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Women and Water Management

The Latin American Experience

edited by

Cecilia Tortajada

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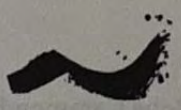

Global Water Partnership

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This book is dedicated to

Johan Holmberg

Assistant Director-General
Swedish International Development Cooperation Agency
As a mark of esteem for an eminent development specialist
and a token of true regard for a friend

Foreword

It is an honour for me as the Ambassador of Sweden to write the foreword for this important book. The book deals with the conditions required to optimize the proper use, from an ecological point of view, of the water resources of our planet. The interesting part of the book is its approach, women and water, two subjects of increasing visibility throughout the world.

Approximately 70 per cent of the world's surface is covered by water much the way the human body contains a similar percentage of water. This undoubtedly motivates us to care for existing water supplies, as water cannot be substituted. The large amount of water on earth could mistakenly lead us to believe that it is an infinite resource, but we must remember that 98 per cent of this supply is salt water. A large amount of the remaining water is in the form of ice on the poles, and only 0.5 per cent of all water is available as fresh water.

One fifth of the world's population today has no access to potable water and more than half of all humanity lacks appropriate sanitary facilities. Beyond a doubt, water resources are necessary to meet the basic needs of all human beings, for health and food production, industrial development, hydroelectric power generation and ecosystem conservation. Economic and social development of developing nations depend heavily on reliable availability of adequate quantity and quality of water. Without the proper management of rivers, lakes, and groundwater, from which we get our water, we shall only further create serious problems for the present and the future generations.

The subject of this book leads to a discussion of one of the most

important matters for the global community. That is, how to care for our environment and our water, and how to properly manage the earth's resources and thus consolidate sustainable development for all. We alone hold the joint responsibility for the proper use of the resources offered by our planet.

In many countries, water resources are subject to unscrupulous use. With neither the necessary knowledge and expertise nor the will to treat waste-water systems properly, rational water management has become a very difficult task in many developing countries under the best of circumstances. In many cases it is the presence of several concurrent factors which serves to create negative effects within the environment. Amongst these factors are poverty, increasing populations, short-term economic policies, lack of adequate investment, and the obvious scarcity of natural resources.

During recent decades, there has been an increased awareness of the importance of a rational use of water resources. The problems, however, continue to be severe. Through improved knowhow and new technologies, the possibilities of proper use of natural resources have increased.

During the Rio de Janeiro Summit of 1992 on environment and development, the UN member states agreed on measures to improve different environmental aspects. The Rio conference has played an important role in global co-operation for environmental conservation. Of special importance is the final document, the now famous Agenda 21, in which the countries agreed to common efforts to achieve sustainable development for ecology. Agenda 21 not only made developing nations assume greater responsibility for conducting environmental reforms but also established the responsibility of industrialized nations within the same context. The latter must modify their production and consumption patterns, with greater consideration given to the environment and existing natural resources.

Quite possibly it is even more important to produce dynamic and clear will amongst politicians, managers and researchers, so that the severity of the problem may be truly understood only then, there may be a profound commitment to do something about it. Not only should the people who hold important positions in society work

towards a more rational and equitable use of water resources, but so should individual members of the society. We all have a responsibility to achieve this goal.

The situation for women in many countries has changed in the last few years. Through debate and work done in favour of sexual equality, there are now more favourable conditions for the meaningful participation of women than ever before in history.

In Sweden, there has been an open debate on gender equality. After the 1994 elections, more than half the ministers appointed are women. For some years now Sweden has an ombudsman for equality between the sexes, whose purpose is to be aware of any possible cases of discrimination against women.

This experience teaches us that many times it is crucial to highlight the role of women in not-so-obvious fields; for example the planning and use of resources or in environmental legislation, fields of endeavour for engineers and lawyers, professions that have traditionally dominated by men. Women should also play a part in creating a society which is ecologically responsible. In many ways, the viewpoint of women can contribute new ideas and measures towards sustainable development. It is not a mere coincidence that the majority of the overwelming contributors to this book are women—women who understand, analyse and stress the role of other women.

The Swedish experience and that of many other nations indicates that it is fundamental not to separate the subjects of equality and environment. The joining of both can produce more favourable development for all. During recent decades, many important things have been done in Sweden in the environmental sector. Still, there is much more to be done, but we Swedes are proud of what has been accomplished thus far. For example, in Stockholm, after extensive clean-up, water in the lakes downtown is good enough to bathe in. In fact, it is suitable for use as drinking water.

Each August a seminar is organized in Stockholm on water management. This has now become the major water event of the year on a global basis. Experts come from all over the world for a few days to discuss improvements and development in the field of water resources. It is with great satisfaction I note that the Third World Centre for

Water Management, and the two most important personalities from Mexico responsible for this book, Dr Cecilia Tortajada and Professor Asit K. Biswas, have played and continue to play critical roles for the Stockholm Water Symposium. Their involvement has already ensured that the conclusions and recommendations that stem from concrete programmes in the area of water management, this book result in and highlight the role that women can play in this process.

There is the desire to share the knowledge and understanding achieved in Sweden, in the field of both equality and environment. The Swedish Agency for International Cooperation and Development (SIDA) has contributed towards the preparation of this book. It is my hope and conviction that with the expertise and will of the global community sustainable development will not only be possible, but that it will also take into account respect for the natural resources we have been endowed with. The opinions of women everywhere shall make the possibility of success even greater. It is our duty to conserve what we have—there is no substitute for it.

I am confident that this book will be a major contribution on the important issue of the critical roles women can play, and should play, in ensuring efficient water resources management in this World. I wish the book every success, and its editor, Cecilia Tortajada, much professional success.

Karin Ehnbom de Palmquist
Ambassador of Sweden to Mexico
Mexico City

Preface

The active participation of women, who comprise approximately half the world's population, is critical for ensuring sustainable human development through their actions on environmental management. In the area of water management, the role of women has thus far been focused primarily on them as providers and users of water at the household and community levels. However important and appropriate these roles may be, the contributions of women are not limited to these activities. Equally important are the significant roles women play, and could play, as decision-makers, planners, managers and research scientists in making sustainable water resources development and management possible throughout the world.

In order to fill this gap, the Third World Centre for Water Management, the Committee on International Collaboration of the International Water Resources Association (IWRA), Inter-American Institute for Cooperation of Agriculture (IICA) in Brazil, Swedish International Development Cooperation Agency (SIDA), Global Water Partnership (GWP), and the International Water Management Institute (IWMI), jointly convened a Latin American Workshop on the Contribution of Women to the Planning and Management of Water Resources in Mexico City on 21 and 22 May 1998. Participation to the workshop was by invitation. Leading experts from Latin America were carefully selected and specially invited to participate in the workshop.

The main objective of the workshop was to analyse the roles women play, and could play, in sustainable water resources management, not as

an end but as a means to an end, the end being efficient and integrated water management which could improve the quality of life of people and simultaneously protect the environment. Another important objective was to provide a forum wherein the experiences of senior women decision-makers and professionals from the various Latin American countries could be objectively reviewed in order to draw practical and operational lessons from this collective knowledge. The workshop was also expected to contribute to the development of an informal network of senior water professionals (both women and men) who are working on, or interested in, water and gender issues in rural and urban areas in different countries of Latin America, specifically in terms of macro policy and management issues.

The two-day workshop analysed twelve specially commissioned background papers on the noteworthy contributions women are making, and can make, in the overall area of water resources planning, management and decision-making in Latin America. Some of the issues analysed were the roles women have played so far in different parts of Latin America, and the roles they should and could play in future in the management, planning and use of water resources under different conditions, cultures, institutions and legal systems.

The speakers represented sixteen national and international organizations, with case studies from diverse countries—Argentina, Bolivia, Brasil, Costa Rica, Ecuador, El Salvador, Mexico, Panama, and Peru. The workshop was restricted to around forty carefully selected senior professionals from federal and state governments, private sectors, universities, research institutions, and NGOs from different countries of Latin America, as well as some national and international organizations like Inter-American Institute for Cooperation of Agriculture, Global Water Partnership, International Water Management Institute, Organization of American States (OAS), Interamerican Development Bank (IDB), UNDP, CEPAL, British Council, International Water and Sanitation Centre (IRC) in The Netherlands, and Mexican Agricultural Trust Fund (FIRCO). All the participants were invited in their personal capacities to ensure free and frank discussions.

All twelve commissioned papers were application-oriented and

well-documented studies, based on years of management and research investigation. General and dogmatic papers were discouraged from the initial planning stages of the workshop. It was an enlightening experience to listen to participants from several disciplines who shared their views on the current contributions of women in the field of water, and on how women currently influence water resources management at national levels. Most of the participants invited to the workshop were senior women decision-makers who generally had not participated in such meetings earlier. While there were agreements on many issues, there were naturally some disagreements as well.

Probably one of the most notable findings was the difference in the mind-sets of senior women professionals working in the water sector, compared to women professionals active on gender issues. Everyone agreed on the importance of increasing the participation of women, not just in the water sector but also other development sectors as well. Senior women professionals working in the water sector emphasised the achievement of women, whereas those working on the gender issues focused primarily on the discrimination faced by women, both real and imagined. Even though development of concrete proposals for research and study were an integral part of the workshop, professionals working on gender issues, while basically arguing for a much higher level of participation of women in the 'corridors of power', were unable to make any concrete proposals on how this could be achieved.

It was agreed that water resources management is not only a technical issue but includes political and social issues. In order to improve the overall water management process, the participation and the contribution of all actors should be objectively analysed. Women are clearly half the main actors in this field. Their presence has been fundamental historically in the provision and management of water at household, community, and agricultural production levels. Yet women have been increasingly occupying management and decision-making roles only more recently.

Of the different issues discussed, the principle of increasing women's involvement at all levels was strongly supported. Even though

this has created a certain momentum, it does not necessarily reflect the many existing realities. Statements by themselves are unlikely to improve the situation in the forseeable future.

It was also noted that women alone cannot play a pivotal role in properly managing water resources; society as a whole must be concerned with it. Similarly, to consider women as only providers and users of water is to stress the fact that women are solely responsible for domestic work. This is unlikely to contribute to significant long-term benefits for society. Society has to be better equipped to deal efficiently with water problems and has to be empowered to influence the decision-making processes. Communication, training, formal and non-formal education, transfer of information and interdisciplinary teams were considered to be fundamental issues which could contribute to integrated water resources development, and also increase the participation of women. The importance of the role of NGOs was stressed.

In rural areas, both women and men carry the heavy loads that poverty and water-scarcity bring. Women have to carry out two different sets of tasks: one imposed by their responsibilities at home, the other by responsibilities as a farmer. In addition, male emigration has created new roles and responsibilities for women. Their role as decision-makers in irrigated lands increases significantly when men emigrate. It is because of the importance of the new role women are playing as administrators and producers of irrigated lands that the managers and users of irrigation districts need to redefine the role of women in order to improve the efficiency of overall water resources management. Women need the necessary technical training to plan and manage the water supplies and facilities by themselves.

An important lesson of the workshop was the recognition of the importance of participation by women in the management, planning, conservation and use of water resources, and to improve the quality of life of the families and communities of which they are part of. Women are being increasingly recognized as important contributors to water management sector at different levels, even though the change in the mindset of water professionals has been somewhat gradual. The number of women who are senior decision-makers is still low.

However, there has been a remarkable increase in the number of women who are planners, supervisors, managers, researchers, operators, and technicians. There was a general consensus that barriers are breaking down in Latin American countries, and women are already taking advantage of this change. While more could be done, the progress already made by women water professionals in certain Latin American countries needs to be properly recognized. This could serve as a model in the remaining countries of the region as well as for the rest of the developing world.

An important workshop like this could not have been organized without the support and encouragement of many dedicated individuals. On behalf of the Committee on International Collaboration of the IWRA, I would like to express our most sincere appreciation to Gertjan Beekman, Helio de Macedo Soares, and Gerardo Escudero of the Inter-American Institute for Cooperation in Agriculture (especially their Brazilian office); Johan Holmberg and Leif Rosenhall of the Swedish International Development Cooperation Agency; Torkil Jonch-Clausen and Jorge Rogat of the Global Water Partnership; Carlos Garcés of the International Water Management Institute, and Benedito P.F. Braga, President of IWRA. It simply would not have been possible to organize the workshop without their unstilted help, advice and support. However, my greatest debt of gratitude is to Asit K. Biswas, President, Third World Centre for Water Management and Past President of IWRA, who not only helped me to raise the necessary funds to organize the workshop but also gave me his wise counsel and valuable time every step of the way. I am most grateful to all the above for all their help, which made the workshop an outstanding success.

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Contents

CHAPTER I

Water: A Symbolic View

Gertjan B. Beekman and *Tamara M. Costin*

Water is a typical symbolism of the unconscious, since it alludes to the origin, to abysmal depths, to the motherly womb. The symbolic significance of water can be reduced to three dominant themes: source of life, medium of purification, and centre of regeneration. These three themes are found in the most ancient traditions, they form most varied imaginary combinations as well as most coherent ones.

Water, an undifferentiated mass, represents the infinitude of the possible, contains everything virtual, the informal, the germ of germs, all the promises of development, but also the threats of reabsorption. To submerge oneself in water and to get out again without being dissolved in them completely, save for a symbolic death, is to return to sources. This means resorting to an immense deposit of potential and from there to extract new strength: a transient phase of regression and disintegration that conditions a progressive phase of reintegration and regeneration (→bath→baptism).

In different cultures these terms vary, but they have an almost identical basis.

