WATER-RELATED ISSUES AND PROBLEMS OF THE HUMID TROPICS AND OTHER WARM HUMID REGIONS

IHP HUMID TROPICS PROGRAMME SERIES No 11

HELPING CHILDREN IN THE HUMID TROPICS: WATER EDUCATION

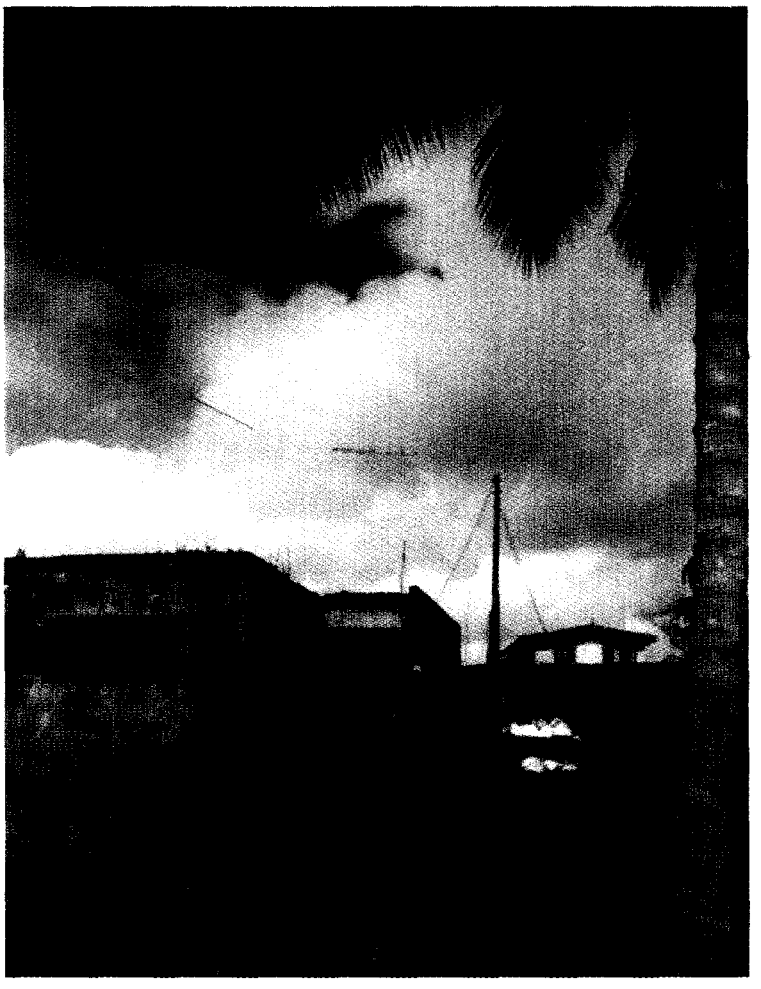
UNESCO

INTERNATIONAL HYDROLOGICAL PROGRAMME

MAB

MAN AND THE BIOSPHERE PROGRAMME

"... by the Year 2000, almost one-third of humanity will be living in the tropics"



Claudine Brelet-Rueff
International Institute of Tropical Agriculture
Ibadan, Nigeria

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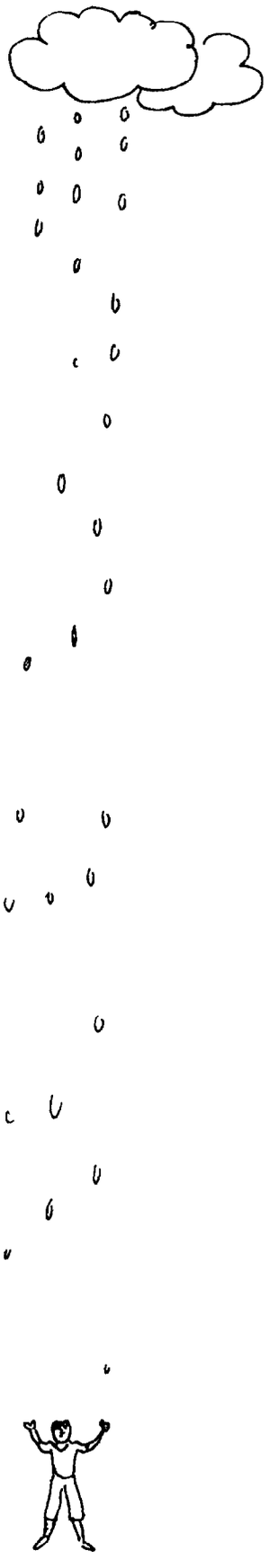


