



**IN OUR HANDS  
UNITED NATIONS  
EARTH SUMMIT '92**

**WOMEN AND CHILDREN FIRST**

UNCED/UNICEF/UNFPA Symposium  
Geneva, 27-30 May 1991

**Water for Life**  
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**UNITED NATIONS CONFERENCE ON  
ENVIRONMENT AND DEVELOPMENT**

Research Paper No.20  
July 1991

(The paper was commissioned for the preparation of UNCED official reports and is made available as originally prepared by the authors. This paper was not prepared by the UNCED secretariat, therefore it is an unofficial record and the views expressed herewith do not necessarily express those of the UNCED secretariat).

202.1-91WO-10448

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## I. INTRODUCTION

For years, the Burkina Faso government talked of the great potential for irrigated agriculture in the Yatenga plateau. The Mossi people who tilled the lands recalled the pride of their ancestral warriors during the 500 years of Mossi kingdoms. But trade and times had changed. There seemed to be little hope for prosperity built on agriculture. The rains sometimes came, but they soon disappeared into a deep, unreachable underground.

Finally, the Naam Federation, a local non-governmental association, decided that they must take matters into their own hands. In December, 1979, representatives met to voice their opinions on how to solve the problems. One man said "There is nothing to eat. It's simple!". Others talked of the dying livestock and scarcity of wood. In the midst of heated debates, Minata from Somiaga rose from her chair. She said, "What you say is fine, but it is useless to talk about livestock and food when there is no water. The first problem is that we have no water! We, women, are going to find out how to get it", and she sat down. Everyone looked at each other. There was a long silence. They were stunned by the simplicity of the truth.

In the months that followed, the Mossi women took the leadership in solving the water problem. They got the cooperation from men when they threatened to leave them and return to their parents' villages if men did not help. They organized youth groups, old people and village leaders to help build large traditional dams. When one dam broke due to poor construction, aid agencies provided technical assistance and seed money so that the dams would hold. The people envisioned fish in the dams which they could use for their meals, gardens around the edges, and water for the cattle. They talked of replanting the forests which would give them herbal medicines and fuel for their night fires.

With the strong support of the central Naam office, judicious financial inputs by agencies, and mass mobilization of villagers throughout the region, the "mother dams" soon gave birth to "daughter dams". These were built at a fraction of the cost of the French colonial large dams, and they multiplied. They helped restore a self-confidence among the people. As Minata put it "We created harmony and cooperation on earth by building the dams together. The rains came because the watchful ancestors could not help but be pleased at what they saw".

The story of the Mossi "women's dam" is an inspiring example of how women's participation in water projects can be the starting point of rebuilding environmentally degraded ecosystems.(1) It is one of many examples in Africa, Asia, Latin

America, and other regions. Indeed, by now, "women's participation" in water is hardly new. What have we learned from past experience? Perhaps the most important lesson is that the commitment to women's participation must be continual and long-term. This is because ecosystems are continually changing; development, itself, introduces life-threatening environmental changes and alterations in population behavior. In such a situation, women's movements must be concerned with an ecological approach to poverty and development so that they can support or challenge the political process.

This paper will review the issue of "Water for Life" from a social perspective, one which takes into account gender inequality and the special needs of children. It maintains that at all levels -- from the micro ecology of the household to the global ecological system, women's participation and empowerment is one of the essential factors to achieving sustainable, ecologically sound development. Strategies related to policy and planning, technology development and transfer, resource management and building of national capability and women's leadership are critically assessed in relationship to this central issue.

## II. SIGNS OF MALADAPTATION - NEEDS AND PROBLEMS

### A. Health

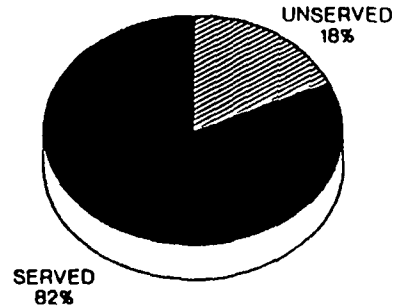
It is useful to review the current needs and problems relevant to "Water for Life" issues. Among these, the most important is health. Health status can be an indicator of the successful adaptation of a population to its environment. But health statistics indicate trends towards "maladaptation" of populations in industrialized as well as developing countries.

\*Water-borne pathogens -- which contribute to typhoid, cholera, amoebic infections, bacillary dysentery and diarrhoea -- account for 80 percent of all disease in developing countries and for 90 percent of the 13 million child deaths each year. Outbreaks of these in the United States along with high incidence of cancer have been traced to contaminated water supplies.(2)

\*Water-related disease is acute in urban communities. In 1985 at least 25 percent of urban communities (and 58 percent of rural communities) were without clean water for sanitation needs. (see chart 1) Women and children, as water carriers in many

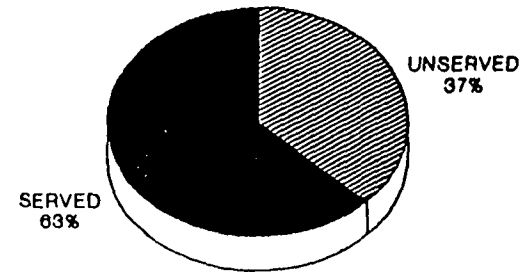
(source: "the decade and beyond: at a glance" by Joseph Christmas and Carel de Rooy, UNICEF, NY, 1990)

