PROCEEDINGS OF THE WORKSHOP ON

WATER AND SANITATION PRIORITIES FOR THE 1990's

November 23-26, 1991

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Proceedings of the Workshop on

"WATER AND SANITATION PRIORITIES FOR THE 1990's"

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Cover photo: *The traditional practice of cleaning a child after defecation is a potential source of fecal contamination of hands and the environment.*

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A community meeting on hygiene education.

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Preface

The International Centre for Diarrhoeal Diseases Research (ICDDR,B) is an autonomous, non-profit making organization for research, education, training and clinical service.

ICDDR,B's mandate is to undertake and promote research on diarrhoeal diseases and the related subjects of nutrition and fertility, with the aim of preventing and controlling diarrhoeal diseases and improving health. The ICDDR,B has also been given the mandate to disseminate knowledge in these fields of research, to provide training to people of all nationalities and to collaborate with other institutions in its fields of research.

The Centre has its headquarters in Dhaka, the capital of Bangladesh, and operates a rural field station in the Matlab sub-district of Chandpur District. The Centre is organized into four scientific divisions: Community Health, Population Science and Extension, Clinical Sciences, and Laboratory Sciences. The Centre is funded by organizations and nations which share its concern for the health problems of developing countries.

The Community Health Division has been recently organized into five scientific interest groups according to major research activities; the Environmental Health Science group is one of these. The members of this inter-disciplinary group aim to work on environmental health problems, including descriptive and intervention studies, risk factor analysis, other applied research studies, promotion and dissemination of research findings, and provision of appropriate training. Organizing workshops is one of its activities. This was the group's first workshop and was meant to assist both them and fellow professionals in drawing up plans for applied research at the regional level.

Summary

The International Drinking Water Supply and Sanitation Decade (1981 - 90) has ended but the momentum created needs to be sustained to realize "Health for All by the year 2000". In order to design effective applied research plans through the next decade this workshop on "Water and Sanitation Priorities for the 1990's" was organized, with the following aims:

** To identify and prioritize the applied research needed to improve the health impact of water supply and sanitation (WSS) programmes in developing countries of the Asian region.

** To identify opportunities for collaboration in WSS applied research.

The workshop was held at Comilla, Bangladesh, November 23 - 26, 1991 and was conducted by the Environmental Health Sciences Group, Community Health Division, ICDDR,B and funded by the Swiss Development Corporation. There were participants from 11 countries: India, Bhutan, Myanmar, Malaysia, China, Vietnam, Indonesia, Thailand, and Bangladesh. Additional resource persons and facilitators came from North America. The workshop design was participatory, emphasizing the identification of gaps in knowledge and prioritizing applied research needs in small group sessions. Although the major part of these tasks was undertaken in 3 small groups (Water supply, Sanitation, and Water supply and Sanitation during disaster), the results were presented and discussed in plenary sessions.

The research priorities identified include: development of appropriate water supply and sanitation technologies, methods for increasing community participation, development of appropriate education packages, and development of appropriate emergency preparedness plans. Sanitation problems were recognized as being most acute in urban slums. Technologies for providing water and sanitation during disaster were noted to be lacking in those countries of the region which are most disaster prone.

The participants agreed on the need for inter - country regional collaboration. They felt that this collaboration would help to increase the exchange of information, resource - sharings, the development of appropriate technology and applied research programmes, and improve the effectiveness of water supply and sanitation programmes in the region.

The suggestions presented here were developed from the views of the individual participants and do not necessarily reflect any country's official opinion.

Women carrying food during a flood.

Rural women volunteers maintaining a Tara handpump.

Chapter one

Introduction

Background:

The International Drinking-Water Supply and Sanitation Decade (1981-90) has made a substantial impact on issues related to water supply and sanitation (WSS) from global to country levels. During this period significant achievements have been made in several areas, including: technology development, information documentation and networking, and increasing access to WSS provisions. Less progress has been made in other areas, such as operations and maintenance of systems, community participation, and monitoring and evaluation of hygiene education programmes. One of the important outcomes of the decade has been the realization that WSS is a complex, multidisciplinary problem.

At the beginning of the decade most WSS projects were designed following methods and technologies which had previously been found to be successful in other countries, many times on another continent. However, many social, cultural, economic, geographic and other differences exist between countries and between regions or communities within countries. Where these differences were ignored, projects led to unacceptable standards, inappropriate implementation strategies, and doubtful achievements. The decade taught us to envisage WSS issues with realistic approaches, and to recognize the inevitable relationships between local physical and human factors and their consequent multidisciplinary facets. In the 1990s the overall challenge should be to continue our efforts for Health for All by the year 2000 and to address the problems experienced during the decade, taking advantage of the experiences both within and between countries.