INTRODUCTION: CHILDREN'S HEALTH IS TOMORROW'S WEALTH

Information about water and health issues is not lacking. On the contrary, it is abundant. Yet, there is often a communication gap between the environmental sciences and the social and human sciences. The International Hydrological Programme aims to fill this gap by providing suggestions for integrated water management strategies. It is expected that the reader will have access to booklet no. 3 in this series, entitled Water and Health. Duplication of information is thereby avoided and the reader is provided with a comprehensive overview of water-associated diseases and their related ecological conditions. It is hoped that the present series will help managers to make the right decisions and thereby lessen, or even eliminate, the threats to human health.

When one considers that, of the 250 million new cases of water-associated diseases reported every year, 75 per cent occur in tropical poor rural areas and slum-outskirts of big cities, it becomes clear that water education is a priority. This booklet is deliberately practical. It attempts to illustrate that early water education can benefit the entire community. Changing human behaviour is a long, slow process, but the long-term benefits to health far outstrip the investment in time and effort.

Since habits related to water use are learned very early in life, children's water education is vital. It is a bottom-up process. The sooner children understand that prevailing water-associated diseases can often be prevented through simple measures, the more likely it is that the new habits will be performed throughout their lives and adopted by their communities. Children can then help their families to recognize situations where safer use of water is more rewarding than remedial actions.

Several examples based on appropriate techniques are used in this booklet. They offer practical means of improving the quality of life at the humble level of the household in underdeveloped areas. These methods include disinfection, various ways of storing water at home and how to protect water from contamination.

As decision-makers usually belong to the modern and wealthy segments of society and are more sensitive to the needs of their own social category, this booklet may be considered a two-way communication tool: (1) helping people at risk to help themselves, and (2) informing decision-makers of real and felt needs. Chapter 1 may be considered a guide to the planning of training programmes attuned to local cultures. Children in poor communities are, after all, involved in many daily tasks to sustain their household. In Chapter 2, children's specific needs and activities are reviewed: these constitute the entry-points through which water education can be developed with the most rapid and positive effects both on the children's health and on the health of their entire community.

Bearing in mind that water education is a basic part of health education and that motherhood often occurs at a very early age in poor regions, Chapter 3 highlights the specific needs of the most vulnerable segment of the community, namely infants and mothers. The benefits of education usually reverberate first on the family. For this reason, Chapter 4 focuses on some appropriate techniques for children to use in their homes that may draw in their parents and improve the family's well-being at home. Chapter 5 introduces ways of helping children to improve their community's comprehensive protection. Yet, new habits and knowledge are not enough if they are not put into practice through social organizations and with their support. Chapter 6 suggests ways of educating children to take responsibility and actively participate in the collective changes that can promote health and environmental security -- for example, through the establishment of a water committee at school or a children's water committee in the village.

Methods of addressing health problems at the community level suggested here apply the principles of active education. The approach is comprehensive in order to stimulate imagination and creativity, and a sense of initiative and of moral responsibility. It simultaneously gives the basic knowledge necessary to understand the relationship between the cause -- infectious agents -- and the effect: unsafe water and ill health. The "learning-by-doing" approach can be used in almost all pathological conditions related to water. When behavioural and technological changes are adopted by the community across generations, cultural shocks that too often weaken a community's self-esteem and energy are avoided. Not only that but sustainable development progressively gains ground as a result of this dialogue.

A reminder

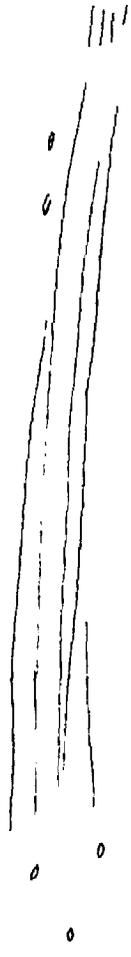
By the turn of the 21st century, the world's population will have risen to approximately 6.5 billion. Considering that 95 per cent of the extra billion will have been born in the Third World, the water issues related to infants and children are of crucial importance. Although, since 1945, there has been a 50 per cent decline in infant and child mortality as a result of a better public health service, much still needs to be done. The situation of the child with regard to water issues in the humid tropics and other humid regions can be improved but this will require more care and political will than simply sending in big, expensive equipment.