In Asia water has been seen as the origin of all life and the element of corporeal and spiritual regeneration, the symbol of fertility. Water is the prime source: 'all was water' state the Hindu texts; 'the vast waters do not have borders,' says a Taoist text. 'The water is Wu-ki', say the Chinese, the 'without summit', the chaos, the foremost indistinction.

The notion of the primordial waters of ocean origins is almost

universal. It is found in Polynesia, and the greater part of the Austro-Asiatic people consider water to be the cosmic power. It is the source and vehicle of all life: the sap is water and, in certain tantric allegories, water represents *prana*, the breath of life. Water from the skies makes the paddy, say the mountaineers of South Vietnam, who are also very perceptive to the regenerative function of water, which to them is the elixir of immortality.

Water is the instrument of ritual purification from Islam to Japan. This is so in the rites of the ancient Taoist *fu-chuei* (masters of consecrate water), not forgetting the use of holy water by the Christians, among whom ablution plays out an essential role. In India and Southeast Asia the ablution of sacred statues and of the faithful (particularly in the New Year) is the time of purification and regeneration. 'The nature of water leads to purity', writes Wen-tse. It is 'the emblem of supreme virtue', teaches Lao-tse. It is also the symbol of Taoist wisdom, since it has no opposition—it is free and without bonds, it lets itself flow following the slopes of terrain. It is the measure, since strong wine must be mixed with water; this is the wine of knowledge.

Water, opposed to fire, is yin. It corresponds to the north, to the cold, to the solstice of winter, to the centres, to colour black. But in another way water is related to lightning, which is fire. In this manner, if 'the reduction of water' by Chinese alchemists can be perfectly considered as a return to primordiality, to the embrionary state, it is also said that this water is fire, and that hermetic ablutions must be understood as purification by fire.

It must also be pointed out that the ritual water of Tibetan initiations is the symbol of vows, of commitments held by the postulant. In Jewish and Christian traditions water symbolizes, foremost, the origin of creation. The Hebrew 'em' (M) embodies the sensitive water: it is mother and matrix, source of all things. In every way water, along with all other symbols, can be acknowledged in two rigorously opposite levels. Water is the source of life and the source of death, creator and destroyer.

In the Bible the desert wells and the springs that offer themselves to nomads are places of joy and astonishment. Near spring and wells essential encounters take place; as sacred locations, these spots have

an incomparable role. Near them love flourishes and matrimony is prepared. The march of Hebrews and the walking of each man during his earthly pilgrimage are intimately related to an exterior and an interior contact with water; this results in a place of peace and light. Palestine is a land of torrents and springs; the pacific waters of Siloe irrigate Jerusalem. The rivers are agents of fertilization of divine origin; the rains and dew give it fecundity and manifest the benevolence of God. Without water the nomad would be condemned to death and burnt by the Palestinian sun. Thus the water that he finds in his way is comparable to manna: quenching his thirst, it nourishes him. For this reason one pleads for water in prayers, it is an object of supplication. 'Hearken God unto the cry of thy servant, send the showers and help find wells and springs.' Hospitality demands that fresh water be offered to the guest and that his feet are washed, so as to assure his peaceful rest. All of the Old Testament celebrates the magnificence of water. The New Testament receives this legacy and knows how to make use of it.

Yahweh compares Himself to spring rain, to the dew that makes flowers grow, to fresh waters that runs down from mountains, to torrents that wet. The pious one is similar to the tree planted at the shores of running waters; consequently, water appears as a sign of blessing. However it is fitting to recognize in it precisely its divine origin. According to Jeremiah, the people of Israel in their infidelity, disapproving Yahweh, forgetting His promises and stopping considering Him as the source of living water, wish to dig their own cisterns—but these crack and don't conserve water. Jeremiah, censoring the posture of the people before their God, source of living water, laments: 'Thou shall make thy country a desert.' Foreign alliances are comparable to the waters of the Nile and Euphrates. The soul seeks its God as the thirsty deer seeks the presence of living water. The soul so resembles a dry and parched land; it waits the manifestation of God, just as the dry land longs to be soaked by rains.

Yahweh bestows water to the earth, but there is another more mysterious water: it expresses wisdom, which directed the forming of waters in Creation. In the heart of the wise man resides water, he is similar to a well and a fountain, and his words have the strength of a

torrent. A man deprived of wisdom has a heart similar to a broken vase which lets knowledge leak. Ben Sira compares the Torah (the Sey) to Knowledge, since the Torah spills the water of Knowledge. Church priests consider the Holy Spirit as the author of the gift of Knowledge that it pours into thirsty hearts. The theologists of the Middle Ages represent this theme and give it an identical meaning. To Hugo of Saint Victor, Knowledge possesses its waters and the waters of Knowledge wash the soul.

It is natural that Orientals have first seen water as a sign and symbol of blessing: Is it not water that permits life? When Isaiah prophesized a new era he said: 'I will make the desert a pool of water . . . the country of thirst will transformed into springs of water.' The seer of Apocalypse speaks no differently: 'The Lamb . . . shall guide them unto fountains of waters of life'.

Water converts itself into the symbol of spiritual life and of the Spirit, offered by God and often rejected by men: 'they have forsaken me, the fountain of living waters, and hewed them out cisterns, broken cisterns, that can hold no water.'

Jesus also employs this symbolism in His conversation with the woman of Samaria: 'Whosoever drinketh of the water that I shall give him shall never thirst; but the water that I shall give him shall become in him a well of water springing up unto eternal life.'

Above all a symbol of life in the Old Testament, water converts itself to a symbol of the Spirit in the New Testament. Here Jesus Christ reveals Himself as the Master of living water to the Samaritan woman. He is the fountain: 'If any man thirst, let him come unto me and drink.' At the stone of Moses, water sprouts from his breast and pours over the cross until it sheds water and blood from his open side. From the father spills living water, which communicates through the humanity of Christ and also through the gift of the Holy Spirit and which, according to the text of a Pentecostal hymn, is *fons vivus* (font of living water), *ignis caritas* (fire of love), *Altissimi donum Dei* (gift of the Highest). Saint Anastasius specifies the meaning of this doctrine saying: 'The Father is the fountain, the Son is called the river, and it is said that we drink from the Spirit.'

Water in this manner is granted a sense of eternity; the one who

drinks from this living water partakes in eternal life. The living water, the water of life, presents itself as a cosmogonic symbol. It purifies, cures, rejuvenates, and consequently introduces the eternal. According to Gregory of Nisa, wells contain stagnant water. 'However the fountain of the Husband is a well of living waters. It has the depth of a well and the mobility of a river.'

According to Tertullian the divine Spirit chooses water from the various elements; and to it goes his preference, because it appears since the beginning as 'perfect matter', fertile and simple, totally transparent (cf. baptism). It possesses by itself a purifying virtue and for this reason it is also considered sacred. As such it is used in ritual ablutions, and with its virtues removes all offense and all taint. Hence the importance given to pure water in Judaism. Only baptismal water can wash away sin and it is never bestowed more than once, since it permits the ascension of a new state: that of a new man. This rejection of the old man, or in other words death in a moment of history, is comparable to a deluge, since it symbolizes disappearance, destruction: an old time was annihilated and a new one emerges.

Water, which possesses a purifying virtue, exerts also a soteriological power. Immersion in it is regenerative and operates a rebirth, in the sense that it is simultaneously death and life. Water erases history, since it re-establishes being in a new state. The immersion is comparable to the burial of Christ: He resurrects after descending to the bowels of the earth. Water is a symbol of regeneration: baptismal water leads explicitly to a 'new birth'. The shepherd of Hermas speaks of those who descended into the water dead but arose from it living. It is the symbolism of living water, of the spring of Juventa. What I find in myself, says Igantio Teoforo, 'is the water that builds and speaks'. It is also remembered that the water of Castalia of Delphos gave its inspiration to the Pythia. The water of life is divine grace. One can recall that water is mingled with the blood that flows from the cloven heart of Jesus.

Worship is often concentrated in the surroundings of fountains. All places of pilgrimage have a spot of water. Water can cure due to its specific virtues. Over centuries the Church has at many times risen against the worship of water, but popular devotion has always

recognized the sacred and sacramentalizing value of waters. Yet the pagan deviations and the return of superstition have always been threatening: the magician watches over the sacred so as to pervert it in the imagination of men.

Nevertheless waters precede Creation, and it is evident that it continues into the present for re-creation. To the new man corresponds the appearance of another world. In certain cases water can perform as the instrument of death. The great waters announced in the Bible proves this. The unleashing of waters is the symbol of great calamities. Water can raze and engulf; tornadoes destroy vines in blossom. Thus water can carry within it the force of damnation. It punishes fishermen, but it cannot reach the pious, who do not have reason to fear the great waters. The waters of death do not concern more than fishermen since water transforms-self into the water of life for the pious.

As an analogue of fire, water can serve as an ordeal. Objects thrown into it are judged, but water itself does not judge. Symbol of the duality of high and low are rainwater and seawater. The first is pure, the second salted. Pure, it is creator and purifier; bitter, it produces damnation. Rivers can be beneficial currents, or give shelter to monsters. Agitated waters mean evil, disorder. The evil are compared to stormy waters. 'Save me, Oh God, for the waters are come in unto my soul, I sink in the mire . . .'

Calm waters signify peace and order. In Jewish folklore the separation done by God, at the moment of Creation, of superior and inferior waters, designates the diversion of male and female waters, which symbolize security and insecurity, the masculine and feminine. The bitter waters of the ocean designate the bitterness of the heart. Man must wade through bitter waters when he becomes conscious of his own misery, and this holy bitterness will transform itself into rejoicing.

In the traditions of the Islam, water also symbolizes numerous realities.

The Koran designates the blessed water that falls from the skies as one of the divine symbols. The gardens of Paradise have streams and fountains of holy water. Even man was created from flowing water.

Jill symbolizes the universe as ice whose substance is water. Here

water is the raw material. In a metaphysic sense, Rumi symbolizes the divine foundation of the universe as the ocean, whose divine essence is water. It fills all Creation and the waves are its creatures.

Furthermore, water symbolizes purity and is used as a means of purification. The Muslim ritual prayer—*salat*—cannot be validly consummated until the one who prays has put himself in a state of ritual purity by ablutions, which are the object of meticulous rules.

Finally, water symbolizes life: the water of life, which is found in darkness, and which regenerates. The fish thrown in the confluence of seas, in the furrow of the Cave, resurrect when submerged in water. This symbolism forms part of an initiation theme: the bath in the fountain of immortality. This theme reappears constantly in the Islamic mystic tradition, especially in Iran. In the legends concerning Alexander, the conqueror starts off in search of the Fountain of Life, accompanied by his cook Andras, who, one day, washing a salted fish in a spring, sees it revive and finds immortality. This spring is situated in the 'country of Darkness' (which no doubt relates to the symbolism of the unconscious).

In all the other traditions of the world, water has an equally primordial role around the three themes already defined, but with a particular insistence on origins. Beginning in the cosmogonic point of view, water corresponds to a complex antithetical symbolism, which must not be mistaken: the descending and celestial water, rain is the seed that makes the earth fecund: thus masculine, and associated to the sky—fire. On the other hand, primordial water, which originates from the soil and from the dawn, is feminine and is associated to the moon as a symbol of consummation, the pregnant earth.

In both cases the symbolism of water contains that of blood. However it is not the same blood, because blood also corresponds to a twofold symbolism of celestial blood, associated with the sun, fire and menstrual blood; and associated with the earth and moon. Through these two positions, one can discern the fundamental duality, light–darkness.

Among the Aztecs, human blood, necessary for a periodic regeneration of the sun, is called *chalchivatl*, precious water, that is to say, 'green jade.' Water, divine seed, also of the colour green, impregnates

the earth to engender the Twin Heroes and the cosmogony of the Dogon. These twins come to the world as men at heart, but also as veiled serpents. They are green in colour.

The symbol of water, a vital and impregnating force, goes even farther—in the thoughts of the Dogon and their neighbours from Bambara. Thus water—or the divine seed—is also light, the word, the generator verb, whose main mythical avatar is the red copper spiral. However water and word do not mingle as act and manifestation, producing the creation of the world, but take the form of a 'humid' word, opposed to its twin half (which remains outside the cycle of life) which the Dogon and Bambara call 'dry water and dry word'. Dry water and dry word express the thought, that is to say, the potential, as much in the human plane as in the divine. All water is dry before the cosmic egg, in whose interior the source of humidity is born and is the basis of the genesis of the world. The Supreme God Amma, when creating his double, Nommo, God of humid water, keeps to himself in the superior skies and puts outside the limits of the universe half of these primordial waters, which are still 'dry' waters. In the same manner, the non-expressed word, the thought, is called a 'dry word'; it is nothing greater than of potential value, it cannot engender. In the human microcosm is the replica of the primordial thought, the first word stolen from Amma by the genie Yurugu, before the appearance of actual men. To Mr Zahan this first word, this undifferentiated word, without consciousness of itself, corresponds to the unconscious: it is the word of dreams, the ones humans do not own. The jackal, or the pale fox, avatar of Yurugu, has stolen the first word, and so possesses the key to the unconscious, the invisible, and consequently that of the future, which is no more than the temporal component of the invisible. For this reason the most important divining system of the Dogon is based on the interrogation of this animal.

It is important to note that Yurugu is also associated to chthonic fire and to the moon, which are universal symbols of the unconscious.

The fundamental division of all phenomena in two categories ruled by the antagonistic symbols of water and fire, of humid and dry, finds a noteworthy example in the funeral practices of the Aztecs. Facts show likewise an analogy of similar symbolic duality with the

notion of parity Heaven–Earth: 'All those who died drowned or struck by lightning, the lepers, the hydropic, ultimately all those that the gods of water and rain made different withdrawing them from the world' were buried. All the other deceased were incinerated.