In the Asian region some developing countries with high morbidity rates have shown remarkable success in rural water supply coverage. India and Bangladesh have shown significant success in developing appropriate technologies and increasing access to safe water supplies. However, the morbidity rates from water related diseases are still very high in these and other similar countries. Natural disasters, like floods, cyclones, tornadoes, and hurricanes, and man-made problems, like refugees, are also common in many of these countries. However, little information is available on environmental health conditions and appropriate interventions related to disasters. The International Decade for Disaster Management (1990-99) indicates that there is an immediate need to work on disaster-related crises, particularly in WSS in order to reduce post-disaster epidemics of infectious diseases related to poor WSS.

Although we face certain common regional problems in water and sanitation there are also differences which make collaboration and comparison particularly rewarding. The varied social, cultural and economic conditions within the region mean that concepts such as community participation may take different forms in each context. In each country, for example, ideas about gender vary and influence the strategies that must be adopted to fully involve women in these issues. We all have in common enormous human resource potential. The time has come to use this strength and apply ourselves to making water and sanitation a priority. Applied WSS research conducted by professionals in this region with collaboration between countries can help to develop guidelines for strategies which will have implications for planners and policy

makers at the country as well as regional and global levels.

Organizing a regional workshop was the first step in describing the applied research challenges and launching the applied research agenda for the 1990s through a formal, visible activity. We aimed at inviting expert participants who are currently active in WSS issues. The views on research and development priorities endorsed here were developed through extensive discussions among the participants, and do not necessarily reflect the country's official opinions or those of the authors. We present here the workshop activities and findings, which represent the consensus of the participants in the workshop.

Workshop Goals And Objectives:

The goals of the workshop were:

** To identify and prioritize the applied research needed to improve the health impact of water supply and sanitation programmes in specific developing countries of the Asian region.

** To identify opportunities for collaboration in WSS applied research.

The specific objectives were:

** To identify and define research gaps and priorities, in the light of existing research, on specific topics related to maximizing the health impact of WSS interventions in developing countries.

** To examine the overall problems in water and sanitation that follow natural disasters (e.g. cyclones, floods, famine).

** To identify opportunities for inter-country collaboration in WSS applied research activities.

Making a pit latrine.

Chapter Two

Workshop preparation and participation

Preparatory Activities

The workshop was first conceived in April 1991. At that time we outlined the objectives of the workshop and proposed the idea to a prospective donor, the Swiss Development Corporation (SDC), for funding. Having secured funding for the workshop, we requested Dr. Massee Bateman from the Water and Sanitation for Health (WASH) Project in Washington D.C. to assist us, since we knew that WASH had special interests and expertise in organizing workshops.

The venue selected was BARD (Bangladesh Academy for Rural Development), Comilla, about 90km from Dhaka. This is a quiet conference centre conducive to concentration and ideal for such workshops. One participant was invited from each country in the region, 5 participants from local Bangladeshi institutions outside ICDDR,B, and five from ICDDR,B. Three international consultants from North America (including Dr. Bateman) were also invited to function as resource persons; we expected about 25 participants in all.

To identify appropriate regional participants we sent the preliminary programme of the workshop to the UNICEF and WHO offices in each country in the Asian region, requesting them to send us names and credentials of suitable participants. From these responses we selected one participant from each of the 12 interested countries, except India, from which two were selected based on the diversity and size of the country.

About a week before the start of the workshop, Dr. Bateman and Ms. Claudia Liebler, an adult education specialist and workshop facilitator also from WASH, joined the ICDDR,B coordinating team to assist in organizing the workshop.

All those invited were able to attend, except the representatives from Pakistan and Sri Lanka. The three experts from North America, Dr. Bateman along with Drs. Steve Esrey from Canada and Barry Davis from Atlanta, participated as resource persons, representing respectively the three main topics of the workshop - sanitation, water supply, and water supply and sanitation in disasters. The participants were environmental and public health engineers, epidemiologists, social scientists, ecologists or parasitologists working in research and teaching institutions or in water and sanitary engineering departments of their governments (see appendix 1 for names & addresses). All had extensive experience in water and sanitation-related projects. A few also had experience in undertaking water supply and sanitation activities in disaster affected areas.

Workshop Activities:

Attempts were made to encourage close and in-depth interaction among the participants. Although the formal meeting started on November 24, 1991, at BARD, informal introductions began at ICDDR,B in Dhaka, on November 23rd. A morning introductory and administrative meeting was held, and participants visited several slums in Dhaka to observe existing WSS conditions. In the afternoon, the group travelled to Comilla by bus.

The formal meeting was launched the next morning at BARD with brief personal introduc-

tions followed by the overview lectures by our external resource persons. The programme for the workshop was explained to the participants by the organizers, who played the role of facilitators during the small group and plenary sessions.

Three small groups of about 6 - 8 members each were formed according to the 3 main topics: water supply, sanitation, and WSS in disasters. These were formed by allowing the participants to choose their major interests as much as possible. The small group participants discussed their specified problems in detail and reported their findings to the plenary session, where further discussion then took place.