**Fig. 9: ESTIMATED COVERAGE 1990  
URBAN WATER**



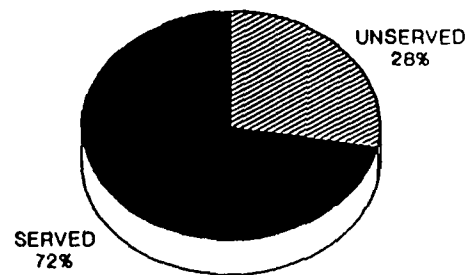
Unserved Population 243.70 M

**Fig. 10: ESTIMATED COVERAGE 1990  
RURAL WATER**



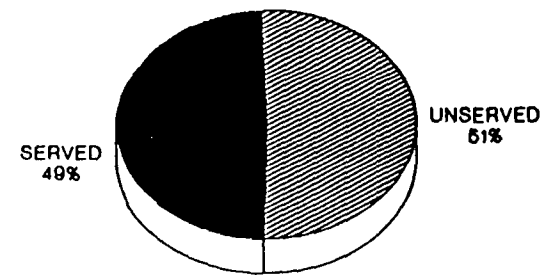
Unserved Population 988.72 M

**Fig. 11: ESTIMATED COVERAGE 1990  
URBAN SANITATION**



Unserved Population 377.00 M

**Fig. 12: ESTIMATED COVERAGE 1990  
RURAL SANITATION**



Unserved Population 1363.79 M

societies are in constant touch with polluted water and thus are among the most vulnerable to these diseases.

\*Unsafe water and sanitation conditions lead to high incidence of parasitic diseases. In some countries these are reported to be higher for women and girls than for other groups. Guinea worm affects 4 million cases a year; schistosomiasis, 200 million cases, trachoma, 500 million cases and hookworm, 800 million cases a year. (4)

\*Stagnant and unprotected water containers are breeding grounds for vector-borne diseases such as malaria and dengue hemorrhagic fever. In Africa, malaria infects about half of all children under the age of three, killing an estimated one million a year. In women, malaria causes miscarriages, and poor maternal health. DHF which has no prophylactic or vaccine, is often fatal for children. It is rapidly spreading and is now reported in Asia, Africa, the Caribbean and in the United States. (5)

\* Women and children may spend as much as 6-8 hours a day collecting water. Women may suffer serious injury from falls while carrying and getting water and they may be disfigured from the heavy loads. Fatigue from walking long distances is chronic. (6) Children are equally at risk, and have accidents, especially around unprotected wells.

In addition to these more "traditional" health problems, development projects have dramatically altered the balances between populations and other biotic factors to exacerbate the problem (see Chart II). Large-scale dams have expanded the breeding sites for hosts of schistosomiasis (snails) and anopheles larvae in areas previously free of them. Changes in irrigation systems also create new breeding sites for black flies causing onchocerciasis and vectors for malaria. (7) Improved transportation combined with increased proletarianization of rural populations stimulate migrations to and from cities and from forests to lowlands. Regions which were previously malaria-free are reinfected by movements of parasite-carrying populations. International tourists and transport vessels are vehicles for the transport of vectors and DHF viruses.

CHART II

Possible adverse impact of development on six diseases

(source: "Social and economic research in the UNDP/World Bank/WHO special programme for research and training in tropical diseases" by Patricia L. Rosenfield et.al., in *Soci. Sci. Med.* Vol. 15A, pp. 529-538, 1981)

Diseases

Development activities	Malaria	Schistosomiasis	Filariasis		Trypanosomiasis		Leprosy	Leishmaniasis
			Filariasis	Onchocerciasis	African	Chagas		
Water resources								
irrigation	x	x			x			
dams and reservoirs	x	x		x				
fish ponds	x	x	x		x			
navigation*	x	x			x			
Population movement								
migration	x	x		x	x	x		
resettlement	x	x		x	x	x		
Agriculture								
rice production	x	x	x		x			
opening new lands	x	x		x	x			x
livestock	x	x		x	x			

downstream.

DHF tends to spread where water supply coverage has actually increased. This occurs when more attention was paid to providing piped water than to its steady supply and protection. Urban dwellers may receive piped water only intermitantly, and thus store water in large containers. The DHF vector thrives in rain water containers, water jars used to store water, and even desert water coolers. The mosquito (aedes aegypti) breeds near homes and schools where young children spend most of their day, transmitting the virus during epidemics.

Such health conditions entail high economic and social costs for women and children because they affect productivity. Studies in Egypt show a 30 percent drop in agricultural productivity among schistosomiasis infected farmers. In India, around 12 million working days are reportedly lost every year due to guinea worm. (8) In a study of guinea worm in Nigeria, researchers reported that "demands upon mothers are onerous throughout most of the Third World, but they are nothing compared to the burden that the guinea worm brings. "They noted that sixteen mothers were bedridden while another 12 could only move with the aid of a stick. Nine could limp without a stick and 2 suffered ulcers on their hands so severe they could barely feed or suckle a child. (9)

Despite the severity of such problems, many countries including those in industrialized countries have jeopardized health and the environment to service their external debts and finance growth oriented programs. (10) Advocates of reducing spending on environmental and poverty-alleviating programs point out that there are problems of rising debts and deteriorating terms of trade. Monitoring of unsound environmental impact and enforcement of legislation have lost ground and improvements of safe water supplies and sanitation and public health services have not kept pace with the increased rates of health problems.