This relation between fire and water are also observed in the funeral rites of Celts. In the lustral water that the Druids employed to ward off curses, 'was extinguished a firebrand drawn from the sacrificial fires. At a given time, in a house, a large jar filled with lustral water was placed, brought from a house that had none deceased. All that came to the house of mourning sprinkled themselves with this water on parting.'

In Irish texts water is an element submitted to the Druids who do not have the power to bind and unbind. The wicked Druids of King Cormac bind the waters of the Muaster, so as to make people submit by thirst, and the Druid Mog Ruith unbinds them. Drowning is the punishment applied to a poet guilty of adultery.

However, water is also and above all, because of its lustral value, a symbol of passive purity. It is a medium and place of revelation for poets who enchant water so as to obtain from it prophesies. According to Estrabon, Druids affirmed that at the end of the world fire and water shall reign alone. Among the Germanic people the first waters that flow in spring on the surface of perpetual ice are the ancestors of all life, enlivened by southern airs which reunite into a living body—that of the first giant Ymir, from whom all giants, men, and certain gods proceed.

Water—plasma, female, freshwater, lake water, stagnant water, sea water, frothy, impregnating, male; are all carefully differentiated in the Theogony by Hesiod: 'The earth bore light, but without the desirable love, to Ponto, the sterile sea of swollen waves; and afterwards, coupled with the sky (Uranus), bore an whirling Ocean.' Sterile water and fertile water are distinguished in Hesiod by the intervention of love.

Stagnant water, plasma from the earth from whence life is born, appears in numerous Creation myths. According to certain Turkish traditions of Central Asia, water is the mother of the horse. Within Babylonian cosmogony, in the beginning, when neither sky nor earth

existed, 'only an undifferentiated mass extended since ever: the primordial waters. From its mass were detached two elemental principles: Apsu and Tiamat. Apsu was considered a masculine deity, and represents the mass of freshwater upon which floats the earth. While Tiamat wasn't but the sea, the abysm of water mentioned, from whence come out all creatures.'

Similarly a crest of mud emerging from the waters is the most frequent image in Egyptian Creation mythologies, 'A great lotus came out of the primordial waters, it was the craddle of the sun in the first morning.'

German Romantic poets have magnificently sung of the feminine sensual and maternal value of water. It is lake water—nocturnal, lunar and milky—from whence libido is aroused: 'the water, this premier creature, born from aerial fusion, cannot deny its voluptuous origin and, upon the earth, shows itself with a celestial omnipotence as the element of love and union . . . . It was not in vain that the old sages sought in it the origin of things . . . and all our pleasant sensations are not, at last, more than diverse manners of feeling the internal movements of this original water that is in ourselves. Even our proper sleep isn't but the flow of this invisible universal sea, and awakening is the start of its ebb.' And the poet concludes: 'only poets should be in charge of the liquids'.

From ancient symbols of water as the source of making the earth and its inhabitants fecund, one can return to analytical symbols of water as a source of making the soul fecund: the stream, the river and the sea represent the course of human existence and the fluctuations of desires and feelings. As for the earth, it fits in order to distinguish the symbolism of shallow and deep waters. Navigation, the wandering of heroes on the water's surface, means that they are exposed to the dangers of life—that which the myth symbolizes as monsters that emerge from the depths. Submarine regions are thereby converted into symbols of the subconscious. Perversion is likewise represented by water mixed with earth (earthly desire), or stagnant water, which has lost its purifying qualities: the mire, the mud, the swamp. Cold water, ice, both express stagnation in its highest form, the lack of warmth in the soul, the absence of a vivifying and creating feeling

that is love: cold water represents a complete psychic stagnation, a dead soul.

Water is the symbol of unconscious energies, of the formless potentials of the soul and of secret and unknown motivations. It often happens in dreams that one is 'sitting on a water shore fishing. Water is the symbol of the still unconscious spirit, it holds the contents of the soul that the fisherman struggles to bring to surface and that should nourish him. The fish is a psychic animal . . .'

Gaston Bachelard has written subtle variations about clear waters, 'waters of spring season, running waters, loving waters, deep waters, sleeping and death waters, composed, fresh, violent waters, the master of language water, etc . . . which are other facets of this mirrored symbol . . . Mirror less than a chill . . . at the same time rests and caresses, passage of a liquid arch in a foam concert.'

A link between these practically metaphysical impressions and the role of women was the highlight of the International Conference on Water and Environment, which took place in Dublin, where the third article of the Directives Guide specifies that the *woman exerts a central role in the provisioning, administration and handling of water.* Alongside this principle, the fundamental role of woman as providers and users of water as well as defenders of environmental life is emphasized, which has rarely been discussed in institutional gatherings for the development and management of water resources.

The acceptance and implementation of this principle requires positive policies so as to address the specific needs of women, rendering if possible for them to participate in all levels of water resource programmes, including implementation and decision-making. Obviously, this perception is not unilateral and should be seen within its social context, where the active role of all is indispensable.

CHAPTER 11

Women and Water in Humid Tropics

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INTRODUCTION

The term 'Humid Tropics' suggests a climate with sufficient precipitation to enable a broad range of human activities. However, the amount and distribution of water, in place and in time, varies considerably within the region. Some areas experience an annual rainfall of around 2000mm, evenly distributed throughout the year. A vast majority of the countries in the Humid Tropics however suffer frequently from a distinct seasonal pattern. Where precipitation reaches extreme high amounts during the wet season, serious water shortages and droughts may occur during the rest of the year. Annual precipitation may be very high in most of the countries of the Humid Tropics, but rain is merely concentrated in only one or two seasons (Bonell *et al.*, 1993).

Temporary drought, with its reflection on the availability of clean drinking water, is an important constraint in the development of communities, and a severe threat to health in the Humid Tropics. Intense rainfall, on the other hand, is another main cause of water-related problems in the Humid Tropics. It leads to the risk of flooding. Excessive run-off may also cause severe soil erosion. Erosion hampers agricultural development as the sediment, resulting from upstream erosion processes, fills downstream rivers, lakes and reservoirs. The dissolved material in the water also lowers its quality for drinking purposes and has to be considered, in some cases, as a serious pollution. All these considerations make water management in the Humid Tropics a complex task.

Women in the tropical countries, especially in the developing countries, are often referred to not just as water suppliers but most important as water managers, albeit merely at the household level. Daily collection of water is almost entirely the responsibility of women, and it is women who allocate water for its different uses within the household. The participation of women on all management levels is therefore expected. Policy-making and decision-taking institutions are however mostly dominated by men. At the same time in the Americas the tendency registered in these institutions is for the number of women to increase.

In addition, women are more involved in water-related activities than men, and are therefore more affected by a change of its quantity or quality. Consequently, as will be pointed out in this document, women understand better the need for protecting water resources by using them in a sustainable fashion. Furthermore, women are more active and passionate participants in the design and implementation of projects or programmes for the environmentally sound use of water.

HISTORICAL PERSPECTIVE

During the last decade the concept of the significance of women in relation to the sustainable development of our natural resources has received an increasing amount of attention. The report of the World Commission on Environment and Development, *Our Common Future* (1987), which brought the world's attention to the term 'sustainable development' as the ability to meet the needs of the here-and-now without compromising the ability of future generations to meet their own needs, included very little reference to the role that women play in this concept (WCED, 1987). In the Earth Summit that took place in Rio de Janeiro in 1992 the issue of women was included as a distinctive item and was mainstreamed throughout the documentation. The main output of the Earth Summit was Agenda 21—the plan of action for sustainable development for the twenty-first century. This plan included a separate chapter on women and specific recommendations were made considering the role of women as related to poverty, human settlement, health, forests, biological diversity, sustainable agriculture, education and freshwater resources (UNCED,

1992). As far as specific topics of water are concerned, the relevance of women in relation to water supply and sanitation became apparent during the International Drinking Water Supply and Sanitation Decade (1981–1990) and at the conference marking the end of the Decade in New Delhi in 1990, where women made a significant contribution to the discussions. The New Delhi statement recognized that the poor, especially women and children, are the main victims of problems arising from the lack of safe water. The statement recommended institutional reforms, including the full participation of women at all levels in sector institutions, and that women should be encouraged to play influential roles in community-water management and hygiene education.

The importance of the 'gender' dimension was reinforced in the discussions at the International Conference on Water and the Environment in Dublin 1992 (ICWE, 1992), which had one of its four principles devoted to the central part women play in the provision, management, and safeguarding of water. Although it can be stated that the gender dimension has received an increasing amount of attention in the international arena, the implementation of the ideas and theories of sustainable development, especially in the rural environment, require the further involvement of women.

Gender equality is essential for empowering women—and for eradicating poverty. Already, women are on the frontline of household and community efforts to escape poverty and cope with its impact. But too often they have not had a voice in decision-making—in the household, in the community, in national and international arenas. Gender equality needed, and in some countries still needs, to be part of each nation's strategy for eradicating poverty, both as an end and as a means to eradicating other forms of human poverty. This means:

1. Focusing clearly on ending discrimination against girls in all aspects of health, education and upbringing—starting with survival.
2. Empowering women by ensuring equal rights and access to land, credit and job opportunities.
3. Taking more action to end violence against women, the all-too-pervasive hidden side of human poverty.

A creative commitment to gender equality strengthens every area of action to reduce poverty—because women bring new energy, new insights and a new basis for organization. If development is not engendered, it is endangered. If poverty reduction strategies fail to empower women, then they fail to empower society (UNDP, 1997a).

In the Humid Tropics women were mostly involved in projects and programmes as volunteers and labourers. In the middle of the century, they were in a very small percentage in the professional sector. Today, it is widely recognized that it is essential that more women be involved as advisers, planners, scientists and engineers, in all areas from academia to government services. The lack of women at the advisory and policy-making levels in the region was due largely to the disparity between levels of women's and men's education, starting with the most basic education and levels of literacy.

In addition to basic literacy, it is necessary to consider the type of education and the subjects studied. Even in countries where there is no gender disparity in terms of educational opportunities, there were fewer women studying science and engineering. The fact that many women were not technically literate was particularly relevant with regard to water supply and sanitation. It is also noticeable that, not so long ago, fewer women than men were given access to the opportunity of participating in education and training activities. For example, of the fellowships in hydrology awarded for 1992 by the WMO, only a small portion of the recipients were women, the number being 6 women and 54 men. A sample of five UNESCO-supported courses on hydrology for that same period indicated that approximately 14 per cent of the participants were women, which is only slightly higher than the number from the WMO. These figures indicate that even within the United Nations System, one of the leaders, like UNESCO, which claim a significantly more aggressive approach towards women's participation in scientific specialization and training, do not practice what they preach.

GENDER AND WATER ALLOCATION

As the economic value of water increases due to water shortages from bad management, population increase, urbanization, and overall scarcity, the economic return to investing in domestic water supplies

will be undervalued because they are located in the traditionally invisible domestic arena. If the returns to investment in domestic water were properly measured, the optimal allocation of water might look very different.

For the costs of insufficient quantity or quality of water for domestic uses will likely be borne disproportionately by women and children due to their predominance in the domestic sphere. These costs include:

- *Longer times for water collection.* Because women and children are the primary water collectors, longer collection times mean that women have less time for agricultural production, less control over income, and less time for child care.
- *Less water for drinking, bathing, and sanitation.* Research by the international Food Policy Research institute has shown that in some circumstances these nonfood inputs into nutrition are more important than food in avoiding malnutrition.
- *Loss of income from water-intensive activities, undertaken by women.* Domestic water supplies are used in many small-scale food processing or craft activities and gardens, which are important sources of income, especially for poor households.
- *Poor water quality for domestic use.* Water is contaminated as a result of intensive farming, industrial use, and/or urban development.
- *Increased incidents of disease.* Malaria on account of standing water, diarrhoeal diseases due to contamination, or other effects of bad water management affect women disproportionately, because women have to shoulder health expenses and time burdens for caring for the ill.

In allocating water rights, it is important to ensure that women's needs are also met. This involves:

- *Acknowledging customary rights.* This includes recognizing use and ownership rights to various sources, for various purposes.
- *Protecting water rights and providing adequate compensation for water losses.* For example. mechanized pumps for irrigation and industrial use are draining aquifers in many areas, and no attention is being paid to how this affects the use of open wells and hand pumps that supply water for domestic use.
- *Ensuring women's participation in decision-making bodies.* If water

allocation is left in the hands of public agencies, they must meet the needs of women as well as men. If rights and management responsibilities are transferred to local user groups, they should be structured to include women (IFPRI, no date).

INCREASE OF WOMEN'S INVOLVEMENT

The principle of increasing women's involvement at all levels has been strongly advocated in statements and recommendations from major international conferences. As mentioned earlier, the UNCED was particular significant. The chapter in Agenda 21 (UNCED, 1992) devoted to women, 'Global Action for Women towards Sustainable Development', sets out objectives for governments with recommendations for action and implementation. In addition, it urges governments to ratify, implement and strengthen existing internationally agreed instruments relating to women. Agenda 21 recommends that governments increase the number of women involved as decision-makers, and as scientific and technical advisers.

The need for greater attention to be given to programmes and projects involving women, especially on matters relating to societal development and the environment, was emphasized at the inter-regional workshop on the Role of Women in Environmentally Sound and Sustainable Development, organized by the United Nations in Beijing in 1992 as a follow-up of the UNCED Earth Summit. The workshop focused on the development of project proposals involving women on issues highlighted at UNCED. It was generally recognized that women in most developing countries lack the required skills and experience in preparing technical co-operation programmes and that this needs to be remedied if women are to participate fully. However, in the Americas the gender gap in the level of preparedness to participate in development projects is barely significant. In most cases, the lack of political will or vision is the major obstacle impeding full women's participation in development activities, both at the planning and implementation levels.