These small group meetings and plenary sessions were designed to guide the participants through 3 activities, which applied to each of the 3 main topics.

Defining the problem:

* Discuss and list the major problems facing our populations in _____ (water supply, sanitation, or WSS in disasters).
* Identify and list the current gaps in relevant knowledge and applied research.

Setting Priorities:

* Discuss the goals for improving the health impact of each main topic.
* Develop a list of topics for applied research to address these goals in the 1990s.
* Review and refine the criteria for prioritizing the list of applied research topics.
* Rank each applied research topic as high, medium or low for each country.

Identifying Collaborative Projects:

* Given the regional priorities established, identify one project of cross country interest from each of the three major topics of the workshop.
* Outline the steps needed to push cross - country collaboration forward.

Indiscriminate defecation: a persistent problem.

Chapter Three

Defining the problems

Safe water and adequate sanitation are basic necessities for assuring minimal standards of health and quality of life, but unfortunately these are usually associated only with industrialization and economic development. In developing countries increasing population pressures and constraints in natural resource management have made the provision of these services increasingly difficult. In spite of the advances of the past decade, much of the world's population still remains unserved. We have attempted to outline the problems and gaps in knowledge which are faced in providing these services.

The major problems identified are tabulated under the three main topics of the workshop: Water supply, sanitation, and water supply and sanitation in disasters (Tables 1 - 3). The types of disasters which were considered included cyclone and tidal surge, flood, tornado, earthquake, drought, and war. This exercise was done by listing all the important issues for the participating countries. All problems were not necessarily applicable to all countries.

The problems and their associated factors are presented in the following tables. The gaps in applied research related to these problems are listed in appendices 2 - 4.

Table 1: Problems in Water Supply

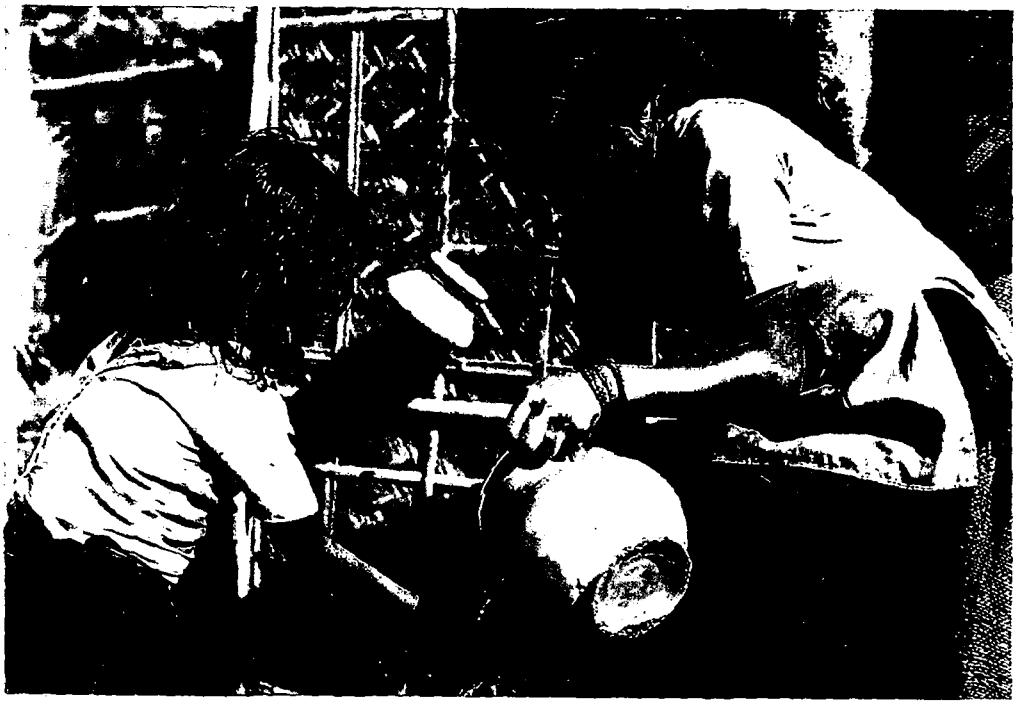
Problems	Related Issues
1. Access	1. Distances between the source and the user's household 2. The time cost of water collection 3. Social differences for selection of water sources by males, females, (castes)
2. Quantity	1. Number of users per source 2. Minimum quantity of water required to show health impact 3. Data on water use patterns and their determinants
3. Quality	1. A generally agreed upon definition of microbiologically safe water
4. Beliefs	1. User's beliefs concerning hygiene and water use
5. Appropriate technology	1. Water quality at its source and during storage
6. Operation and Maintenance	1. Ownership and responsibility 2. Lack of skills and resources 3. Women's participation
7. Community participation	1. At all levels of the projects
8. Integration of water supply with other services	