A newly installed tap ensures a safe drink for this little girl on the Pacific island of Tongo - WHO Photo by Längst

1. MANAGING WATER EDUCATION THROUGH COMMUNITY PARTICIPATION

Think globally, act locally

The motto "Think globally -- act locally" was coined by René Dubos for the First International Conference on Environment, held in Stockholm in 1972. It also applies to the general philosophy and practical concepts underlying water education. These rely upon internationally recognized scientific standards and the dual acknowledgement of cultural diversity and biodiversity.



In November 1980, the United Nations General Assembly decided to launch the International Drinking Water and Sanitation Decade. The Decade (1981-1990) widely contributed to giving over 1,500 million people access to a safe water supply and approximately half this number access to adequate sanitation. Yet, in the early 1990s, about 1,025 million people in developing countries remained without a satisfactory water supply and 1,750 million without appropriate sanitation. This situation is due to population growth, which has contributed to a deteriorating standard of living and to an increasing demand for safe water and sanitation. The Decade created international awareness of the growing needs in poor communities and placed greater emphasis on the use of appropriate and affordable technologies, community participation and the involvement of women. However, the importance of giving priority to the training and education of children in health and hygiene was to be realized only after the Decade.

"Water education" is a particularly important factor of community health in an age when it has become urgent to abandon the prevailing "use and discard" philosophy. Rapid population growth, together with the extension of irrigated agriculture, is drastically affecting the quantity and quality of water. Safe water for drinking and sanitary purposes is rapidly becoming an increasingly scarce commodity. As human activities are a major factor affecting water quality and quantity, both directly as a result of discharge into rivers and indirectly through activities on land, it is urgent to place greater emphasis on education. These activities must be organized in schools. Primary school projects, especially in poor rural areas, can change the current philosophy of carelessness and, through local action, build happier prospects.

Women play a key role in health practices. Progress in increasing their participation can be noted. Yet, it is only logical to start earlier: namely to focus on health education and training of children. Behavioural change is very difficult to accomplish, especially when it affects intimate personal habits. Behaviour patterns can nevertheless be changed quickly and on a large scale. However, this will only occur if the community involved in a children's health education project understands the benefits of the new practices. It can be achieved only when support systems or services and the required means exist and only when the community understands that the benefits will outweigh the cost in terms of finance, energy and time.

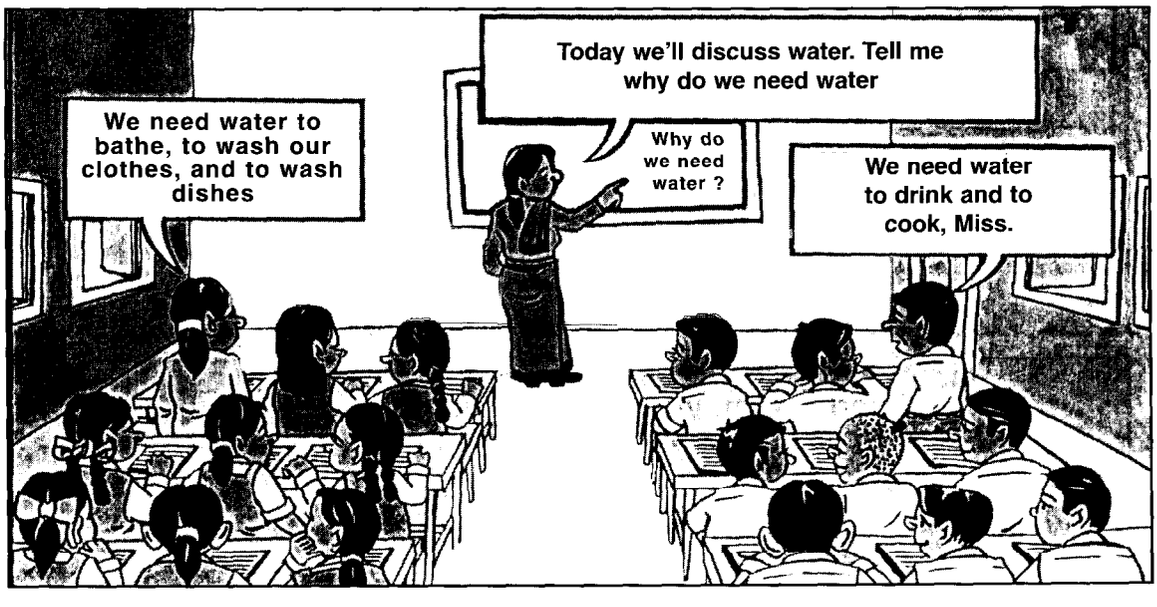
Education improves health!
Health improves learning potential!