### B. Water Scarcity and Population

Another challenge facing women's participation in water projects is the scarcity of water. Improvements in health services and greater access to safe water and sanitation technology are certainly effective in improving the quality of life for women and children, but efforts will have limited impact unless safeguards are taken to replenish the water supply and reduce consumption. There is growing evidence that there will soon be global shortages of water which will affect all regions. (11) As noted in the recent Global Consultation on Safe Water and Sanitation for the 1990's, some 80 countries supporting 40 percent of the world's population already suffer from serious water shortage. And water scarcity is accelerating. Contributing fac-



tors include poor water efficiency by irrigation works, industry and urban systems. Since about 70 percent of the world's water goes to irrigation, 23 % to industry and 7 % to domestic demand, it is important to address the scarcity issue across all sectors. (12)

Factors contributing to reducing the availability of safe drinking water supply include side products of the Green Revolution and intensification of agricultural production; pesticides, herbicides and other chemicals seep into the ground water supply and make it undrinkable. Industrial pollution is another contributing factor as it is estimated that in developing countries more than 95 percent of sewage is discharged into water (13). In India 70 percent of the total surface waters are thought to be polluted. In Malaysia, 40 of the rivers are so polluted that they are devoid of fish and aquatic animals. (14)

One controversial dimension of the water scarcity issue involves the population issue. Many experts point out that during the past 20 years, the world population grew from about 3.7 billion in 1970 to over 5.3 billion today. Population size, its growth and distribution can place demands on the world's finite resources in disturbing ways. Reducing population size has become a major national policies in most countries and women's reproductive role is increasingly seen as a key link between women and the environment. Some of the most effective programs which have reduced population growth have been those which have raised the status of women through integrated packages with higher levels of education for girls, improved health and family planning services, and greater income-generating opportunities.

This noted, it is equally important to emphasize that even with population reduction, the ecological pressures may not be alleviated for the poorest. This is because population consumer behavior and the political economic structures which define water distribution and use can create conditions of water scarcity even in situations of relatively low population growth -- some European and North American countries are prime examples where water consumption per capita is still extraordinarily high. In other cases, water scarcity is created artificially by unequal access to water. The National Water and Sanitation Agency in Honduras reports that in 1984, 50 percent of the municipality's water was consumed by only 18 percent of the users, while the 60 percent of the population who lived in the marginal areas consumed just six percent. (15) Similarly, rich farmers may have control over water allocation and are able to limit water flow to poorer villagers.

### III. A GENDER APPROACH TO THE ECOLOGY OF WATER

Emerging from women's involvement in helping to solve these problems is a convergence of ideologies and perspectives which

may be termed a "gender concept of ecology". What is the gender concept applied to the ecology of poverty and development? (16) It is an evolving concept which is still relatively new. Here, we will suggest some ideas for consideration.

First, the points made during the Water and Sanitation Decade are valid and should be reiterated. These include a central role for women's participation at all organizational levels, from the village water management committees to international policy-making. The key justifications for such a visible role are based on women's central role in household decision-making about water management, hygiene and health habits, household finances, and their potential in building and maintaining a water system. As one report noted "Women...are primarily the ones who draw water for household use, transport it home, store it until it is used, and use it ." (17) They are, therefore, the most qualified to know what improvements are needed in household water supply and are among the first to ask for them.

Assessments at the end of the Decade noted that while some targets for water and sanitation coverage fell short of expectations, there had been considerable advances made in raising awareness about the importance of women's participation at national levels. (18) Even more important, numerous national initiatives had demonstrated the effectiveness of community-management approaches which include women. In Panama, village women helped engineers to identify fresh water sources which had not been known to them in the initial surveys. (19) In Latin America, Africa and parts of Asia, women volunteered labor in construction of piped water supply. In Malawi, women provided up to 70 percent of labor. In Lesotho and Tonga, women build latrine while in Bangladesh and Kenya, they are trained to repair broken-down pumps. (20) Also, their role in helping to generate new finances for water projects has been shown to be important because women often reinvest in other family basic needs such as better education for children and improved child nutrition. In cases such as the women's garden groups in Casamance, Senegal, and in rural South Korea, women were key links between improved water sources and income-generation for family welfare. (21)

In brief, a gender perspective on the ecology of poverty and development states that women's concerns such as improved domestic water supply (and latrines) must be given equal priority in development plans and that the gender biases which prevent effective participation must be challenged. This "feminization" of water politics has been promoted actively at international and national levels. And although implementation has been slow, the fundamental orientation has already taken shape.

This said, the gender discussions cannot end there. It must continue to recognize women's central role in other water sectors, particularly in those affecting agriculture, fisheries

and industries. Indeed, these, like urban planning, are mistakenly assumed to be free of gender bias and areas in which women's participation has no special contribution to make.