Table 2: Problems in Sanitation

Problems	Related Issues
1. Inadequate coverage	1. Low priority for sanitation 2. Poor maintenance 3. Inadequate low cost 4. Inadequate appropriate technology and lack of options
2. Lack of public health awareness	1. Lack of perceived needs (demands) 2. Low usage 3. Abuse of latrines 4. Need to link sanitation to water supply 5. Lack of understanding of existing practices and their determinants 6. Lack of understanding of health implications of disposal of other domestic wastes, including animal waste and solid waste, and waste water 7. Inadequate disposal of children's feces
3. Lack of participatory approach	1. Lack of community participation at all levels: design and planning, implementation, financing and maintenance, and monitoring and evaluation
4. Possible health hazards from waste disposal technologies	1. Ground water pollution by on-site sanitation 2. Use of night soil for fertilizers

Table 3: Problems in Water and Sanitation in disaster affected areas

Problems	*Related Issues.*
1. Water availability	1. Shortage of safe water 2. Disruption of existing water supply and sanitation provisions 3. Delay in availability of alternative provisions and in restoration of predisaster facilities
2. Water quality	1. Water pollution
3. Disruption of personal hygiene practices	1. Water availability 2. Water quality
4. Increased risk of communicable diseases	1. Disruption in provisions and their use 2. Lack of public health knowledge
5. Lack of appropriate disaster preparedness and planning	1. Lack of ability to form quick and accurate needs assessments 2. Lack of water - sanitation and epidemiological data bases



Handwashing is a priority and good practice starts young.

Chapter Four

Setting priorities for the 1990's

In order to continue to improve strategies for the implementation of WSS programmes in the 1990's, many of the problems and knowledge gaps identified in the previous section will need to be addressed. Nonetheless, a number of constraints exist that limit our ability to address these long lists of issues. First the lists themselves are not complete; many other problems and knowledge gaps could be added. Second, resources for conducting applied research are constrained. This includes not only financial resources, but also time and human resources. At the same time, resources for the implementation of WSS programmes are, in relative terms, diminishing. As the population grows and economic resources become more constrained in the 1990's, resources allocated for the implementation of WSS programmes will fall woefully short of what is needed (New Delhi Global Consultation on Water and Sanitation, 1990). We are challenged to develop more creative strategies for the efficient use of available resources.

The identification of regional priorities for applied research in WSS provides us with the basic structure to plan creative activities for developing practical applications in the next few years. In addition, the identification of common priorities will facilitate regional collaboration on common problems. In this exercise lists of goals for applied research in the 1990's were developed, lists of related applied research topics were developed, and the applied research topics were prioritized for each country in the region, according to the judgement of the participant from that country. The goals for applied research for each main topic are listed in Tables 4,5& 6.

Table 4: Applied Research Goals: Water Supply

GOALS
1. Make water a national priority.
2. Increase coverage of safe & sufficient water.
3. Reduce diarrhoeal incidence & water related disease.
4. Increase programme sustainability through increased community participation and management.
5. Promote appropriate behavioural changes.
6. Increase inter-sectoral coordination.

Table 5: Applied Research Goals: Sanitation

1. Extend coverage and increase usage.
2. Improve operation and maintenance.
3. Develop and disseminate appropriate latrines/sanitation technology (esp. swampy/sandy/slum areas, and other special institutions, such as, schools, markets).
4. Improve knowledge, attitudes and practice, and increase participation at the community level.
5. Improve proper disposal of children's faeces.
6. Minimize health hazards from:
   * solid waste
   * waste water
   * animal waste, and
   * poor food hygiene.

Table 6: Applied Research Goals: Water & Sanitation in Disaster Areas

1. Reduce morbidity and mortality associated with water and sanitation in the disaster-affected area.
2. Supply enough safe water to prevent communicable diseases related to water.
3. Promote use of available safe water through health education.
4. Review/restore the available facilities of safe water.
5. Ensure safe disposal of human excreta, solid wastes, corpses, chemical waste and other health hazardous waste.
6. Promote the use of available sanitation facilities.
7. Promote domestic, personal and food hygiene.
8. Improve the capability to conduct quick and accurate need assessment.
9. Establish water supply, sanitation, and epidemiological databases in the disaster prone area.
10. Develop disaster preparedness programmes
11. Ensure the development of the capability of the affected population to sustain themselves through vulnerable periods.

The lists of applied research topics related to these goals and the prioritized ranking of these topics are presented in Appendices 5 - 7. In the priority matrices (Appendices 8 - 10), based on the identified problems and research gap issues, the participants identified applied research priorities for their countries by grading them as 'high', 'medium' and "low," according to their individual judgment.

Here we represent the priorities of the topics by an arbitrary numerical system (Tables 7, 8 and 9). We have scored them as "High" = 3, "Medium" = 1 and "Low" = 0.