School-age children number over a thousand million in the world. The school is a basic institution in every society and offers the possibility of improving the health not only of children but of whole communities. In 1993, the World Bank and the World Health Organization (WHO) compared the cost-effectiveness of various public health programmes. They concluded that a school health programme providing safe and low cost health services, such as de-worming treatments and health education, was one of the most cost-effective investments a nation could make to improve health.

WHO considers that, taking into account the cost of improving health and the fact that all nations face difficult decisions about how best to use their limited resources, the school emerges as an ideal setting for increased investment and return. The Global School Health Initiative is based on the following elements:

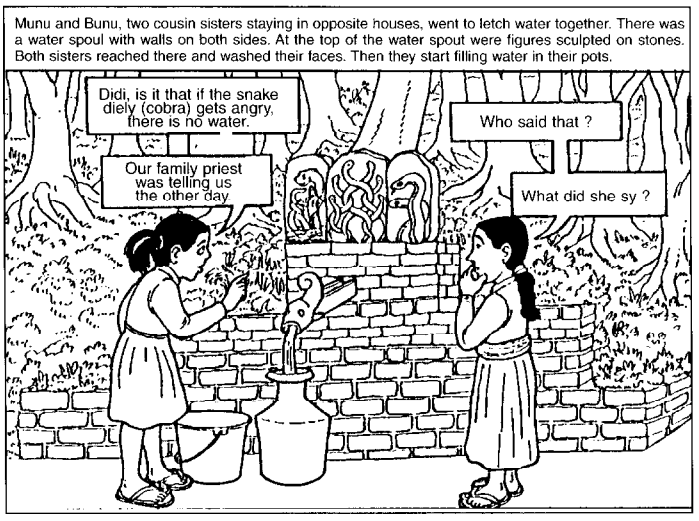
A healthy school environment -- not only appropriate water and sanitation facilities and good hygiene but also adequate space and working conditions for students and teachers. An unplanned school environment can actually be detrimental to health...

- A comprehensive school health education that treats health holistically, addressing the interrelation between health problems and the factors that influence it...
- A comprehensive health service for students and staff, which addresses priority conditions (eyesight and hearing problems, malnutrition, malaria, worm infestations and psychosocial stress). These can be readily countered by specific health intervention at school...
- Ensuring the optimal use of scarce health and education resources through intersectoral planning at national and international levels, training programmes for teachers and networking between schools...
- A positive approach to health promotion, adapted to the local environment (counselling on self-care and the prevention of illness, injury, drug abuse and unwanted pregnancies)...
- Outreach to parents and the community, in which the school provides the focus for health education and adult education programmes for the community, as well as for village health committees, women's and youth clubs and other communal activities...
- A move towards equity in education and health, using the enhanced influence of the school to raise the standards of schooling and the status of girls and women in the community.



Professionals working in the water and sanitation sector have many reasons to be proud of their knowledge and skills. Their work and expertise stand to gain in efficiency when combined with social and communication skills. Basic knowledge of the planning of training programmes for children can be acquired at minimum financial expense and yield maximum rewards in terms of the community's well-being (health and acquisition of new skills and opportunities). The main requirements are: personal involvement, patience and a capacity to listen and to look at situations from other people's point of view so as to promote discussion and group activities involving both the children and the adult community.