Yet numerous studies, have noted that women's work is not restricted to the household and "social reproduction" (22) activities such as health, education, and child-care. Rather, their labor is fully integrated into all areas of production whether in home gardens, in dry fields or in cash crop production. The double burden of combining productive and social reproductive work accounts for their increased hours of work. While men may have free time to attend community meetings, women are at home cooking and caring for the aged. And, while their role in income-generation and food production is an essential part of the family's survival, they often have unequal access to resources, including water. This is particularly problematic for female-headed households with dependents.

Furthermore, children's labor, especially that of girls, is invisible in "mainstream" planning, despite studies which indicate that their labor is often the backbone of economy. Because children are the cheapest, most docile labor force available, they have become the very basis of rural and industrial development. Official figures suggest that more than 52 million children between 7 and 15 years of age are working. (23) Some of these are living in industrialized countries. Children who migrate to the cities end up in slums where only 5 hand pumps may be available for 10,000 persons. More and more street children become exposed to health hazards of city life: lead poisoning, water pollution and accidents. But the child workers who are most invisible to planners are those whose workplace is the traditional family farm. While around 80 percent of Asian and Pacific children live in rural areas, only a fraction have access to safe water. Girls help in carrying and storing water, child-care, preparation of food, gathering fuel, weeding, and other labor-consuming tasks.

The gender perspective emphasizes that women and children's productive and social reproductive roles bring them into relationship to the total ecosystem so that all aspects of water development and resources management are relevant -- from domestic water supply to large-scale irrigation projects, from deforestation and acid rain to industrial pollution, and from urbanization to global water scarcity. This also requires more than "attaching" women and children's concerns to existing international and national plans. Instead, it merits a reorientation of priorities which gives women's concerns equal priority. This would mean a more balanced national planning agenda, one in which financial and technical support to promote women's participation would be an integral part of building up national institutional capability.

Going one step further, this gender concept should be linked to a social view of sustainable development. Sustainability related to water projects has had various meanings: 1) technical - easy repairs, replaceable parts, etc. 2) economic - low-cost for installing and keeping up, 3) environmental - without damage to environmental resources required for the next generation, and 4) social - development is based on viable, strong social organizations. While gender is relevant to all types, the most important is its relationship to social organizations which are sustainable. These may be at the community level, such as water management groups, the bureaucracy, or planning bodies. But unless these are participatory and strengthened in the process of development, they will easily collapse and none of the other objectives -- technical, economic, environmental -- will be operationalized.

#### IV. NATIONAL STRATEGIES

##### A. Building of national capability: leadership and mobilization

In the "New Delhi Statement", over 600 participants from 115 countries adopted guidelines to improve safe water and sanitation for the 1990's. Among the four guiding principles was provision for "Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behavior, and the full participation of women at all levels in sector institutions" This statement was a welcome renewal of commitment to changing the institutional structures affecting women's leadership and participation.

##### 1. NGOs.

In building up of national capability, there are many institutions which needs strengthening. Among these are water and sewerage utilities management systems, technical training institutions, and community management groups. But an interesting new focus has been on the integration of non-governmental organizations (NGOs) into public and private sector activities. Governments are approaching NGOs to provide services, assist in community level training and mobilization and provide linkages between public services and local groups. Large-scale NGO programs involving water and sanitation are underway in Honduras (CARE), Indonesia (Dian Desa), Kenya (KWAHO), Pakistan (AKRSP) and Thailand (PDA). (25) In all cases, strengthening the women's decision-making role within the institution can have an important impact on building up women's leadership and mobilization.

In some cases, as among the Mossi "Naam" groups, the founder of the group along with the struggles of younger women

within the organization helped to promote women's equal participation within a comprehensive program for rural development. The NGO provided for equal representation for women in project management committees. They also trained women extension workers from the villages who lived in the region and conducted consciousness-raising activities. Women were given equal roles in key economic positions such as planning and supervising cooperative groups; these were guaranteed in the organization's charters. The central Naam group also provided administrative and technical assistance to local groups which had already demonstrated their ability to promote equal participation of women in order to encourage other groups to do the same.

In another instance, the Kenya Water and Health Organization (KWAHO) helped assist communities in developing self-help water systems by focusing on women. In cooperation with UNIFEM, the UNDP/ PROWESS program, and other development agencies, village women were trained in community organization and development, maintenance and use of simple water supply systems. As a recent report noted: "Encouraged and supported by the approach of KWAHO extension workers, women have utilized increased availability of time and water for horticulture. Water groups have increasingly branched off into a variety of production activities including poultry keeping, processing of red oxide and production of cloth. This has, in turn, increased cash contributions towards pump maintenance and the probability of its long-term survival." (26) Similar successes in working with women's semi-official NGOs are reported in Timor, Indonesia (27)

With the doors widening for NGO involvement, two kinds of strategies emerge. The first, similar to that of the Naam group, promotes women's decision-making and empowerment within a viable, participatory NGO structure. This ensures women of structural and administrative support and integration with mainstream development activities. It also means that male leaders and bureaucrats have routine channels to interact with "women's projects" and that the whole community and even regional resources can be called upon by women leaders. Another kind of strategy is that in which a women's NGO, such as local garden groups or the KWAHO groups initiate projects and gradually link themselves with local and regional development projects. In some cases, as among the Casamance garden groups in Senegal, the women's projects become so successful in water-related income-generation projects that men ask to become involved. At some point, it appears essential that a "women's NGO" make these linkages with male leaders and the dominant institutions so that the burden of water development does not fall entirely on their shoulders. These linkages will become even more crucial as women become leaders in the larger-scale water projects and resource management.