We assumed the denominator (the highest score) to be 33 (11 countries X 3 = 33 points) for any topic and computed the percent of the total scored by the participants. The topics which were given more than 50% scores are listed in Table 7.

Table 7: Priorities in Applied Research for Water

Topics	Score (%)
1. To identify social and technical elements for involving the community in creating sustainable systems for maintenance	70
2. To determine how water supply programmes and systems can be targeted to achieve a maximum health impact	58
3. To identify factors for increasing participation in community management	58
4. To develop locally-appropriate technologies	58
5. To identify sources of pollution and contamination from the water source to the time of ingestion by humans	55

Table 8: Priorities in Applied Research for Sanitation

Topics	Score (%)
1. To develop appropriate sanitation facilities for slums	91
2. To investigate and develop appropriate packages for hygiene/sanitation education to improve: awareness, demand, usage, and maintenance	79
3. To investigate how to increase coverage and improve functioning (user participation in management and financing)	70
4. To determine the minimum level of community coverage to achieve optimum health impact	67
5. To do applied research on a) filling-up of pits, b) lining of pits, c) life span of components, and d) emptying of pits	61
6. To investigate mechanisms for community involvement in planning, design, implementation, etc., emphasizing the role of women	55
7. To investigate and develop appropriate technologies for waste water and solid waste disposal/drainage at the household and small community levels	55

Table 9: Priorities in Applied Research for WS in Disaster.

Topics	Score (%)
1. To develop appropriate emergency preparedness plans	91
2. To develop appropriate waste disposal technologies	76
3. To develop appropriate water treatment methods	73
4. To improve self-help during the vulnerable periods of disasters	67
5. To develop health education related to water, sanitation and hygiene (food and personal)	64
6. To efficiently distribute safe water	58
7. To recondition existing water sources	55
8. To replicate country level experiences	55

The topics of highest priority are generally consistent with the global suggestions developed during the past decade. The importance of community participation, the role of women, operations and maintenance and the general issue of sustainability are once again emphasized. Hygiene education and a focus on human behaviour are also emphasized. It is interesting to note that after extensive work on appropriate technologies during the past decade, there continue to be major needs for technological development.

Water supply and sanitation issues following disasters were not addressed in depth during the International Decade for Drinking Water Supply and Sanitation. This lack is reflected in the basic applied research needs for this area, including preparedness planning, technology development, and education strategies.

Running through the list of priorities are common themes which have been of high priority during the past decade, and which continue to include the major concerns and challenges for the future. One of these challenges is to determine what is locally appropriate and to evaluate and respond to local customs, beliefs, and behavior when developing programmes - both the technological and the hygiene education aspects. Another is to better understand how to target WSS services to maximize health impact. Related to these is the identification of target groups with special needs that require new strategies, such as disaster affected populations and urban slum dwellers.


A S I A

Chapter Five

Inter – country Collaboration

The third objective of the workshop was to develop guidelines for inter – country collaboration. All the participants agreed that such collaboration would help to increase networking and information exchange, appropriate technology development, and resource sharing. The development of applied research programmes, both in individual countries and regionally, would be facilitated, and the effectiveness of WSS programmes would improve. It was suggested that in this regional collaboration, international resource – persons from outside the region should also be included.

The recommendations of the group were the following

1. Establish a regional working group. The collaboration should be a two – phased approach:

   a. Country groups in each participant country.

   b. A regional group to be made up of people committed to and involved in the applied research agenda.

   Participants from this workshop could be regional group members or could identify appropriate candidates for this position.

   The group could start with countries represented at the workshop and expand later to involve additional countries of the region, particularly Pakistan, Sri Lanka, Maldives, Laos and Cambodia.

2. Identify a dynamic organization and person to provide leadership. ICDDR,B was thought to be a possible candidate for this.

3. Explore potential funding sources.

Based on these recommendations, it was decided that ICDDR,B would prepare the workshop proceedings and lead the search for funding for a regional working group. Individual participants will also explore the possibility and mechanism for developing country – level working groups.

"Water and Sanitation Priorities for 1990's": Workshop participants.

Acknowledgement

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Appendix 2

GAPS IN APPLIED RESEARCH: WATER SUPPLY

1. Determination of optimal acceptable distance from source of water and the time women spend fetching it.
2. Definition of optimal microbiological, physical, and chemical qualities required for health impact.
3. Understanding of community requirements for quality and community definitions of safe water.
4. Determination of minimum quantity of water per capita for health impact. (number of users per source).
5. Identification of specific barriers to appropriate water use: beliefs, women's mobility, users' alternate source preference, and storage.
6. Identification of existing practices and beliefs.
7. Identification of sources of pollution and contamination
8. Appropriate technology trial & development:
   a. salinity, minerals
   b. storage, containers
   c. disinfection
   d. filtration (treatment)
9. Operation And Maintenance.
   a. Increase community participation in maintenance of water systems
   b. How to create awareness and involvement in all stages of development
   c. Reliability analysis of all types of interventions (hand pump, tube well, etc.)
   d. How to sustain and finance water supply