Despite the fairly limited and contradictory beginning in the early second half of the century, the process of involving and consulting women in development projects relating to water is under way . Today,

agencies and organizations responsible for projects are looking at the gender dimension particularly in relation to the participatory approach. In questions relating to national resources and sustainable development, it is critical to involve women as experts and advisors.

Another important aspect to be discussed in addressing the issue of increase in women's involvement in the water sector refers to the position and status of women, legal and political, within the labour force in general. The International Labour Conference, at its 78th Session held in Geneva in June 1991, adopted a resolution which reaffirms the ongoing concern that ILO has had for women workers since its establishment. It recalled the Resolution on Equal Opportunities and Equal Treatment for Men and Women in Employment, adopted in 1985, and stressed that an effort between governments, employers' and workers' organizations was needed to implement the principle of equality. These include the adoption of comprehensive strategies to eliminate continuing barriers to the equal participation of women in employment, including that of the labour market, the proper recognition and fair valuation of work—including work which has traditionally been done predominantly by women—and the adoption of measures to help women and men to reconcile work with family responsibilities (ILO, 1991).

In this declaration, the International Labour Conference noted its concern that considerable discrimination against women workers persisted and was incompatible with economic development, social progress, social justice, the fundamental rights of women and men, and the welfare of the family and society. The declaration called for the protection of women at work as integral to the improvement of living and working conditions of all employees. The declaration also states that 'positive special treatment during a transitional period, aimed at effective equality between the sexes, shall not be regarded as discriminatory' (ILO, 1991).

In most American Humid Tropics countries there exist legislative measures that address such issues as equal remuneration for equal job positions, maternal leave, etc. The degree of implementation of such laws and regulations varies from country to country. In the regions affected until recently by civil war, the application of such ordinances,

especially in the conflict areas, was particularly deficient. However, the overall status of women in the region within the labour force is considerably better than that of women in other Humid Tropic nations of the world.

WOMEN IN THE HUMID TROPICS OF THE AMERICAS

In the Humid Tropics of the Americas a strong increase of participation among women in all levels of management is becoming apparent. This statement has equal validity in the water sector. A great number of countries in this region have produced excellent examples of this emancipation tendency.

In Mexico, an interesting project, *Housewives Campaign to Regenerate the Eroded Lands of Mexico* (CACRETEM) was developed and executed by a group of housewives. The objective of the project is to link urban and rural communities to collect organic disposed matter which could be transformed into fertilizer. The slogan says it all: 'From the Kitchen to the Countryside, with Love'. An estimate of 6000 urban households participated in this initiative, but with support of the media an expansion and development of other similar projects was achieved (Rodda, 1994).

Projects such as the CACRETEM initiative have multiple positive outcomes. From a gender perspective, they not only enhance women's participation in the planning and management of natural resources and the environment, but equally important they contribute to generate and strengthen positive interactions between city dwellers and the countryside, thus realizing the stress made upon urban areas by finding common objectives and developing joint actions with women participation, and consequently families, of both environments. It is important to notice that in the course of developing this project, women leaders were naturally identified both in the rural and urban communities. Collaboration and co-ordination among these women leaders has been successful and effective.

In San Jose, Costa Rica, a women-oriented housing programme was successfully implemented. Families, coming from rural areas are generally doomed to live under poor conditions in the city's slums at the outskirts of San Jose. A project, initiated by a women's NGO,

CEFEMINA involved women in the planning and building of new communities. Leisure areas, traffic control, parks and pollution prevention, are all elements that are normally absent in low-income communities. In this successful project they were incorporated in the plans (Rodda, 1994).

The planning of water-related issues was an important part of this Costa Rican project. Provisions were made for providing clean drinking water to the households; the disposal of used waters was also considered. A simple but effective system was implemented to mow plants in green areas. In the zoning of the different components of the projects, as well as in the entire process of planning and construction, participating women at all levels were constantly exchanging information and in contact with the community. Team-work was one of the key elements contributing to the success of this project.

Furthermore, an increased number of female activists are becoming involved in environmental and water resources protection crusades. In Brazil the campaign to assess the environmental impact of the Tucurui dam in the Amazon forest was headed by the lady-president of the Brazilian Movement for the Defense of Life. A quick surfing of the WEB yields the fact that over 200 environmental and water resources related NGOs in the Americas are directed by women. The agenda and membership of these organizations respond to a wide spectra of interests, but the message is clear—that more women at all levels are participating in the quest to assess and solve environmental and water problems, and to ultimately preserve life in our planet.

From collective efforts to individual success stories, women in the Humid Tropics of the Americas have made substantial contributions to the water sector. Many of the success stories are because of women involved in management and in policy-making, as well as in science.

In Panama, women's involvement in social and economic sectors is booming. Participation of women at all levels is broadly accepted and there seems to be no 'glass ceiling', especially in water management-related issues. In most countries this 'technically highly responsible' work is considered as a typical male thing. In Panama this situation is different: 27 per cent of ministers, vice-ministers and heads of agencies relating

to water issues are women. Table 1 presents the number of females and males working in the three leading governmental institutions dealing with water resources in Panama (Contraloría General, 1997).

It is interesting to note that the average participation of women in politics in Panama is much lower; only 6.7 per cent of the ministerial posts are held by women, while the representation of women in the National Assembly only reaches up to 7.5 per cent. But there is a strong tendency towards increased women's involvement, triggered by the success of the leading role women play in many fields of management, both in private enterprises and government institutions.

Today, in Panama, the percentage of women's participation within the governmental institutions is in the order of 25–35 per cent, but the universities, especially the Technological University, show a remarkable high involvement of women (see Table 1). The latter is due to the fact that women have become more attracted to water sciences and engineering. For example, the number of women that entered the School of Civil Engineering has risen from 2 per cent in the early seventies, to 47 per cent in the last years.

Enhancing the career possibilities for women starts with education. Lower education in Latin America and the Caribbean is generally easy accessible for women, higher education is much harder for women to achieve. Traditional role models form the basis for this inequity. But in Panama, and some other countries in Latin America and the Caribbean, a major breakthrough has been achieved.

Women in the water sector still have to work harder to achieve the same goal compared to men. This makes them persistent in achieving their objectives, and cautious in their decisions. Consequently, they demand more from their employees than men. But this does not necessarily makes them worse bosses. On the contrary, a recent poll carried out among engineering university students in Panama who have had more than one part-time job declared that they were more comfortable working for a woman. Also, they indicated that they learned more, although in most cases they had to work harder. Thus it is not surprising that an increasing number of women engineers and technicians, as well as administrators, are being hired by major construction and engineering firms in the water sector of Panama.

Women are also becoming more visible in the political arena. They are enthusiastically preparing for the next presidential elections, in mid 1999: according to recent polls their candidature should be taken very seriously. Some media even declared that the second female president in the Americas could very well be the next president of the Republic of Panama (*Panama News,* 1998). Although this is yet to be seen, the important aspect to underline is that the number of women candidates to the various positions at the national assembly, the municipalities and other political posts will drastically increase.

But the presence of women candidates in presidential elections is not exclusive to Panama. In Venezuela one third of the candidates to this year's election for president are women. Venezuelan women were allowed into the political arena only fifty years ago. In July 1947 was approved the first constitution that granted women the right to vote and be elected to public positions. Today, according to data prepared by National Women Council (CONAMU), female representation in the Venezuelan Congress is 6 per cent; 2 of the 22 ministers; 12.6 per cent of the representatives to the Regional Legislature Chambers; 10.9 per cent of the mayors; and 16.4 per cent of the municipal councils (Marull, 1998).

Women in Venezuela have also been given steps towards active participation in the juridical system. Two of the highest positions are occupied by women, one of these being the president of the Supreme Court. Although it is considered that only 6 per cent of the executive positions in the country are being filled by women, both in the government and private enterprises, the number of female decision-makers and academics in the sectors of water and natural resources is estimated in the order of 17 per cent. These numbers may seem low in comparison to other countries of the region, such as Panama, but the interesting aspect is that, as in other parts of the Humid Tropics, the tendency observed in the past five years is that of an exponential increase of women's involvement, at all levels, in water and environmental issues.

According to the Human Development Rankings (HDR) of the United Nations Development Programme (UNDP), two Humid Tropics countries score the highest on the gender equity list in the

Americas. The Gender Related Development Index (GRD) measures life expectancy, education and income for women. Costa Rica is No. 36 on this world ranking list. The Gender Enpowerment Measure (GEM) indicates whether women truly participate in economic and political issues. On this list Costa Rica occupies the 26th place. In Latin America, the second highest ranking country on these lists is Panama, maintaining positions No. 41 and No. 36 respectively (UNDP, 1997b).

Finally, the gender division within the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) is presented in Table 2. Forty per cent of the secretariat are women, but 50 per cent of the senior staff, including the director, are female. In the governing board, 23 per cent are women, including the president.

BUILDING OPPORTUNITIES: PARTICIPATION IN FORA

The above examples show that increased women's involvement is very effective, not to say indispensable, in the drive for sustainable development. This is particularly true when addressing water and water management-related issues. Unfortunately these examples do not reflect the situation in the totality of the region. Efforts still need to be made until the involvement of women at all levels is a fact throughout the Humid Tropics.

An excellent opportunity to promote and provide visibility of women as decision-makers and scientific and technical advisers is given through their participation in international meetings and conferences. Institutes and organizations are encouraging and sponsoring women to be dynamic participants in their regional and international activities. In the last five years the incursion of women into the regional and international arena has experienced a substantial increase. However, despite their enthusiastic and in many cases leading role in multinational programmes, their participation in international events is not a reflection of their involvement in these programmes. For example, in ten of the last co-sponsored meetings by CATHALAC, the number of female participants ranged from 15 per cent to 36 per cent, but the estimated number of women active in programmes related to these meetings is in the order of 20 per cent to 43 per cent.

CATHALAC, with other partner organizations, is joining the regional efforts carried out to increase the quantity and character of female attendance to international events in the field of water-related issues. During these gatherings, an attempt would be made not just to blend science, policy-making and decision-taking, but also to have a well balanced gender representation.

The first of these water events is the Second Colloquium on Hydrology and Water Management of the Humid Tropics. This rendezvous of water scientists is a follow-up of the First International Colloquium on Hydrology and Water Management in the Humid Tropics that was held in 1989 in Townsville, Australia. To the Second Colloquium, seventy leading investigators from around the world are invited to present papers for discussion and share their experiences in related fields. CATHALAC and UNESCO have agreed to reserve a special fund for young women scientists.

The Second Colloquium on Hydrology and Water Management of the Humid Tropics will be organized parallel to the Third Inter-American Dialogue on Water Management co-sponsored by the Organization of American States and the Government of the Republic of Panama. The First Inter-American Dialogue on Water Management, Miami 1992, brought together 400 water professionals and policy-makers from 19 countries of the Americas. The final results of these meetings, which were summarized in the respective statements of Miami and Buenos Aires, contain important guidelines for governments for sustainable development and management of water as a natural resource. Women's participation in the various sessions of these two first dialogues ranged from 13 per cent to 37 per cent.

These activities are likely to form an excellent platform for women to become involved or to increase their participation in scientific research relating to the characteristic hydrology of the region of the Humid Tropics. Moreover, a unique opportunity will be offered to the attendees to be part of the interactions between the scientific community and the policy-making and decision-taking sectors relating to water and natural resources in general.

In conclusion, judging from what we see today and from the tendencies that we observe, the new millennium awaits with encouraging

perspectives for women. Yet equality has to be reached not just among genders, but also among races, religions, and nationalities, and not just in the domain of water issues, but in all the different socio-economic sectors. To attain this aspiration, humanity, both women and men, must still dedicate their intense and energetic efforts.

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TABLE 1: Number of females and males working in the three leading governmental institutions dealing with water resources, and in the two major state universities in Panama (Contraloría General, 1997)

1995	Specialists		Managers		Employees		Total	
	women	men	women	men	women	men	women	men
INRENARE[1]	73	210	21	85	109	17	236	651
	25.8%	74.2%	19.8%	80.2%	86.5%	13.5%	26.6%	73.4%
IDAAN[2]	54	153	55	260	314	331	463	2055
	26.1%	73.9%	17.5%	82.5%	48.7%	51.3%	18.4%	81.6%
IRHE[3]	207	527	161	637	618	488	1047	3398
	28.2%	71.8%	20.2%	79.8%	55.9%	44.1%	23.6%	76.4%
Universidad de	1696	2423	185	341	757	238	2948	3762
Panama	41.2%	58.8%	35.2%	64.8%	76.1%	23.9%	43.9%	56.1%
Universidad	227	364	93	133	251	112	648	824
Tecnológica	38.4%	61.6%	41.2%	58.8%	69.1%	30.9%	44.0%	56.0%

[1]INRENARE: National Institute for Natural Renewable Resources
[2]IDAAN: National Institute for Water Supply and Sanitation
[3]IRHE: National Institute for Water Resources and Electricity

TABLE 2: Percentage of women in CATHALAC*

Description	Female
Secretariat	40 %
Senior Staff	50 %
Governing Board	23 %

*CATHALAC: Water Center for the Humid Tropics of Latin America and the Caribbean

CHAPTER III

Capacity Building for Women in Water Supply and Sanitation[1]

María-Lúcia G. Borba

INTRODUCTION

Education and training are essential for better water management, provision of safe water, water saving, and efficiency. Educating women and girls is especially important as it is bound to have a positive influence in the sector, with direct consequences for family health and welfare.