In order to further strengthen NGO involvement, there is room to launch nation-wide information and education campaigns in order to reach all development-related NGOs. While many NGOs exist, not all of them are aware of the importance of water and environment issues as they relate to other development efforts. Because water is only one of the many underlying ecological factors affecting poverty and sustainable development, a wide variety of NGO exchanges would enrich the programs. NGOs need more information on how their activities may help build or destroy the environment; they need to exchange ideas on the problems of promoting women's role in an integrated environmental management at the local level.

## 2. Youth and education programs

Building up leadership which respects women's role and which is focused on ecologically sound development begins with youth. That appears obvious. And, in countries such as Honduras, Indonesia and South Korea, children have contributed their time and labor to reforestation programs and helping in community development projects. Still, there is room for much more focus on youth and education programs. In some cases, where women's organizations are difficult to operationalize, girls can still participate in youth groups. For example, in Pakistan, the idea of youth organizations handling domestic water supply projects was much more acceptable than to have women's groups do them. It was also possible to start female youth organizations particularly where there were girls schools.(28) The ideology and organizational model of the "Naam" NGO was also based upon the youth "naam" groups. Unlike the ranked age and kin institutions, the youth "naam" groups were traditionally much more egalitarian and cooperative. Also, there were female as well as male "naam" groups, and girls had considerable freedom within them. The principles of this "youth" group then became the basis of a regional development group involving all ages, but it was much more acceptable than a modern "cooperative" concept precisely because it was traditional and understood.

Building up the national capability through schools and extra-curricular activities as well as through traditional youth groups means that many more educational materials are needed -- ones which not only create awareness about the environment, but which also help break down sex role stereotypes. A gender-oriented curricula would help to break-down gender biases related to the division of labor between girls and boys, and to the need for more girls to enter technical fields such as water engineering. Also, more innovative means are needed to reach girls who may not be able to attend school or who are confined to their homes. These may be through women's groups, or, they may be through religious institutions and NGOs.

In sum, when allocating resources to building up of national capability, it is important that these also be given to NGOs which promote women's participation and to youth and education programs as well as to the more traditional areas such as improving urban water management. And, in order to be effective, NGOs and local community groups have to have decision-making powers as to the planning, implementation, monitoring and evaluation of projects.

## B. Policy and Planning

### 1. Participatory structures

Women's movements sometimes are cynical about the importance of legal reforms or changing national policies, noting that in any case, if the political will is not there, they will not be enforced. But this is probably short-sighted. The structural context defined by policies, legislation and the planning mechanism defines the limits and possibilities of women's overall participation. Accordingly, it can be dynamic or sporadic, a basis for a grass-roots movement or existent only "on paper". If the national planning mechanisms are highly centralized, very likely women's participation on a national level will have to conform. Examples of centralized, anti-participatory structures which have involved women can be found in many countries, particularly those under military rule. It is unrealistic to think that women's participation can have a national impact if the national policy and planning structures are not supportive, and targeting these for reform would then be the first priority.

In water and sanitation programs, some headway has already been made; there is a welcome trend towards decentralization so that the role of the central government as the main provider of services is being modified to provide room for more regional planning, the private sector, and community participation. More than 20 countries including Bangladesh, Bhutan, Cape Verde, Ethiopia, India, Nepal and Somalia have reported that committees have been established at community level to manage maintenance systems.

This trend towards decentralization takes many shapes, and it should not mean that the central government can be relieved of major responsibilities. Local institutions have to be strengthened. In the water-related services, there has to be an investment in building social leadership at local level and financial support is required to provide technical training and management skills. Likewise, to protect water resources and monitor the environmental impact of development, strong central government in-

initiatives are required in national quality control institutions and effective enforcement bodies. In brief, structural and financial support to women's participation is required even with moves towards decentralization .

## 2. "Integrated management" - intersectoral coordination

Another policy and planning issue relevant to the ecological approach to water is the need to improve intersectoral coordination particularly between health and water sectors and between those affecting women and children's economic and social status. There are many examples of how narrow planning in one sector alone can multiply problems for national development. Researches clearly indicate now that provision of better quality and quantity of water, without linkages to improved sanitation practices and health information will not significantly lower the incidence of disease. (30) and deforestation due to over cutting by commercial forest companies, agricultural encroachments and displacement of impoverished farmers to uplands has resulted in a disruption of water shed systems and downstream flooding. In the Ganges River, dry-season water flows have declined by almost one fifth during the 1970's. The ozone-layer depletion resulting from the CFC chemicals released in the air will lead to a global warming with possible destruction of the phytoplankton-based food chains in the seas. (31)

Narrow water sector planning overlooks the potential of human resources and loses opportunities to widen the impact of water development . If local water systems are to be maintained the community must begin to take more responsibility for them. But water projects must include or be linked to poverty alleviation. As one report put it "If we expect poor people, especially women to pay for water and sanitation facilities, we must provide or create opportunities for earning increased incomes" (32)

While 77 countries have reported establishment of national action committee for water supply and sanitation, or similar mechanisms to improve inter-agency and intersectoral coordination, they have not always been operationalized or effective in implementation. (33) Also, a review carried out in 1984 by the Director-General of WHO showed that in many countries the national health councils and coordinating committees for health do not include representatives of the agencies responsible for water supply and sanitation. (34) Indeed, there are often weak linkages between those sectors looking after the welfare of women and children ( health and family planning, women's bureaus, child welfare etc.) and economic development planning. Problems ranged from non-functioning committees, to lack of competent staff, and lack of technical expertise on intersectoral matters.