Appendix 3

GAPS IN APPLIED RESEARCH: SANITATION

1. Development of better communication between implementors & researchers
2. Discovery of the minimal level of community coverage to achieve optimum health impact
3. Quantification of health benefits of sanitation under a variety of conditions
4. Study of the minimal level of a sanitation component to be in-built in community water supply projects to maximize its health benefits
5. Investigation of low cost latrine designs
   - Swampy areas
   - Including pit linings
   - Urban slums
   - Inadequate water supply
6. Investigation of technological options for safe disposal of children's faeces
7. Designing of appropriate and low cost portable toilets for disaster/large congregations
8. Study of ways to implement biogas units, combining human/animal/agriculture/other organic waste, in the local context
9. Discovery of the health risk of use of faeces in aquaculture & agriculture
10. Determination of current usage of nightsoil as fertilizer
11. Study of sewage treatment using aquatic needs and biogas generation, carefully looking into survival of pathogens
12. Study of ways of monitoring success of sanitation programmes to include not just coverage but usage and hygiene behaviour
13. Development of indicators for monitoring hygiene education programmes
14. Investigation of current practices of off-site disposal of nightsoil
15. Study on mechanisms (kinetics) of travel of pollutants through the soil under varying hydrogeological conditions
16. Study of current belief/attitudes/practices of people with respect to adult and children's faeces

17. Quantification of health risks of animal faeces in the environment

18. Investigation of health benefits of integrated water & sanitation programmes

19. Investigation & development of appropriate low cost technology for urban solid waste disposal/management

20. Investigation & development of appropriate package for hygiene education at various levels of:
    - awareness
    - demand
    - usage
    - maintenance

21. Investigation into ways to increase coverage & improve functioning (e.g. willingness to pay/financing mechanisms, types, policies)

22. Investigation of the feasibility of community (emphasing the women) involvement in planning/design/implementation/monitoring maintenance

23. Study of the role of women in promoting sanitation & hygiene education

24. Situation specific studies on pathogen survival in the environment

25. Discovery of alternatives to protect water for personal use by community people in areas where sanitary latrines are not implementable/affordable

Appendix 4

GAPS IN APPLIED RESEARCH: WATER & SANITATION IN DISASTER AREA

Qualitative and quantitative assessment of health, water and sanitation effects of disaster within the following contexts:

1. Definition of high risk areas according to nature of disaster
2. Definition of high risk groups within the identified problems
3. Prescription of risk reduction measures: both short – and long – term.
4. Definition of the risk factors
5. Research on the ability of the affected people to manage themselves in the initial critical period
6. Orientation and coordination of the personnel engaged in the relief operation

Appendix 5

TOPICS FOR APPLIED RESEARCH: WATER SUPPLY

1. Examination of how provision of safe water supply becomes a priority
2. Measurement of economic and social health benefits of w/s programmes
3. Establishment of the minimum and maximum quantity of water for optimizing health benefits
4. *Identification of acceptable levels of contamination:* –
   - Microbiologically
   - Chemically
   - Taste
   - Appearance
5. Measurement of how close the water point should be from the household
6. Discrimination of the optimal number of people per water point for health impact & access of use
7. Identification of sources of crucial pollution and contamination from water source to mouth
8. Definition of the critical pathogenic indicators
9. Development of a methodology to identify appropriate interventions
10. Environmental impact assessment (EIA) of the water supply
11. Identification of social & technical elements for involving the community creating sustainable systems
12. Determination of how to identify factors to increase participation in community management
13. Reliability analysis of all types of W/S interventions
14. Development of locally appropriate technology
15. Study of waste/leaks in water supply

Appendix 6

TOPICS FOR APPLIED RESEARCH: SANITATION

1. Determination of minimum level of community coverage to achieve optimum health impact

2. Study of ways of monitoring success of sanitation programmes to include not just coverage but usage and hygiene behaviour (including baseline surveys)

3. Quantification of health benefits of sanitation under variety of conditions (including cost – benefit analyses)

4. Investigation into how to increase coverage and improve functioning (user participation in management and financing; willingness to pay studies)

5. Study of the role of women in promoting sanitation hygiene education and operation and maintenance

6. Applied research on :

   a. filling – up of pits
   b. lining of pits
   c. life span of components
   d. emptying of pits
   e. Other tech – options in swampy/sandy areas

7. Development of appropriate sanitation facilities for slum areas (esp. urban)

8. Study of current beliefs, practices of people with regard to children's and adults' faeces and defecation habits

9. Investigation and development of appropriate package for hygiene/sanitation education for various levels of education to improve:

