Community managed arsenic screening, patient identification and mitigation is effective and reliable to villagers. The process had enhanced the confidence among the

villagers as the experience and knowledge remains with the villagers and increased linkage building with formal local government institutions.

## Action Research

**Impacts:** The serious problem of arsenic contamination in groundwater has led WPP to change the focus on arsenic problems. With unique characteristic of adaptive change and demand responsive, the WPP has taken several action research activities on arsenic mitigation as per field needs. These action research activities are alternative option, arsenic and bacteriological treatment. These are further divided in short term emergency and long-term sustainable solution. A great effort has been provided in carrying out the action research activities with the establishing the complete laboratory and trained personnel. The action research activities have created a good understanding about the water quality aspect linking to health benefit. The acceptability levels of different technologies have been ascertained in a participatory way. The action researches also provide different options to the arsenic affected area and people can now choose the technology according to their need. Most of the technologies under the action research have some limitations in operation and maintenance, which need to be addressed with due care.

**Lessons:** Access of safe water in adequate quantity is a concern. Many filtering devices are not able to provide sufficient water as per user's requirement. The availability of quality reagents i.e., supply chain network development is essential. Some of the treatment technologies require quality chemicals/filtering media, which are not readily available at local market. This discourages the users to continue the treatment options. Again, there is no consistency in the saturation limit of filtering media. The dug-wells and rainwater harvesting also have the bacteriological contamination problem. It leads to routine monitoring of water quality for both treatment unit, dug-well and rainwater harvesting system.

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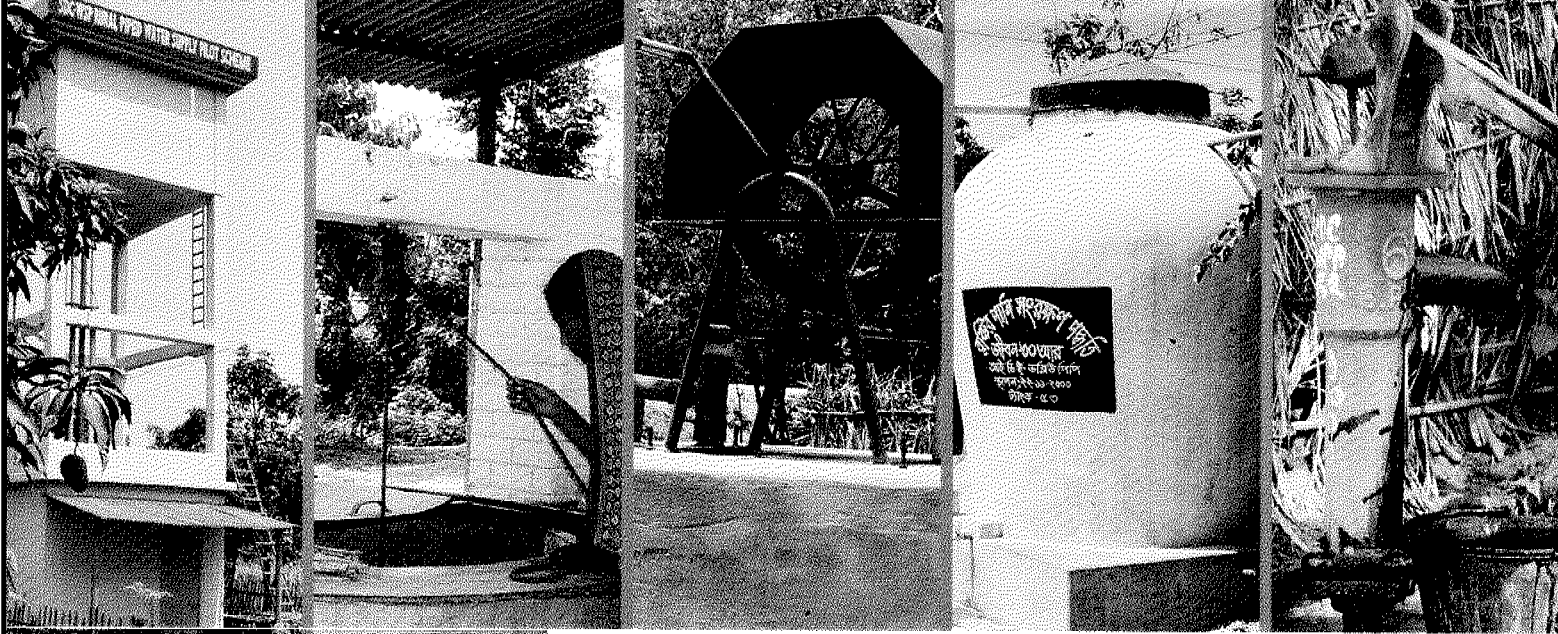
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