Initiatives to improve the situations have taken place in some countries. One UNICEF report states that in programs including those in Mauritania, Central African Republic and Chad, water supplies with simple irrigation are related to domestic vegetable gardening. (35) In South Korea, rural women's groups helped organize the government "package" of household technology improvements designed to save time. These included improved domestic water supply, alternative fuels (to replace wood), more efficient kitchens and family planning. This strategy was effective in releasing women's time for cash crop production and children from child labor so that they could attend schools.

Income-generation and community development are often the felt need of an entire community so that when these are integrated with health and water and sanitation they have stronger community support. One innovative project in Gujarat, India based its vector control activities on an integrated environmental management approach combined with social and economic projects. Algae was removed from waters breeding malaria mosquitoes and used to make paper. Stagnant ponds were cleared and converted into playgrounds for children. Larvorous fish were raised to eat mosquito larvae, but they could also be sold. A social forestry scheme planted trees to dry the marshy areas which also provided more fuel. The project was able to show that the strategy was cost effective compared to the cost of using massive DDT spraying and other chemical methods. Furthermore, women and children benefited from the community development projects and became enthusiastic supporters of the early detection of malaria. (36)

Another important example is the private Grameen Bank, an NGO established to help improve Bangladesh's rural landless. It offered collateral-free assistance to the rural poor for productive enterprises and tube wells to members on a sale or part loan basis. Under the agreement, tube well materials were made available from local stores where the Bank had branches and money was raised by selling these in a revolving fund. By end of 1987 there were over 1500 applications for wells from members; over two-thirds of them were landless women. (37)

At the national level, mechanisms need to be developed to coordinate such projects, and to provide planning forums for integrated programs. These may be under the rubric of "integrated environmental management" which draws together various sectors into working groups, or "integrated pollution control" dealing with a specific aspect of the environment. In all instances, women must be seen as managers as well as implementors and their interests represented at the planning stage.

### C. Technology development and transfer -

During the Water and Sanitation Decade, the development of low-cost, appropriate technologies has resulted in better coverage for the poor and better services for money spent. (38) For women and children, low-cost hand pumps which could be cheaply maintained, and designs which made it easier for women and children to use facilities have been important advances. Technology development and transfer continues to be a major concern for other important agricultural and urban water needs. Gravity-fed water supply, simplified water treatment processes, improved rainwater catchments, and increased efficiency of irrigation systems have provided alternatives to high-cost systems.

Efforts have also been made to overcome "bottlenecks" in the "transfer" phase. At the regional levels, in the Americas, the Pan American Center for Sanitary Engineering and Environmental Sciences has become a central processing unit of information and documentation with 213 collaborating centers in 20 countries. Other regions have similar mechanisms to ensure that advances in appropriate technology undergoes "field trials", combining action-research approaches with the introduction of technological innovations. In the Southeast Asia region, considerable attention has been paid to women's participation related to new water technology. (39)

Perhaps the most interesting contribution of recent projects concerning women's participation in water has been the substantiated argument that women can make technology transfer more successful and sustainable. Once they are effectively trained in maintaining pumps or building latrines, they may carry on the activities with much more enthusiasm and over a longer period of time than if the activity had been left to conventional village leadership. For example, women latrine-builders in Lesotho were reported to have good coverage because they extended credit to households and followed-up more with health information. As communicators and awareness-builders, women's involvement in technology can become an important first step in behavioral changes which are needed to improve health -- notably in safe water use, hygiene and water conservation.

At the same time, the well-known problem remains that in women are often by-passed when it comes to access to new technologies or training. This is particularly true in water technologies related to economic production, notably those in irrigation, fisheries, and industry. Much more needs to be done in these sectors to change the stereotype of women as non-producers and to involve them more fully in decision-making about types and uses of technologies.

#### D. Resource management for sustainable women's participation

The economics of "Water for Life" is a crucial factor in determining the sustainability of women's participation in water

projects. Although costs may have been lowered in some rural areas with appropriate technologies (for example, a family tube well with hand pump costs from \$50 to \$200 in Asia in 1990 ) in most cases, costs are still beyond the means of the poorest people. (40) When credit is made available (as in the case of the Grameen bank in Bangladesh), women have shown a keen interest in investing in water and sanitation. In urban areas, the situation is exacerbated by proliferation of water vendors who sell water at high prices. In Honduras water could take up to 20 percent of a household budget. (41)

The national and international economic situation has been highly unfavorable to increasing external resource mobilization. As noted in the New Delhi meeting in 1990, over half of the developing countries experienced a reduction in per capita income in the last decade. Inflation has meant rising costs for all goods and public investment has declined on the average from 10.9% of GDP in 1985 to 8.7% in 1988. (42) This will force governments to rethink their commitments to public service expenditures. Cost-recovery has to be a consideration, even when discussing women's participation.