Women are managers of water in their homes. They decide how to obtain water, carry it, use it, distribute it. They pay for water. They are the target groups of water vendors. While men need water for agriculture purposes, for a business or a restaurant or a bar, domestic water is commonly considered a woman's domain. In the homes, men's responsibility *vis-à-vis* water falls more in the construction of facilities—although construction work by women is not uncommon, especially among female heads of household. Even when women are not directly involved in construction work, their decision in the design, planning and operation of water and sanitation facilities is recognized as a factor in the durability of the systems.

This paper poses some questions: to what extent and in what ways are Latin American women getting explicit support in improving their role as managers of water both at the household and the

[1] This paper is based on the report, 'Gender in education and training for water supply and sanitation: a literature review', prepared in 1997 by the author at IRC, under the auspices of the UNDP/World Bank Water and Sanitation Program.

community level; what sort of attention, training and education are they receiving for a more efficient participation, for sector improvement, and for personal growth? The paper looks into the roles that Latin American women could and should perform at higher levels of decision-making: are women influencing higher levels of policy-making, sector-training and education, given the sector division of labour? And if yes, are they receiving support to play these roles? How are training and education opportunities distributed between men and women? What are the consequences of women's education and training at all levels for the sector's efficiency and the durability of interventions therein? Some data help answer these questions.

WATER MANAGERS AT HOUSEHOLD, COMMUNITY AND PROJECT LEVEL

Water supply and sanitation interventions bring improvements which will only be incorporated by informed, educated and trained men and women, and by school-children. Such people will be able to take best advantage of water as a basis for their activities.

Despite low educational levels in many regions of the world, from the 1960s to the 1990s there has been an increase in the rates of school enrolment in developing countries from 48 per cent to 77 per cent for primary schools and 35 per cent to 47 per cent for secondary schools.

Some of the biggest advances have been for women: primary and secondary enrolment rates (in the developing countries) increased from 38 per cent in 1970 to 68 per cent in 1992. In some regions, these rates are approaching those in industrial countries, notably in East Asia (83 per cent) and in Latin America (87 per cent) (UNDP, 1996).

Although enrolment in all levels of education has increased fivefold since 1960, education and literacy for women still lag behind. Table 1 shows that in countries with a low 'human development' index, female literacy and enrolment rates are lower than those for men. Table 1 also illustrates the disadvantageous position of women in relation to literacy levels, not so much in school combined enrolment, and the striking disadvantages in their share of income earning even in countries with a *high* human development index,i.e. HDI (from Latin

America: Chile, Costa Rica, Argentina, Uruguay, Venezuela, Mexico and Colombia) and a *medium* HDI (Brazil, Cuba, Dominican Republic, Peru, Paraguay, El Salvador, Bolivia, Honduras, Guatemala, Nicaragua)—according to the UNDP ranking.

As regards income earning, women show a lower level of participation than men, probably due to their lower job opportunities as a result of their lower education, on-job training, and experience.

Lower self and social expectations regarding the success of a female professional add to this situation. Even in countries where the combined primary, secondary and tertiary gross enrolment ratios (%) are higher for women than for men, female enrolment in secondary education is the same or even higher than that of men—as for Honduras and Nicaragua (and the Netherlands, for a comparison: See UNDP 1996). However, women's share in income generation is lower, as they choose course subjects which are low-valued in the labour market.

An important question which emerges is: how is the education that is needed being determined? In general, in their homes, girls and boys are being prepared to follow their parents' roles: girls fetch and carry water, help their mothers with cooking, cleanup, and look after the hygiene of siblings. In schools, girls are being educated to perform a 'feminine role', cultivate a passive attitude, and stick to social and/or domestic subjects. They are being prepared to be housewives and take courses which do not promote them to higher levels of education.

Table 2 illustrates that, for some countries in Latin America, although female school enrolment is very high at the primary education level, it drops dramatically at the secondary level. It also illustrates the striking differences per country in relation to the share of income-earning by women and men. This means that women are outside the labour market, or their work is not considered 'work' and is ignored in formal statistics.

One interpretation of this situation is that in Latin America boys are getting better prepared for higher valued jobs and are finding their way into the labour market, while women are relegated to informal market activities, low-paid jobs, and voluntary work. In the water supply and sanitation sector, some trends illustrate the

evolution of the involvement of women in water supply and sanitation activities.

Trends in education and training for water supply and sanitation

In the water supply and environmental sanitation sector, educational programmes and training aim at better performance of all those involved, and at sector efficiency and progress. These programmes should accompany all phases of interventions in the sector, and it has been recommended that the education and training of users continue even after project completion, both for technical continuity and for the impact on environmental health (van Wijk, 1989).

Traditionally, women have been excluded from such programmes. Although women have a crucial role in the provision of domestic water and care of the environment (Bhadra, 1992; Souto-Maior, 1993; van Wijk, 1998), when new installations for water supply and sanitation were provided, information on the new technologies was passed on only to men. Women were kept out of the information and training circuit, not for technical or educational criteria, but primarily for social reasons (Harkness, quoted in van Wijk, 1985: 170). However, it gradually became evident that new arrangements for the transmission of information and knowledge should accompany the increasing sophistication of water and sanitation provision, and that these new arrangements should include training and education for both men and women (Abdullah and Boot, 1989; Jongepier and Appel, 1995; Tunyavanich, 1987; van Wijk, 1993, 1995).

In these new arrangements, women are not seen as mere users and beneficiaries of water supply and sanitation facilities. Women are gradually being recognized as actors and agents of change. Although the number of women who have the possibility of participating in decision-making, even in urban areas, is still lower than that of men (ENDA America Latina, 1990), at the community level there is now also an increasing number of female planners, supervisors, managers, operators, technicians and decision-makers. This development has been accompanied by a gradual shift in the sector's formal and non-formal education and training activities, and it includes specific arrangements

to accommodate and support the new roles played by women (HESAWA, 1991; Sumbung, 1990; van Wijk, 1993, 1995).

If women are gradually taking on positions traditionally held by men, men are also acquiring new roles which call for a shift in their education and training. Sanitary engineers are being trained in social aspects (Helvetas, 1991); male field workers are being trained on how to involve women in projects (Water and Sanitation Cell, 1994); fathers are receiving training in hygiene and health practices (El Katsha and Watts, 1993; Douglass *et al.*,1994).

The line of evolution tracing education and training of men and women in the water supply and sanitation sector is clearly given by Carolyn Hannan-Andersson (1995). When women were merely users of water and no technology was available for making their task an easier one, some attention was given to them in programmes through health and hygiene education. When new technology was introduced and payment became involved for the operation and maintenance of the new technology, men became interested. All the information and the new knowledge were then transmitted to the men, who also profited from knowledge and information from their broader circle of contacts outside the household. This had a negative effect on the position of women, who, despite their crucial role in the sector, were bypassed by the new technology trends and became more dependent on the knowledge of men in their role of water providers and water managers. It soon became clear that for a better provision in the household, women also had to take up new roles in the operation and management of the new facilities, and efforts were then made to train them as caretakers and pump mechanics. Opposition was raised by men once women could compete with men in a broader sphere. Even women themselves did not see a role outside their community circle. Gradually, women started to take part in planning (for example in the siting of facilities) and decision-making in their communities.

This required special training for women and different strategies had to be developed, which included gender sensitization of both men and women (Hannan-Andersson, 1995).

When low-cost technologies and decentralization of responsibilities gained support and women's involvement was increasingly required,

a condition for a gender approach became even more evident: if women's and men's needs and roles are not taken into consideration, and if appraisal and consultation does not involve men and women at the local level, the projects may worsen the position of women (Hannan-Andersson, 1995).

Attention has to be given to primary education, as it gives the basis for better performance at a later stage in life. The next section highlights some sector elements of basic education and gender.

BASIC EDUCATION

Reasons which contribute to low female school enrolment and attendance are, in general, economic crises and political instability, ethnic conflicts and natural disasters. In this situation, governments tend increasingly to put the responsibility for covering costs of primary education, such as school fees, transportation, uniform, books and other materials, on the shoulders of the families concerned. Families are also affected by macro-economic crises; when only one child goes to school, preference is given to boys. This leaves girls with little or no chance to attend school and increases illiteracy ratios for women (Doyle, 1995; Jongepier and Appel, 1995; United Nations Commission on the Status of Women, 1995; UNDP, 1996; World Bank, 1995b).

In many countries, efforts are being made to integrate elements from the water supply and environmental sanitation sector in primary school programmes and curricula. Children learn about water, and efforts are being made to link, in the curriculum, the theory and practice of safe water, environmental sanitation and care, hygiene practices, water and other natural resources.

Many times this is done through special programmes, such as school sanitation programmes, or by simply changing the curriculum as an entry point for sector elements. In some Latin American countries, efforts are being made to link health education and hygiene education with better environmental conditions around the school. Still, there are problems: although many curricula cover hygiene education or offer an entry point for hygiene education, they are quite standardized and not adjusted to the local situation. Also, teachers tend to transmit knowledge but do not know how to use participation of children in

hygiene practices. In schools, the maintenance tasks are sometimes considered an additional and less educational activity, or sometimes even as a punishment (OMS, OPS, IRC, 1993).

In Costa Rica, secondary school children can get four-month's training, in weekly sessions, on how to repair water systems and protect water sources (Christine van Wijk, 1998, personal communication). These positive modifications in the school curriculum will reach girls as well as boys, depending on the degree to which girls participate in and complete their education, and on the actual attention given to these programmes and elements in class. Whether they affect gender depends on the presence or absence of a gender angle in these programmes.

There are however reasons for low female school enrolment and attendance which relate directly to the water supply and sanitation sector.

One of the main reasons for low school attendance by girls is the fact that they are helping their mothers in domestic tasks. The collection of water can be one of the most time- and energy-consuming of these tasks, and has been noted as one of the main reasons why girls do not attend school. Responsibility for collecting water falls mainly on women and girls, who begin to help their mothers in fetching water from an early age. Boys may be involved in collecting water when they do not have any other economic activity to take care of.

In projects in Guatemala and Mexico, as early as the beginning of the 1980s, women reported that they continued to spend the same amount of time in water collection even when trips became shorter due to the proximity of the new installations. However, men and children no longer assisted them in fetching water, which liberated children (especially girls) to go to school. Women perceived this as a positive effect of the new installations (van Wijk, 1985).

Other reasons for low female school enrolment and attendance which relate specifically to the water supply and sanitation sector are: inappropriate school sanitation or total lack of toilets or latrines; lack of water; and lack of privacy. Many schools have begun to install drums or water reservoirs to increase storage capacity, and recognize that a sanitary environment will also protect health and enhance girls'

attendance. Besides enhancing girls participation, the provision of sanitary facilities in primary schools also reinforces sanitation and hygiene, because it helps boys and girls to apply concepts they learn in their own school regarding health and hygiene education. Teachers will also profit from better facilities. Female teachers will be motivated to take jobs in schools where water and sanitation facilities are present and functioning.

Time and energy saved from water collection has not only benefited girls education; it also has an impact on their mother's non-formal education and further development. Time saved from water collection may be used for more participation in women's groups, church groups, ceremonies, local councils, discussion centres and associations—or simply for leisure.

However, sometimes husbands will use the time saved from collecting water for female work in production for the husband's benefit. Also, when women get paid for their labour, husbands stop paying for children's' school fees and clothing, claiming that their wife's earnings should be spent on these (Muller, quoted in van Wijk, 1989). This may lead women to continue to spend more time to collect water out of fear of having to work harder in productive activities, with no direct benefit for themselves. A gender-balanced approach is necessary in such cases.

Infrastructure and hygiene curricula in basic or primary school education

The provision of water and sanitation facilities in schools enhances female school enrolment and assistance. The introduction of hygiene and health education enhances efficiency in using these facilities. However, much hygiene and sanitary education in schools, and many efforts to raise the awareness of children of sector issues (such as water use, hygiene and good sanitation practices), do not cover gender aspects.

Much of the literature describing projects where children are the target group does not specify whether they are targeting boys or girls, or how they involve either group. It is more common to find 'children' mentioned and not their 'gender'. Yet, at the same time, pictures are generally gender-biased. Pictures in books and leaflets, posters and

other material for awareness-raising, tend to show girls cleaning, girls taking care of younger children, and girls conveying messages to their mothers, while boys are playing, bathing and defecating in rivers.

In principle, schools may play an important role in the dissemination of information and knowledge on sanitation, health and hygiene, and in contributing to behavioural change as well as, improving children's health.

Hygiene and health education have more effective results when combined with programmes for the improvement of water and sanitation infrastructure. Since schools are meeting places where infections easily pass on from one child to another, a clean sanitation environment in school has a positive impact on the health of children. Clean and functional facilities, combined with hygiene education, will make it easier for children to practice hygiene in school and spread positive hygiene messages in their families (OMS, OPS and IRC, 1993).

However, many schools do not have a clean environment or good sanitation facilities. This has a negative impact on school health. Also, a school's girl population should be heard separately when decisions concerning school sanitation are being made, because the needs of girls are different from those of boys when it comes to sanitation facilities (IRC, 1993).