   - Awareness
   - Demand
   - Usage
   - Maintenance

10. Investigation of mechanisms for community involvement in planning/design/implementation/ monitoring maintenance, emphasizing the role of women

11. Investigation of appropriate technological options for safe disposal of children's faeces

12. Quantification and qualification of health risks of animal wastes in the environment

13. Investigation and development of appropriate technology for waste water and solid waste disposal/drainage at the household and small community level

14. Study of current beliefs and practices relating to food hygiene (household, vendors/restaurants)

15. Investigation of risks of various treatment/disposal options for:

    a. solid waste
    b. waste water
    c. animal wastes
    d. nightsoil

Appendix 7

TOPICS FOR APPLIED RESEARCH: WATER & SANITATION IN DISASTER AREAS

1. Development of water supply, sanitation and epidemiological data base of the disaster prone areas
2. Development of and identification of appropriate sources of safe water
3. Development of appropriate water treatment methods
4. Development of quick methods to test the microbiological quality of water when there is no disinfectant residual
5. Development of efficient methods of distribution of safe water
6. Determination of whether or not health education programmes related to use of safe water during disaster will be effective
7. Determination of whether or not health education programmes are related to good sanitation practices
8. Development of integrated health education programmes for both safe water and sanitation
9. Establishment of effective methods for reconditioning the ground-water sources and effective methods for restoring the ponds, tanks, reservoirs, etc
10. Development of appropriate technology for disposal of wastes during disaster
11. Development of necessary components of an emergency preparedness plan for it to be effective, including the roles of different levels of disaster relief participants
12. Development of standardized methods for quick and accurate need assessment
13. Determination of whether experiences developed in one country could be transferable and replicable in another country
14. Determination of effective measures related to W & S that disaster victims including women and children, can take on their own to mitigate the effects of a disaster
15. Improvement of community participation for sustainability of practices
16. Development of food sources for use during disaster which are not easily contaminated by water or other sanitary means
17. Study of how to store water during disaster for use in vulnerable period

Appendix 8

REGIONAL APPLIED RESEARCH PRIORITIES: WATER SUPPLY

Sl.No.	Topics	*BAN	BHU	CHI	IND	INDO	MAL	MYAN	NEP	PHIL	THAI	VIET
01.	To examine how other programmes became priority	1	1	0	1	1	0	3	1	0	0	1
02.	To measure other Eco/Soc/Health benefits of water supply	3	1	1	1	1	1	3	1	1	0	1
03.	To establish minimum and maximum quantity of water for optimizing health benefits	1	1	0	1	1	1	1	0	1	0	0
04.	To identify acceptable contamination - microbial, chemical, physical	0	3	1	1	1	1	0	1	0	3	1
05.	To measure how close the water point should be to the household	3	1	0	0	0	0	1	0	0	0	0
06.	To find optimal number of users per water point for health impact	1	1	0	1	0	0	1	0	1	0	1
07.	To identify source of crucial pollution and contamination from source to mouth	1	1	0	1	0	3	3	3	3	0	3
08.	To define the critical pathogenic indicator(s)	0	1	1	1	1	1	0	0	1	3	1
09.	To develop methodology to identify appropriate interventions	0	1	0	1	3	3	0	0	1	1	3
10.	To assess environmental impact of water supply	0	3	1	3	1	1	1	1	0	1	1
11.	To identify social and technical elements for involving community to create sustainable systems for maintenance	1	1	1	1	3	3	3	1	3	3	3
12.	To determine if water should be included in a package of interventions	1	1	0	0	1	0	1	0	1	1	1

continued....

Appendix 8 (continued)

Sl.No.	Topics	*BAN	BHU	CHI	IND	INDO	MAL	MYAN	NEP	PHIL	THAI	VIET
13.	To determine if water supply should precede or follow sanitation	0	3	0	3	0	0	0	0	1	1	1
14.	To determine how water supply programmes and systems can be targeted to achieve maximum benefit/greater health impact	0	1	0	1	3	3	1	3	3	1	3
15.	To identify factors to increase participation in community management	3	3	3	1	3	0	1	3	0	1	1
16.	To study unaccounted for water in water supply (waste & leakage)	0	0	0	3	1	3	0	0	3	1	0
17.	To reliably analyze all types of water supply intervention, operation and maintenance	0	1	0	3	1	1	1	0	1	1	1
18.	To develop a locally appropriate technology	3	1	0	1	3	0	3	1	1	3	3
19.	To prevent back siphonage of waste water into water main and identify appropriate cleaning methods	3	0	0	3	0	0	0	0	0	3	0
20.	To identify range of behaviour and beliefs (barriers and incentives) relating to water use & behavioural determinants to identify behaviour amenable to change	1	3	0	1	0	1	1	0	1	0	1
21.	To identify linkage between behaviour and health and develop integrated health education packages	0	1	0	1	0	0	1	0	0	0	0
22.	To investigate appropriate methods of cost recovery/funding for existing and future services	1	1	3	0	0	0	1	0	1	1	1
23.	To analyze cost-effectiveness of involving the community (including women) in the management, construction, operation and maintenance of water systems.	3	1	3	0	0	0	0	3	1	3	1

* BAN = Bangladesh; BHU = Bhutan; CHI = China; IND = India; INDO = Indonesia; MAL = Malaysia; MYAN = Myanmar; NEP = Nepal; PHIL = Philippines; THAI = Thailand; VIET = Vietnam.