One point which is often overlooked is that measurements of cost-benefit have too often been based on data from a single sector. Thus, the water supply for urban areas may consider only the information on cost recovery analysis of an improved piped water supply to a low-income area in terms of hardware spent, labor-time to build, supplies related to payments by consumers etc. However, when considering the linkages between water supply and other sectors, notably health or agricultural production, the cost-benefit analyses can look quite different. Whereas it may seem like a "cost" to improve domestic water supplies in rural areas from a water sector point of view, it is actually an investment from the point of view of productive labor if you consider the labor hours saved from improved health of the working population. Similarly, while it may seem like a costly service to ensure that rain water catchment containers have proper lids, it is an investment for the health sector in prevention of DHF. Lids may cost only \$1-2. a piece whereas during epidemic times, the case management of DHF can run as high as \$300 per case. (43) It would, thus, be useful, for more cost-benefit analyses research to be conducted in water-related activities in health or agriculture, particularly those which affect women and children.

Faced with these constraints, governments seek means to cut costs, to ensure cost-recovery, and to solicit greater inputs by consumers. One means, naturally, has been the promotion and greater acceptance of innovative low-cost appropriate technologies. Nigeria is reported to have reduced the cost of hand pump-equipped borehole to one-fifth the original cost and in the Sudan, to one-third, by using more appropriate technology. (44)

Assessments made of the effectiveness of national community management of water and sanitation systems indicate that they contribute to higher rates of functioning water systems. Indonesia and Benin report 80 percent of systems working at any one time, and Egypt reports 96 percent. (45) When costs are low and services reliable, it becomes more reasonable to request consumers to bear part of the costs of water systems.

An interesting way to reduce costs while improving the income of women is allowing women to act as water and sanitation "entrepreneurs", maintaining water systems and build latrines at low cost. The example in Lesotho in which both men and women were trained is outstanding. While the construction target for the pilot phase was modest, requiring only 400 latrines to be build in three years, over 600 were built in the same period. Ninety percent in 1986 were fully paid for by rural householders who purchased the materials and building fees. (46) As private sector involvement in water services is encouraged, it is important that the government consider women as potential workers.

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etc)

#### E. International Action

At the international level, considerable attention has been paid to women's participation in safe water supply and sanitation so that the level of awareness has been raised. The work of WHO, GEMS (Global Environment Monitoring Systems), UNDP, PROWESS, UNICEF, UNFPA and UN agencies and international NGOs has been vital in influencing national policies and planning concerning the importance of water issues as part of a total environment approach.

There is still a need to promote greater awareness of the relevance of other water sector activities, notably in economic planning, to women and children's welfare. For example, in the Second session of the Preparatory Committee for the UNCED in Geneva, 1991, women are mentioned only in relationship to two of the seven key areas requiring action, notably safe water supply and sanitation and strengthening institutional and manpower capacities. (47) The other five areas are equally relevant. In each instance, the impact on women and children's welfare is often different than that on men, due to gender-biases in economic and social organizations. For this reason, it is important to ensure that they are accounted for in all areas of action. Among these are:

- a) environmentally sound development - freshwater resources
- Women's current role in management of household water supplies, as well as their role as agricultural and fisheries workers is a key factor in the ecology of freshwater resources. Women must be given information concerning preservation of

ecologically sensitive water resources and conservation, and they must be included in decisions affecting their work.

b) management of transboundary watercourse and international lakes

Women as agricultural workers are affected by regulations concerning shared water resources and inter country agreements on international river basins. In cases in which these require the cooperation of producers and workers living in basin areas, education and information should be provided equally to women. National NGOs may be more involved in such initiatives and assist in information dissemination

c) Control of water pollution

In all aspects of the control of water pollution, including protecting fisheries, development of an integrated pollution control policy, and in research and testing of appropriate techniques for pollution reduction and control, consideration is needed to the special needs of women and children and the potential of their involvement in programs. Women as householders and mothers are typically strong supporters of positive actions taken to protect food supplies and the health environment of children. They can help provide vital information concerning community needs, the right direction for policy formulation, and mobilize support for implementation of policies.

d) Use of living freshwater resources

Policies related to the maintenance of genetic variability and living aquatic resources along with improving fisheries development are of concern for women and children, particularly in tribal and ethnic minority groups. In many instances, commercial interests may conflict with those which are beneficial to the poorest population, or tribal groups with traditional rights to freshwater resources. In all cases, it is important that women from various ethnic and tribal groups be informed and involved in decisions concerning use of freshwater resources in order to protect their interests and rights and to ensure a fair national policy.

e) capacity-building for monitoring

Plans for water quality monitoring networks, national laboratories and research on water quality are important actions at the national level. However, in many developing countries, these will not be fully implemented for many years; nor are they able to monitor in remote areas. In their absence, it is important that local community management be encouraged and that women be provided with adequate leadership role so that they can be equal partners in monitoring and evaluation at the local level

## V. CONCLUSIONS

In conclusion, a few points can be emphasized. The first is that women's equal participation in an ecological approach to poverty and development is a human right. This right is claimed on the basis that the negative impact of environmental degradation related to water has an effect on women and children in poor rural and urban areas which is unequal and profound. It is also based on the premise that poor women and children have a right to their share of development's benefits as they are active members of agricultural and industrial labor forces.