In general, schools are training boys and girls for a future where the existing male and female models still predominate. Curricula and teaching materials help perpetuate the cycle, as confirmed during the Fourth World Conference on Women held in Beijing: 'In general, curricula and teaching materials remain gender-biased to a large degree, and are rarely sensitive to the specific needs of girls and women. This reinforces traditional female and male roles that deny women opportunities for full and equal partnership in society.' (United Nations, Fourth World Conference on Women, 1995)

Not only curricula, teaching materials and the behaviour of teachers in the classroom are gender-biased. Other factors are the expectations of communities and cultural and social patterns of behaviour. These lead girls, while still at primary school, to choose subjects (in case they stay in the system) less valued in the labour

market. Boys, on the other hand, will be geared to subjects which are more valued in the labour market and fetch a correspondingly higher salary. This is a common pattern and is documented in studies made in Kenya (Munyakho, 1994) and Botswana (Duncan, 1989), where boys are being prepared to be men holding managerial, influential, better-paid, prestigious positions.

In Latin America, although the participation of girls and women in all levels of education is higher then in the countries of Africa mentioned above, there is still a difference in the ways schools are preparing boys and girls to go on to higher levels of education. Gender-biased schoolbooks and material, the expectations of teachers, and of the boys and girls themselves, will contribute to boys performing better in scientific and technical subjects, while girls have to make a special effort.

While boys are encouraged by their teachers to undertake more technical and scientific subjects, are given more attention during classroom debates and discussions, girls are encouraged to dedicate their attention to the more 'feminine' subjects, which many times do not lead them to higher levels of education. Even when girls are encouraged to take up a career, they are guided to lower levels of qualified labour. For example, notorious indicators in the Latin American countries include the high number of female teachers in basic or primary schools, while the number of male teachers increases in secondary schools, for which a higher level of education is required.

These inequalities are reinforced by traditional stereotyped attitudes, the expected roles of women and men in society, and discriminatory legislation and development policies. A prominent example is the gender imbalance between women and men in scientific and technical fields or sectors, such as the water sector (Botswana Ministry of Education and SIPU International, 1994a).

Many governments are making efforts to promote the enrolment and retention of girls in schools, which will lead to a more equitable gender balance in education. Efforts to educate girls are supported by governments, NGOs, bilateral and multilateral donors, and other agencies in innovative programmes.

In Bangladesh, the Department of Public Health Engineering (DPHE) and the Department of Primary Education (DPE), together

with UNICEF, are helping to provide safe water and sanitation in primary schools. They are convinced that the provision of safe water and proper sanitary latrines will enhance school enrolment, particularly of grown-up girl students (UNICEF *et al.*, 1994) and also of the girl-child (Boot, 1995). With this in mind, a programme of latrine construction and water supply facilities was launched. Grown-up girls in primary schools were interviewed for this purpose. They revealed that the increase of girls' attendance was mainly due to the provision of sanitary latrines and the siting of girls' latrines apart and far from those of boys' and in a location which offered privacy.

In Vietnam, the construction of sanitary facilities has been recommended as a support to the introduction of Health Education in Primary Schools under the UNICEF WATSAN programme. New water and sanitary facilities have been constructed and evaluated. The evaluation of their design, use and maintenance focused on the hygienic behaviours and preferences of boys and girls of primary school age and many shortcomings were then found (Nguyen, 1996). Although in Vietnam women represent an important proportion of the labour force, their level of education is lower than that of men. However, as in Latin America, they are the big majority of school teachers in all regions of the country (Nguyen, 1993).

The provision of sanitation infrastructure to enhance the participation of girls in schools will not always be possible due to lack of financial resources. An innovative approach to be able to finance the provision of water and sanitation in schools would be to get the community involved in the mobilization of resources for the construction of facilities, and also to participate in the physical work involved. One example of community mobilization for environmental sanitation comes from the Barrio Primavera, a neighbourhood of Tarapoto, Peru, where the community mobilized resources by organizing *parrilladas* (barbecues) and collecting entrance fees, while the municipality offered as first prize the material needed for the construction of drainage in the main streets of the *barrio* (colony) (Hilda García, personal communication). Also, volley-ball competitions were organized by residents for the mobilization of resources to be used for further environmental upgrading. Such examples could be taken up

for the mobilization of resources for improvement of sanitation condition in schools where there is a demand for improvement. The same could perhaps be applied for the improvement of facilities by communities in local schools.

The material used by schools on hygiene, water and sanitation matters should break down gender stereotypes. There are positive examples of practices which try to break the gender stereotype of girls helping to educate and clean, while boys play. One comes from Uganda (Uganda, Ministry of Education and Ministry of Health, no date). There is a picture of a girl showing a clean toilet on the cover of a leaflet aiming at linking the use of a toilet with good health. A picture inside the flyer shows a boy teaching a younger boy how to use the toilet: 'Boys must be careful when urinating and not wet the seat,' and suggesting that hands be washed. But the last part on 'How do we keep a toilet clean?' shows a girl cleaning in two pictures: 'Wipe seat rim, wc-tank and handle' and 'scrub bowl with brush', 'sweep floor' and 'burn rubbish'.

An excellent example of breaking through gender stereotypes which contributes to gender equity in materials meant for sector-awareness-raising in schools comes from Kenya. For the reinforcement of gender equity, in the Mazingira Institute's magazines both boys and girls are shown taking care of siblings and transmitting messages. There are specific stories about boys occupied with domestic tasks, such as taking care of babies and looking after the kitchen while the mother is away. In one story, a boy is depicted reading a book and explaining to his sister that he is studying but also looking after the cooking while their mother has gone to fetch water. Both children talk about the fact that their mother has too much work '..fetching water, fetching firewood, weeding crops, preparing food and looking after the babies'. The boy recognizes this situation and says: 'that is why I am helping her. I am also looking after the baby!' (Mazingira Institute, 1989).

Teachers in schools can have an important role in influencing, strengthening or changing attitudes among the students. This has been a worry in many international fora in the field of water supply and sanitation, such as the INSTRAW Women, Water Supply and

Sanitation, a national training seminar held in 1987 in Addis Ababa, Ethiopia (INSTRAW, 1987). Recommendations from this workshop include the need to promote girls' interest in technical subjects and mathematics from an early age in school, linked to redefinition of the roles of women.

The INSTRAW seminar held in Sudan as early as 1988 recommended that technical education related to the theory and practice of water supply and sanitation should be included theoretically and practically in the school syllabus: water resources, water treatment and sanitation, operation and management of water supply and sanitation systems, personal hygiene and environmental health, home economics and income generating activities related to water—such as gardening, small stock animal raising and fishing. These subjects could be treated in the curriculum for geography and general science courses. Teachers should be trained in these subjects and new material such as posters and necessary audiovisuals aids should be made available. Schools should be provided with technically simple tools. Students should be involved in area development, focusing on cleaning, drainage and garbage collection. These changes require the support and involvement of higher levels of decision-making, such as ministries of education (INSTRAW, 1988).

The same workshop recommended ways of motivating girls to take these subjects. Girls are able to select technical topics suitable to their age when they are exposed to successful experiences with women's participation in water supply and sanitation projects. Their awareness is increased through songs and cultural activities that stress women's participation in technical aspects. The benefits of women's participation in technical matters are to be highlighted while creative girls and boys are encouraged and rewarded (INSTRAW, 1988).

More recently in Botswana, the Guidance and Counselling Division of the Ministry of Education has taken serious steps to enhance boys' and girls' interest in the water sector through the training and guidance of teachers. The conclusions and recommendations of workshops with teachers form the basis for a 'Teachers' guide to work with water'(Botswana Ministry of Education and SIPU International, 1994b). The first section of the guide focuses on gender issues. It

contains a number of activities designed to make students more aware of gender issues.

BOX 1:
Guiding teachers to work with water from a gender perspective

As a teacher, particularly if you are a guidance teacher, it is important to *know your students well.* One of the ways in which you can obtain useful information about your students, their attitudes and their aspirations, is by asking them to complete questionnaires. Similar questionnaires can be used to find out more about your students' parents or about your own colleagues—those who have some kind of influence over your students.

It could be helpful to ask your students some *questions* about their attitudes towards certain school subjects, towards certain careers or types of work, towards gender issues, and so on. By asking questions about your students' backgrounds and home environments, you might get some clues as to what or who are influencing them or shaping their attitudes.

Aim: to examine students attitudes regarding girls or boys doing science, maths or technical subjects at school as well as choosing scientific or technical careers.

Objective: 'to examine how being a boy/girl affects a student's choice of school subjects; how being a boy/girl affects a student's choice of career; to what extent the attitudes of teachers or parents influence students' choices' (Botswana Ministry of Education and SIPU International, 1994b)

At the same time, both students and teachers are encouraged to examine their own attitudes towards gender issues. The guide shows how a teacher can influence and change the attitudes held by students and their parents, and influence girls to study science and mathematics so that they may consider taking up careers in scientific or technical fields. The guide offers examples of practical activities to assess the

attitudes of students and teachers towards gender issues in the choice of subjects and careers. The guide also explains the needs and possibilities for work in the water supply and sanitation sector, outlines possible careers, explains how to prepare field visits and provides materials to refer to (Botswana Ministry of Education and SIPU International, 1994b).

Alternative educational programmes

When governments lack the financial and economical resources to provide education for all school-age children, radio programmes offer an alternative means of education. One example is RADECO, the Radio-based Primary Education (Radio Educativo Comunitario) in the Dominican Republic. This programme explores, since the beginning of the 1980s, the use of radio as a means of teaching basic literacy and numeric skills to children between seven and fourteen years of age who do not have access to formal schools. The programme was initiated with the support of the Agency for International Development (AID) supported by Radio Mathematics in Nicaragua (RMN) (Hanssen *et al.*, 1983).

Linking learning for future work with village and community needs can help stimulate both boys and girls for productive work.

School programmes closer to communities will enhance the participation of girls. Alternative school programmes may offer an opportunity for education closer to the community's life, enhancing environmental protection and trying to meet local communities needs. One of them is the *Escuela Nueva* (New School) in Colombia (Colombia Ministry of Education, no date), which uses an innovative, flexible and non-standardized curriculum that permits adaptations to community needs. The aim of the New School Programme is to respond to the rural primary education needs of boys and girls through a new curriculum, training for teachers and administrative personnel, and incorporation of community processes. The programme encourages children to be creative and critical and to apply in their communities the knowledge that they have gained. Problem-solving and games are used daily as a methodology for action learning by children. The government has selected the New School Programme as a strategy for

universal primary school education for boys and girls and to improve the quality of primary education in 25,000 rural schools in Colombia.

Also the Children's Ecological Village, in Tatuí, São Paulo, Brazil, is an innovative example of education closer to the protection of the environment and local community needs which stimulates girls' and boys' participation. The Ecological Village was built up through co-operation between the Neo-Humanist Association of Brazil and the Globetree Foundation of Sweden. The Village is actually a park where children are in contact with a dairy farm, natural woods, an organic garden, an orchard, and other facilities such as classrooms, dining rooms and kitchens, dormitories, an amphitheatre, a playground and a windmill. Children receive education on environmental issues, working practice on organic agriculture, water conservation and other topics. One of the objectives is to raise awareness on environmental crisis and on sustainable development. Teachers and rural women are also trained on environmental practices (Neo-Humanist Association, *c.*1992). These programmes will reduce gender imbalances in proportion with which they stimulate the participation of girls and boys in activities which will lead both sexes to higher levels of education.

Adult education

Literacy programmes for women are also being recommended as a means of enhancing gender balance and will certainly have a positive effect on promoting the education of girls. The education of girls is sometimes more dependent on the efforts of mothers than fathers. Interesting data from a survey conducted in five African countries revealed that 'girls *and* boys are likely to be better educated when the head of the household is female and that in rural areas the presence of a father may be a hindrance to the education of his daughters' (Goutier, 1995).

TRAINING COMMUNITY MEMBERS

From the point of view of the sector as a whole, well educated and trained women and men are an important asset. Good human capacities will contribute to the empowerment of communities, which will have a positive impact on the operation, maintenance and

management of decentralized water supplies; on sanitation and hygiene practices; and on a gender-balanced participation in decision-making in work and benefits (UNICEF, 1995).

Trends in training community women

Training is transferring knowledge and awareness raising (Grift, 1995). It is an organized event aiming at helping communities or individuals to enter into learning processes, to bring about changes in understanding, skills, and behaviour. As opposed to formal education, training is part of non-formal education. According to the 'Oxfam Handbook of Development and Relief', there are different approaches to training. For effective participation in water supply and sanitation, community members—men and women—have to be trained. Almost all sector programmes include a training component, although the type of training, its objectives, and the target groups may vary. In the community-managed sanitation programme in Kerala, India, for example, human-resource development is approached in two ways: through upgrading skills or developing new ones through short-term training; and through providing new experiences—giving support for people to take on new roles and new responsibilities. Training is given to male and female water-committee members, stand-post attendants, schoolteachers, nursery teachers, health personnel, and local government staff (Kurup, 1996).

BOX 2:
Training for urban sewerage

SEVANATHA, an NGO in Colombo, Sri Lanka, co-ordinates a project for a sewer disposal system in Gajabapura Bo-Sevana, a low-income urban neighbourhood in this city. SEVANATHA trains the community on self-managed community services and trains community leaders on maintenance. Training is considered as an essential element of the community mobilization process for sustainable development. The key decision-maker and the implementor of this project is the community. As a first step, SEVANATHA organized a workshop for Gajabapura and selected community members, 50

per cent of them women. During the workshop, participants identified the environmental problems in the settlement, formulated general strategies to deal with the problems, and decided on a programme agreement and action plan to address the 15 problems identified. At every stage of the project the community is given the opportunity to learn from the project. The type of training given during the project implementation period varies from the simple problem identification exercise to comprehensive operational and maintenance issues. After completion of the sewer system, several community leaders within the settlement as well as from other areas were invited for a half-day workshop to discuss issues relating to operation and maintenance aspects of a community-managed sewer system. An experienced technical officer made an on-site demonstration for people on how people should organize and carry out day-to-day operational works and maintenance activities. Families individually as well as collectively are aware of their responsibilities in maintaining a community-managed sewer system. After this training, SEVANATHA handed over the sewer system for community management (Sevanatha–Rajagirya, 1993)

The municipality of Recife, Pernambuco, Brazil, organizes similar training for men and women to manage a local sewer system as well as solid-waste disposal (Arrais, 1993).