Appendix 9

REGIONAL APPLIED RESEARCH PRIORITIES: SANITATION

Sl.No.	Topics	BAN	BHU	CHI	IND	INDO	MAL	MYAN	NEP	PHIL	THAI	VIET
01.	a) To determine minimum level of community coverage to achieve optimum health impact b) Minimum level of community sanitation necessary to achieve optimum health benefits from water supply	3	3	1	3	1	1	1	0	3	3	3
02.	To study ways of monitoring success of sanitation programmes to included not just coverage but usage & hygiene behaviours	1	1	3	1	1	1	3	3	1	0	0
03.	To quantify health benefits of sanitation under variety of conditions (including cost – benefit analysis).	0	0	3	3	1	0	1	0	1	0	1
04.	To investigate how to increase coverage & improve functioning (user participation in management & financing)	1	1	1	3	3	1	3	3	3	1	3
05.	To study the role of women in promoting sanitation/hygiene education & operation and maintenance	0	1	1	0	0	0	3	1	0	3	0
06.	To develop applied research on: a) filling – up of pits b) lining of pits c) life span of components d) emptying of pits	1	3	3	1	1	3	0	3	1	3	1
07.	To develop appropriate sanitation facilities for a) *slum areas* b) *institutions* – schools, markets	3	3	0	3	3	3	3	3	3	3	3
08.	To study current beliefs, practices of people with regard to children's and. adults' faeces and defecation habits	0	1	0	0	0	3	3	1	1	0	0

continued...

Appendix 9 (continued)

Sl.No.	Topics	BAN	BHU	CHI	IND	INDO	MAL	MYAN	NEP	PHIL	THAI	VIET
09.	To investigate and develop appropriate package for hygiene/sanitation education for various levels of education to improve: awareness, demand, usage, maintenance	3	3	3	3	3	1	3	3	3	1	1
10.	To investigate mechanisms for community involvement in planning/design/implementation/etc. emphasising the role of women	3	0	3	1	3	0	0	3	3	1	1
11.	To investigate technological options for safe disposal of children's faeces	3	0	0	0	1	3	1	1	0	1	0
12.	To quantify health risks of animal wastes in the environment	0	3	0	1	0	1	1	0	0	1	1
13.	To investigate/develop appropriate technologies for waste water and solid waste disposal/drainage at household and small community levels	1	1	0	1	3	3	1	1	1	3	3
14.	To study current beliefs and practices related to food hygiene (households/ vendors/restaurants)	0	0	0	0	0	0	0	0	0	0	0
15.	To investigate risks of various treatment/ disposal options for: solid waste/waste water/animal wastes/nightsoil	0	0	0	1	0	0	0	0	0	0	0

Appendix 10

REGIONAL APPLIED RESEARCH PRIORITIES: DISASTERS

Sl.No.	Topics	BAN	BHU	CHI	IND	INDO	MAL	MYAN	PHIL	THAI	VIET	NEP
01.	Water Supply & Sanitation epidemiological data base of the Disaster prone area	3	3	1	3	0	1	0	1	1	1	0
02.	Appropriate sources of safe water	1	1	1	1	1	1	1	1	1	1	1
03.	Appropriate water treatment methods	1	1	3	0	3	3	3	3	3	3	1
04.	Quick water quality test	0	0	1	1	1	3	1	0	0	1	1
05.	Efficient distribution of safe water	3	1	1	1	3	3	3	3	0	1	0
06.	Health education related to safe water	0	0	0	1	0	0	0	0	1	1	0
07.	Health education related to sanitary practices	0	1	0	1	0	0	0	0	1	1	0
08.	Health education related to WSS (food & personal) practices	3	3	3	3	3	0	0	1	1	1	3
09.	Reconditioning of existing water sources	1	1	0	1	1	3	3	1	3	1	3
10.	Appropriate waste disposal technology	1	1	3	3	3	3	1	3	3	3	1
11.	Appropriate environmental preparedness plan	3	3	3	3	3	0	3	3	3	3	3
12.	Replicability of country level experiences	1	1	1	3	0	1	3	1	3	3	1
13.	Self-help during vulnerable period	3	3	3	1	1	1	1	3	0	3	3
14.	Community participation for sustainability of practices	1	3	0	3	1	0	0	0	0	1	3
15.	Appropriate food sources	1	1	0	1	0	3	0	1	1	1	0

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