Second, their economic and social roles bring them into a total relationship to the ecology, not just to domestic water supply. All aspects of water resources management, finance, technology development and transfer, and training affect are relevant to the welfare of women and children.

Third, the commitment to women's participation means more than "integrating" their concerns into an existing program or planning structure. Instead, it means that structural adjustments in the process of power and decision-making must accommodate for inequalities by gender, class ethnicity or region. There must be a dual national system of planning, one which provides strong central leadership and another which is based upon the participation of diverse groups at local level.

To reiterate, the problem is not the occasional ad hoc development project or the next five-year plan. As noted earlier, development is a process of continual changes in the ecology, often with unexpected and detrimental results. Crash programs imposed from above without sufficient feedback from recipients have led to landscapes of broken down pumps and wasted health resources. National systems which were once successful in "delivery of services" from center to periphery stagnate or break-down once funds dry up. There is no "feedback" mechanism from the users of the services, and they become disinterested in decision-making processes which by-pass them. A participatory approach is a built-in mechanism of feedback and flexibility within a changing ecological condition. It is in this sense, that the full participation of all disadvantaged members of society is a necessary structural adjustment to ensure an equitable, sustainable development. Successful experiences in women and water programs have shown the way. . Listen to Minata's song:

"We worked together to gather stones  
We made a dam

All the men who travelled to mecca say they gathered stones  
to throw at the evil tombs of the disbelievers

Like them, we gather stones

But we are going to build a dam, a future for our children,  
our village, for the country and all of Africa."

## FOOTNOTES

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4. p. 3, "Adding guinea worm control components: guidelines for water and sanitation projects", Wash Technical Report no. 51, May, 1988, Arlington, VA. and Steven A. Esrey, et.al., "Health benefits from improvements in water supply and sanitation", WASH, Arling, VA.
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6. p. 7, WOMEN AND WATER, Asian Development Bank and UNDP, Proceedings of Regional Seminar, Manila, 29 August-1 September, 1989.
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8. Data on Egypt from "Stalking an ancient disease of the Nile", in Source, UNDP, Dec., 1990. Data on Guinea worm p. 123, ICMR/WHO workshop report, 1986 *ibid.*
9. Reported in May Yacoob, et al., "Primary health care: why has water been neglected?", in HEALTH POLICY AND PLANNING, Oxford U. Press, 1989.
10. "Progress report on poverty and environmental degradation - report of the secretary-general of the conference", Preparatory Committee for the United Nations Conference on Environment and Development, Second Session, Geneva 18 March - 5 April, 1991.



- 11.p. 2, Norman Myers, *ibid.*
12. p. 10 and 11, "Background paper" for the Global Consultation on Safe Water and Sanitation for the 1990's, September 10-14, New Delhi, India, 1990.
13. p. 9, *ibid.*
14. p. 12. *ibid.*
15. For an interesting report on innovative urban water projects, see "Water supply and sanitation to urban marginal areas of Tegucigalpa, Honduras", UNICEF Guatemala.
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18. For recent assessments of the Decade, see Joseph Christmas and Carel de Rooy, "The decade and beyond: at a glance", UNICEF, New York, 17 August, 1990 and the Background Paper for the Global Consultation on Safe Water and Sanitation for the 1990's, *ibid.*
19. p. 3, "Water and sanitation: the vital role of women", IN-STRAW News, no. 13, Winter, 1989.
20. p. 4 *ibid.*
- 21 For Senegal, see "Women's garden groups in Casamance, Senegal", in *Assignment Children*, vol. no. 63/64, UNICEF, 1983 pp. 133-153; for Republic of Korea, see "Women and collective self-reliance: South Korea's New Community Movement" in Shimwaayi Muntemba ed., *RURAL DEVELOPMENT AND WOMEN; LESSONS FROM THE FIELD*, Vol. II, Sections 1 and 2, ILO, Geneva, 1985.
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28. p. 127, WOMEN AND WATER, *ibid.*

29. p. 23, ICMR/WHO, *ibid.*

30. See pp. 215 and 212 in WOMEN AND WATER, *ibid.*

31. For more details see Norman Meyers, *ibid.*

32. p. 229, WOMEN AND WATER *ibid.*

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34. p. 10 *ibid.*

35. p. 5 "Annual report 1990: water and sanitation", Water and Sanitation Section, UNICEF, New York, WET/312/90.

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37. p. 78, Maggie Black, FROM HANDPUMPS TO HEALTH, UNICEF, New York, 1990

38. p. 37 "Background paper", *ibid.*

39. p. 8 "International drinking water supply and sanitation decade mid-decade progress review", *ibid.*

40. p. 45, WOMEN AND WATER
- 41 p. 19 in UNICEF, Guatamala report, ibid.
42. p. 39 "Background paper"
- 43 From own WHO field notes, 1987
44. p. 24, 1990 UNICEF Annual Report, UNICEF, new York.
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46. p. 6, "Rural Sanitation in Lesotho" Water and Sanitation Discussion Paper Series, , DP no. 3,UNDP/PROWESS.
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