In Guatemala, sector institutions train water committees in support of community-managed water systems.

Training is given to committees, caretakers, treasurers and to the users, with emphasis on women. It is part of the community's responsibility to participate in this kind of activity. Skills training begins during the preparation stage and is done through workshops and lectures in community meetings. Training of the treasurer and caretaker is sometimes done through workshops and lectures, but mainly discovery learning processes are used, which take place in the working context. The caretaker participates in the construction stage, while the treasurer does the book-keeping. The training is directed at men, with the exception of hygiene education, which is directed mainly to women and children. Women are the target group for hygiene education due to their role as housekeepers (IRC, 1997).

This gender-specific training will not affect the position of women negatively if they have the collaboration of male members of the household for better hygiene behaviour. It has been found that training women in construction and technical work can be very efficient for the sector and raises women's position when a gender approach is taken into consideration.

Training local women in the water supply and sanitation sector has various justifications. One has to do with *the special relationship women have with water supply and sanitation:*

> Reasons for training women in local maintenance include the direct concern and personal interest of women in their water supply; their regular visits to distribution points; the compatibility of preventive maintenance and user education with the traditional tasks of women; easier communication between women caretakers and women users; their greater sensitivity to social pressure from other women to do a good job; the importance of health aspects; the lower career orientation and labour mobility of women; and recognition that training in modern technology is for their age-long contribution to household's water supply and sanitation (van Wijk, 1985).

This special relationship women have with the environment is due to the social context of gender relations (Joekes, *et al.* 1996): more women than men are collecting water and firewood and are depending on natural resources for their daily tasks. They are therefore the ones who suffer most from environmental degradation. However, they often do not receive special information, training, or education on issues related to the water supply sector.

Another reason for training women in water-related technical skills is that in general *they are more accepted in the households* for carrying out repairs than men. The acceptability of their presence in private compounds and their commitment to work make them excellent water and sanitation workers (van Wijk, 1993). Women are also valued for their *ability to care, they are at home during the day, and can make arrangements to supervise the work,* they have an ability to *check the technical quality* of the work being done (van Wijk, 1985). *Women have a potential for development* which should be used and from which the sector would greatly benefit; they will also be more motivated in training other women as women can, with more ease, transmit

knowledge and skills, and better influence and educate other women on specific sector needs such as the proper use of pumps and water use (Sharma, 1989).

Male emigration has created new roles and responsibilities for women (International Labour Office, no date). They should therefore have the knowledge they need to operate and manage their water supplies and facilities on their own. In some situations where extensive labour migration of men occurs, or where women groups have been the major force behind the village water supply, one should consider training women for technical tasks as well.

This is especially true in Latin America, where the number of female-headed households can reach 70 per cent in some low-income urban neighbourhoods. In the Santiago metropolitan area in Chile, the course on plumbing given by the water company EMOS has targeted, especially, women heads of households. After the course, women can repair water leaks and deal with other problems affecting their water and sanitation facilities (Raquel Alfaro, personal communication). Women often have difficulties assimilating basic information on the projects and interventions concerning their water supply due to a lack of general education. Projects which recognize the importance of having women in certain positions, such as treasurers in committees, often insist on previous education or adjust their programme.

Projects will benefit people when community traditions are taken into consideration in training programmes. When this fails, problems might occur—as in Cuzco, Peru, during a training programme on technology. In this case, the course on latrine building was 'condescending, preachy and critical of the women's traditions' *vis-à-vis* the latrines, and the women rejected their production and installation. They did not recognize the need for latrines, but were willing to participate in the construction of water taps, they wanted sewerage, but not latrines' (Doucet, 1987).

Educating and training local women is not only important for the efficiency of projects and to meet women's needs; it has also to do with the *need of having more women in decision-making and at policy level positions* in a sector where women play such an important role at local level. This is especially important due to the new requirements

of a demand-driven approach. The benefits to society of training women include *society getting a more positive attitude towards educating girls* if these women perform well in their tasks. It also makes women gain confidence, seeing they can do what is traditionally regarded as men's work. These are intangible benefits (Jonsson and Rudengren, 1991) and are of great relevance to society, and to the women themselves, provided they do not lead to the withdrawal by men of other responsibilities, such as contributing to the costs of maintenance and repairs.

A study by Narayan (1995), based on the results of 121 World Bank projects, contains strong evidence on how the participation of women increases the effectiveness of projects in terms of better quality of project design, implementation, operation and maintenance; transition of operation and maintenance to local groups; maintenance after one year; and reliability of water systems. Not only do projects benefit from the participation of women: the women themselves benefit in terms of empowerment, measured by their increased self-help capacity, ability to organize, negotiate, undertake and initiate action (Narayan, 1995).

Women who turn into pump mechanics get extra income and improve their status, as has happened in some projects. On the other hand, it increases their workload, as they have the double load of a paid job outside the house and an unpaid one within the household. Despite this workload, their work is valued as there is a much lower rate of breakdowns in pumps maintained by women than in those maintained by men. Also, the duration of pump breakdown may be smaller among female mechanics (Jonsson and Rudengren, 1991).

Due to this contradictory situation—better results with increased workload—some questions have to be answered before getting women involved in training: Are women interested in upgrading the skills they already have? Or will they and the project benefit more from increased gender balance in the management of systems and the supervision of jobs done by trained men? If women are to be trained for maintenance, can such a process be made cost-effective especially as women may not wish to travel far from their homes because of practical and cultural reasons? How to avoid training women for new

tasks bringing a heavier burden into their lives which will not be compensated (e.g. via more income or a greater say in decisions essential to them)? Will training free them from the need of having an outsider to do the job and lead to more reliable services? Are the most suitable candidates for training being trained? Is the training of women adapted to their real needs or only to the benefit of the projects? Not only must these questions be answered, an assessment of the roles and responsibilities of men and women is also needed before preparing specific training programmes. Some tasks in health and hygiene are the responsibility of men, and training women for these tasks makes no sense. For example, certain work in latrine construction and well-upgrading is male work, and training women for that purpose may bring more problems than solutions (van Wijk, 1995).

Although women are informally involved in the local management of traditional water sources, when an external project comes into the community and water or improved sanitation are provided, women are often excluded from management tasks. In such cases, it is important to obtain the support of local leaders to involve the women in local planning and train them for *managerial tasks.*

Topics for this training would include: *personnel and basic accountability, functioning of service and tariff setting, water committee status and legal documents, preventive O&M, reporting on construction, drinking water regulations and contracts.* Women also need to be trained as *members of water and sanitation committees.* However, it is sometimes culturally more acceptable for female members of local committees to be responsible for women-specific tasks—such as *health aspects, water/facilities use aspects, communication, collection and financing.*

One example comes from Honduras, where SANAA, the national water and sanitation service, trains women of water committees on financial aspects, and from Guatemala, where the NGO Agua del Pueblo organizes training for local water committee members on record-keeping, basic accounts, planning, communication and leadership (ILO/Turin Centre *et al.,* 1991).

Special management training for members of local management committees is being developed in water supply programmes. In Chile, the national rural water supply programme had addresed the lack of

training and expertise in local management by getting social workers to give on-the-job training to water committees. This had quite a successful result: after seven months, local water boards were able to solve their own problems, which included administration and finances (Luz Alvares, quoted in van Wijk, 1985).

Practically and strategically, women may face a number of constraints to taking part in training. Experience teaches, however, that such constraints, when recognized, can be overcome. *Opposition from male relatives to the training of wives and daughters* has generally been overcome by *obtaining support from male leaders* and by *involving husbands* in some of the activities. Other possible ways of overcoming opposition include the preparation of flyers, poster campaigns showing benefits to husbands and fathers, and encouraging the elderly and more experienced men to also participate in the women's training.

Locally trained women and men may have a more effective approach in communicating with the communities. They are more sensitive to combining the knowledge they have acquired with the ways and languages communities are used to. If women, for one reason or another, are not to be trained for managerial tasks, operation and maintenance, they can be asked to indicate who are the most suitable men to be trained.

Training methods and opportunities

For gender-balanced training it is not sufficient to have the same number of male and female participants if women do not have a say. When community women will not participate in training and men will, separate training for men and women may be one solution. More gender in training, and training methods that give women more chance to take an equal part in learning sessions are further solutions, found in a growing number of programmes.

A participatory approach is of help as well: discussion in small groups; role-play; pictures; games; etc., where the more shy participants get a chance to speak. Extra training for women should be organized if they need help to catch up with the men. Women in training should realize they have already many skills, that their opinion is valid and should be given a more positive self image (Grift, 1995).

Gender awareness is raised not only by formal training; there are many other channels or possibilities for introducing gender awareness. For example, when women participate in *monitoring or evaluation*, depending on what is being addressed and with which objective, they may become better aware of their own situation, their position in relation to men, and their possibilities. The activity can be an eye-opener.

One example comes from Bogotá, Colombia, where women living in low-income urban areas participated in research aimed at finding out how they overcome their problems over lack of public services and proper housing. Initially, women mentioned that lack of water, proper housing, health services, proper light or energy, and the negative impact thereof on the health of children, were the main problems. During the evaluation process, women concluded that they also faced problems such as lack of rights to the ownership of their houses, of opportunities to express their own opinion, of the possibility to participate in decisions concerning the planning of their space, of an egalitarian distribution of domestic roles, of leisure time, and of training for women (ENDA América Latina, 1990).

Monitoring and evaluation can also be tools to provide women themselves with information on their situation; and to better integrate them in water and sanitation and in mainstream development programmes and projects, aiming at equity, shared benefits, project efficiency and empowerment, alongside men. In this, indicators for monitoring and evaluation should be gender-specific and go beyond an assessment of conventional benefits for women; they should include information on access to and control over resources, and decision-making and leadership; changes in status in the community; changes in work situation; possibilities to sustain achievement; and possibilities to apply awareness and skills developed through the water supply project in other areas of work and influence (Ploeg and Wijk-Sijbesma, 1980).

Participatory evaluation with a gender angle will assess whether and to what extent project resources and benefits reach both men and women. An example is evaluation through village maps, or photographs taken at various stages of the project, through which both

men and women can analyse their roles and activities in the project. Participants see themselves and understand from which activities the one or the other was excluded, when they were overburdened, etc. In one workshop organized by 'Promotion of the Role of Women in Water and Environmental Sanitation Services' (PROWWESS) (Narayan, 1993) such an exercise led to a reconsideration of the exclusion of women in the agency training programme as technicians.

Surveys undertaken to supply evaluation processes with information may also contribute to change behaviour and improve understanding about health and hygiene. In Nepal, female sanitation volunteers undertook a survey of community habits of water usage and sanitation. Questions and systematic observations facilitated the process and the findings were shared with the community which resulted in improved behaviour (Morgan, 1992).

Development of popular theatre may be used as a gender-specific sector training tool. It has proved an effective means to raise gender issues and develop positive attitudes with both staff and villagers in a culturally acceptable manner. Theatre and drama offer an entry point for the discussion of gender, of more equal decision-making among men and women, and changes in gender roles in water, sanitation, health and hygiene. Gender aspects, which prevailing cultures often do not allow women to voice openly in public, can be voiced through traditional forms of theatre. Thus, women in Tanzania, through theatre and dance, made public that women are doing physical work but not getting access to a water project, and raised the issue of girl pregnancies in schools. For this, gender should be taken into account during the planning of scripts, which should come after a gender situation analysis (van Wijk, 1995).

Can women find employment or work after their training? Participants in the courses on plumbing given to women by EMOS, the public water company of Santiago, Chile, declared that the course had changed their lives, that they felt more independent and were able to generate income for their family through services rendered to their neighbours. The water company itself sends leaflets and brochures containing technical information, for example how to economize on water and make simple repairs, targeting all members of the families,

and ultimately also involving husbands and children (Raquel Alfaro, personal correspondence).

Problems may occur when training is exclusively offered to women and a negative impact will follow: men left out feel jealous; men will challenge the authority of women and all work is then left to women who are already overburdened; and men withdraw from their training responsibilities, suggesting thereby that water supply is a women's issue.

Men and women should be trained for what they can do best and for what will best suit their and their children's needs and situation. This requires a conscious, open-minded choice, as there is quite often much prejudice against women getting training for new functions they are called to undertake, and stereotyped ideas about the kind of tasks women and men should be trained for. When women and men are called to perform new roles, their training should accompany this shift in their situation. This may occur, for example, when women are needed for more technical or managerial tasks and men are called to work in non-technical tasks.

Effectiveness of gender sensitive training

Does gender sensitiveness have an impact, and if so, on what? Theoretically, a gender-balanced approach will have an impact on longer-term sustainability; tasks, roles and responsibilities for maintenance, management and financing are more equally shared. It will improve the position of women because it will focus on both their practical and their strategic needs. As a result of a gender-balanced training, men and women will develop their work in a complementary manner.

Education and training of both male and female household members has proved necessary for the better use and maintenance of facilities, contributing to the sustainability of the interventions. EMOS in Santiago, Chile, makes an effort to reach all members of the household through the dissemination of messages through water bills. The effectiveness of gender-balanced training also depends on how participants use the skills and knowledge received. This is influenced by the attitudes of both men and women in the community.

PROJECT AND AGENCY STAFF

There may be a wide variation in gender attitudes among project staff members, ranging from open hostility to keen interest and commitment to contribute to the improvement of the programmes from a gender perspective. Even when commitment exists in a project among officials and implementors to work under a gender perspective, skills for that purpose may be lacking. Female officials and implementors were generally more personally committed and excited about producing transformative changes (Bolt, 1994).

As this is quite a common situation, several programmes have included a gender course or session in their training for the sensitization of staff on gender. But a positive attitude towards gender among staff is not sufficient. It is also important to know how to apply a gender approach in a water supply and sanitation project. One way of doing this is through organized workshops. These could take the following basic steps:

> Make arrangements for a workshop for staff sensitisation, invite all participants and if necessary a workshop moderator; assess participants' knowledge and sensitivity concerning women's involvement and gender through exercises, brainstorming or open-ended questions; put up conclusions deriving from the discussions; analyse the job description and responsibilities of the staff members and jointly identify where women's involvement and a gender approach need particular attention; review the various tools and methods available for a gender approach with the staff members and identify abilities and skills needed for using these tools; identify areas for further training by comparing the necessary abilities and skills with the existing capacity (Bolt, 1994).

Besides awareness-raising, gender-training at agency level may be effective in supporting advocacy for gender issues by staff who receive such training (King and Hill abstracted in Jongepier and Appel, 1995; Bruyn, 1995). It is therefore important to involve staff in decision-making positions, intermediary levels and field workers, in such training. Staff trained in gender will link the agency's gender policy to practice in the field. In other words, it will make agencies' gender policies operational. For that purpose, it is also important that staff

are trained both on gender issues and on participatory techniques so as to involve men and women in a balanced way.

The IRC International Water and Sanitation Centre in the Netherlands offers gender training for staff going to work in the water and sanitation or related fields. However, if only female staff are sent for gender-training, 'gender' turns out to be 'women's' business. Involving male staff in gender-training contributes to improving the gender balance in projects and the future training of community members. In the last three years, approximately 60 per cent of the participants who attended IRC's gender-briefing programmes were men.

Agencies emphasize the need for technical skills in recruiting staff, instead of valuing social and managerial skills and the ability to communicate with community members (van Wijk, 1985). However, the increase in decentralized services and the need for users—men and women—to participate in the operation and management of community-based projects has led to a shift in the recruitment of staff by water supply and sanitation-sector agencies. This is occurring in Brasilia, Brazil, where the Condominial Sewerage Programme of the municipal water company is giving more attention to the recruitment and training of staff interested and motivated in working with communities, rather than to technical skills (Borba, 1996). As many of these staff are women, the balance between women and men in the water sector has undergone a shift. Besides a better balance in staff roles—men gradually taking up also social roles and women also taking up technical roles—one can also note a shift away from gender-stereotyped training. Technical training for water supply and sanitation is being given to both male and female community development workers or promoters.

HIGHER LEVEL EDUCATION AND TRAINING

The training and education of girls and women for new responsibilities, roles, and decision-making help them to meet their practical and strategic needs (Doyle, 1995). As agents of change, it is important that they have access to all levels of education and attain educational qualifications (United Nations Commission on the Status of Women, 1995). This will not benefit girls and women alone. It will also benefit

boys and men, as it will ultimately contribute to a better living for families, with positive consequences for both sides. In the sector's labour market, wages are in general related to the type of training and education received, and it is reasonable that both women and men have the possibility of benefiting from a valued position. Besides, 'gender inequality is not only a matter of justice but of good economics as gender inequalities hamper growth' (World Bank, 1995a).

Although a gender balance begins to emerge at the lowest level in the water and sanitation sector, women are also needed at municipal, provincial and national levels of decision-making and policy development—a sphere were they are little represented. A recent example comes from the Global Water Partnership Consultative Group meeting held in Marrakech in March 1997. Of the 115 participants, only 15 were women. This is a common situation at international fora, where representatives of leading water organizations are present, and reflects a lack of gender balance in decision-making at higher levels (Athukorala, 1997).

Equal representation of women at higher levels of planning and decision-making on water resources distribution and management will not only ensure that the interests of women are represented at the higher levels, it will also positively influence the reinforcement of gender equity, the breakdown of gender stereotypes, the promotion of education and employment for women, and the optimal use of female intelligence, skills and ability to work in more scientific, technical and managerial functions. Increasing female enrolment rates in higher-level professional training and education will help to lead women to higher levels of influence in the sector.

In many countries women are better represented in universities than men. This happens in many cases in Latin America, West Asia, the Caribbean and many developed countries (Goutier, 1995). The question is: is this sufficient?

For gender balance in participation and decision-making at all levels of the sector, both men and women should benefit from education at all levels, and should be able to choose careers which lead them to decision-making positions. The situation of female employment and work in the water supply and sanitation sector reflects

the areas and levels of education women choose. Although much is being done to increase the participation of women in all types of high-level courses, the gender bias persists.

Curricula in higher levels of education and training still tend to be gender-biased, especially science curricula: science textbooks do not relate to women's and girls' daily experience and fail to give recognition to women scientists (United Nations Commission on the Status of Women, 1995). Moreover, young women who enter college in fields such as mathematics and engineering usually lack a strong basic education and technical training, and are competing in a male-dominated circle of students, with few role models among women scientists and engineers. Their opportunities for success and employment are very limited and they have to struggle harder to achieve equal performance. Even in countries where women attend university at the same level as men, fewer women study science and engineering. The lack of women in more technical professions can have negative consequences, particularly in the field of water supply and sanitation (Rodda, 1994).

In a country like Brazil, where more than 70 per cent of the population is concentrated in the urban areas and there is great stimulus to the participation of both sexes in all levels and types of education, the rate of enrolment of women in some universities is higher than that of men. In 1992, 53 per cent of all university and college students were women (Souto-Maior, 1993). However, it is very common for women to choose studies and careers which are not valued in terms of position, salary and decision-making, either by society or by the women themselves. Women may stay on in universities for a higher degree because there are fewer job opportunities for them after they graduate. In the School of Public Health of the University of São Paulo, 738 women and 455 men participated in the Master's degree and the PhD programmes between 1973 and 1995. However, there were fewer women in Environmental Health, which includes Sanitary Engineering, a career with much higher salaries and status than, for example Nutrition, Mother-and-child Health, or Epidemiology, where women are much more represented than men.

In the water- and sanitation-related labour market, men occupy

the highest levels and decision-making positions. In CETESB, the Environmental Technology Company of the State of São Paulo, the tendency is to have more men than women in decision-making positions, and a few more women then men in the more technical positions.

When attending international courses abroad, women tend to choose subjects which do not involve managerial positions or capabilities. Throughout the 1980s, the percentage of women in courses offered by the Water, Engineering and Development Centre (WEDC) at Loughborough University in the United Kingdom remained around 7 to 8 per cent. Exceptions were the higher percentage of women (35 per cent) taking the Water Analysis and Quality Diploma and the lower percentage (less than 3 per cent) in the Upgrading and Management of Urban Water Supplies course. The authors concluded that these variations may be attributed to the fact that for women it is socially acceptable to work in a laboratory, while managerial tasks are considered more suitable for men (Bell and Ince, 1991).

Another factor contributing to the low level of female participation in international courses is the lack of incentive from their families to travel abroad, their domestic obligations *vis-à-vis* children and husband, and the lack of incentives in their working environment. 'As engineers, women usually confront the beliefs of male colleagues that the profession is inappropriate for them since it entails arduous work in the field. However, since participatory approaches involve discussion at community level, women engineers may also be valued as communicators with women beneficiaries in particular' (Bell and Ince, 1993).

Technical and managerial positions are not done better by either women or men; both can perform adequately in such positions. As women are much less represented in these categories, their number should be increased so as to combat discrimination against women within organizations and to ensure a more gender-aware perspective in environmental health programmes (Vance, 1993).

The introduction of a non-biased gender curriculum would reinforce the role of women in higher-level education and training for water supply and sanitation. Some recommendations in this connection include: strengthening the gender expertise of staff in

existing education and training institutes for water supply and sanitation; preparing and adding new course material which is not gender-biased; encouraging the presence of female trainees in these institutes by paying them or giving them subsidies; giving priority to trainees coming from deprived areas in terms of water supply and sanitation; establishing a quota system for in-service training of women; providing facilities for the accommodation of women trainees; increase training in technical, managerial, agricultural extension and marketing areas for women to increase income-generating opportunities; support and develop gender studies and research at all levels of education, especially at the postgraduate level of academic institutions, and apply them in the development of curricula, including university curricula, textbooks and teaching aids, and in teacher training (INSTRAW, 1988; United Nations Commission on the Status of Women, 1995).

CONCLUSIONS AND RECOMMENDATIONS

Recommendations were given throughout this paper. Some concrete points for attention are listed below:

- Adequate and gender-sensitive sanitation facilities in schools to increase the attendance and continuation of girls in education
- Increase the number of female staff and their training for a non-gender-biased school environment, where girls are also stimulated to go on to higher grades and choose subjects related to water and sanitation; this will lead women, too, to a better and more influential position in the sector labour market.
- Health and hygiene education as part of school curricula and relevant and realistic teaching for local conditions. More innovative methods of education in schools so that gender inequities are not reinforced, e.g. addressing girls towards tasks such as cleaning and caring.
- Water, sanitation and hygiene projects to train women for paid work in fields where they have natural cultural advantages, such as hand-pump mechanics (regular visits to hand-pumps, greater interest and peer pressure to keep systems working); treasurers (high commitment to keep systems operative, visits to fee-paying

women by women as culturally more acceptable); and latrine masons (traditionally involved in plastering and environmental cleanliness; presence of female masons in another persons' yard or house as culturally more acceptable).

- Projects, staff, and education and training institutes in the sector, with a capacity in the use of rapid gender analysis, to asses the division of work, functions, and benefits between men and women.
- New approaches in education and training preparing women and men for new roles, jobs and functions in water supply, sanitation and hygiene. For women, opportunities to enter managerial and technical fields to be increased. The tendency to train women only for lower level voluntary jobs should be avoided. On the other hand, exclusive attention for women's roles in water and sanitation only increases women's workload and responsibilities (for example in maintenance, financing and environmental care) and leads to men withdrawing or reducing their involvement in water supply and environmental sanitation. Hence a gender approach is needed.
- Both in basic and secondary education, in training at community level, and in higher-level education and training, in curricula and educational materials, more systematic efforts to avoid gender stereotypes in content and illustrations.

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TABLE 1. Combined primary, secondary and tertiary gross enrolment ration for men and women, compared to the share in income—1994

Human development level	Adult literacy rate (%)		Primary, scondary and tertiary gross enrolment ratio (%)		Earned income share (%)	
	women	men	women	men	women	men
High	96.6	97.4	80.0	78.9	34.7	65.4
Medium	76.1	88.9	60.8	65.2	35.7	64.4
Low	35.8	61.8	40.2	54.4	27.9	72.3

Source: UNDP, 1997, *Human Development Report,* New York, USA, Oxford, UK, Oxford University Press.

TABLE 2. Primary, secondary and tertiary enrolment rates for men and women, compared to the share in income—1992 and 1994, approximately

Countries and their GDI value*	Female enrolment (1992)		Female enrolment (1992)	Combined primary, secondary and tertiary gross enrolment ration (%) (1994)		Earned income share (%) (1994)	
	Primary	Secondary	Tertiary (per 100,000 women)	women	men	women	men
Argentina 0.777	95	62		79.0	76.0	22.0	78.0
Bolivia 0.557	87	27		61.0	72.0	27.0	73.0
Brazil 0.728			1,220	72.0	72.0	28.7	71.3
Chile 0.785	84	55		71.0	72.0	21.9	78.1
Colombia 0.811			1,578	72.0	67.0	33.3	66.7
Costa Rica 0.825	88	38		67.0	69.0	27.2	72.8

Contd . . .

Table 2 contd . . .

Countries and their GDI value*	Female enrolment (1992)		Female enrolment (1992)	Combined primary, secondary and tertiary gross enrolment ratio (%) (1994)		Earned income share (%) (1994)	
	Primary	Secondary	Tertiary (per 100,000 women)	women	men	women	men
Cuba 0.699	98		2,134	65.0	61.0	31.1	68.9
Dominican Republic 0.658	83	29		69.0	67.0	23.1	76.9
Ecuador 0.675				71.0	73.0	18.4	81.6
El Salvador 0.563	71		1,281	55.0	55.0	27.6	72.4
Guatemala 0.510				42.0	50.0	20.6	79.4
Honduras 0.544	91		726	61.0	59.0	23.8	76.2

Contd . . .

Table 2 contd . . .

Countries and their GDI value*	Female enrolment (1992)		Female enrolment (1992)	Combined primary, secondary and tertiary gross enrolment ratio (%) (1994)		Earned income share (%) (1994)	
	Primary	Secondary	Tertiary (per 100,000 women)	women	men	women	men
Mexico 0.770			1,333	65.0	67.0	25.1	74.9
Nicaragua 0.515	81	28	819	63.0	61.0	29.5	70.5
Paraguay 0.649	96	29	832	62.0	62.0	22.7	77.3
Peru 0.656				77.0	84.0	22.9	77.1
Uruguay 0.842	93			80.0	70.0	33.4	66.6
Venezuela 0792	90	24		69.0	66.0	26.8	73.2

Based on: UNDP, 1997, *Human Development Report 1996,* New York, Oxford, Oxford University Press.