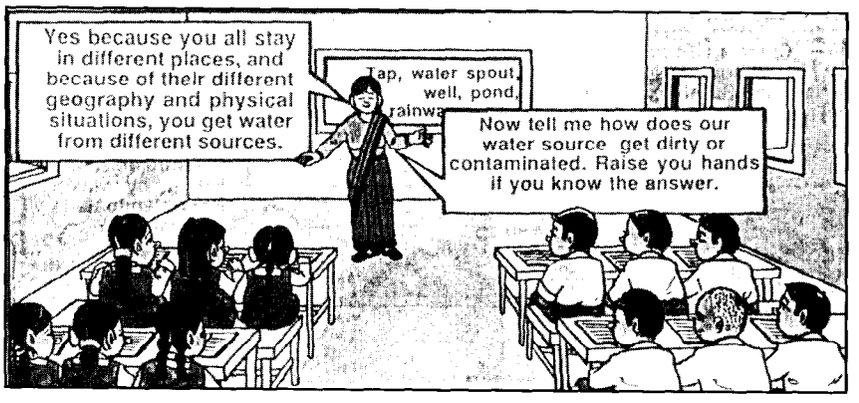
Tradition and innovation

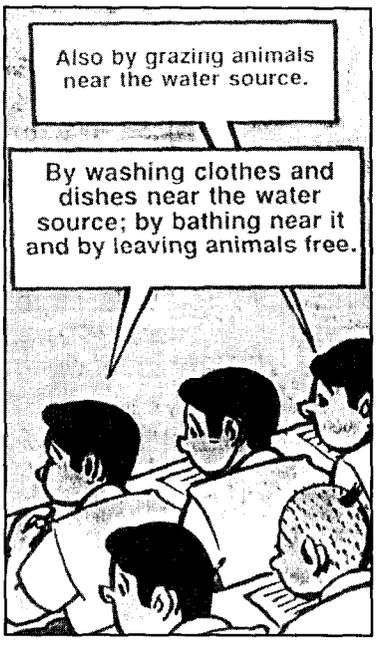


Indigenous people are estimated at 300 million worldwide. They live in over 70 countries. Most of these communities live in tropical regions where their traditions have been maintained because of their isolation. Even in overcrowded, poor urban areas, some populations may suffer from "cultural isolation". Others may see their traditional cultures more or less eroded due to their exposure to the assimilation and integration policies of dominant ethnic groups (as occurs in the outskirts of megacities such as Lima, Mexico City and Lagos) and their exposure to other attitudes and beliefs. Thus, TV sets cloud images of ancient gods and technological progress clashes with ancestrally deep-seated customs.

Cultural identity and cultural relativity

On 10 December 1948, the General Assembly of the United Nations adopted the Universal Declaration of Human Rights. It was one of the United Nations' first major achievements. Articles 1 and 2 of the Declaration state that "all human beings are born free and equal in dignity and rights". Human rights include freedom of expression -- the first step towards international recognition that well-being, development and happiness do not depend upon a standard pattern and that cultural diversity simply reflects -- and represents -- the human answer to natural biodiversity. In 1959, the Declaration of the Rights of the Child, adopted unanimously by the General Assembly of the United Nations, affirmed the right of the child to special protection and to opportunities and openings which enable him or her to develop in a healthy and normal manner. Children spontaneously identify with what is normal in their current settings: their family traditions, lifestyle, customs, language, spiritual and ethical values and the way they eat and dress. Each culture has its specific expression of feelings and ideas.





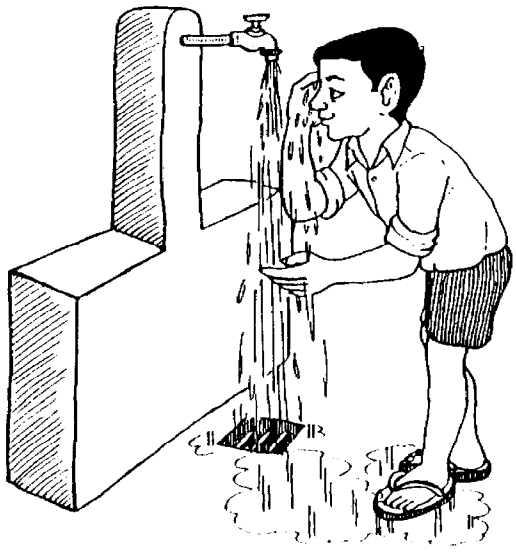
Children in poor communities are commonly involved in a number of daily tasks to sustain their household. The design of a water education project must therefore be based on an understanding of local traditions and customs which vary from region to region. Regardless of the medium used, the messages to children should be scientifically correct, as well as clear and simple. They must also reflect reality as perceived by the local population. People living in contact with nature view it in a much different way from those living in cities: a tree or a water source is often several things at the same time -- obviously a tree, or a spring, as "Westerners" would commonly view these "things" but also, and perhaps more importantly, sacred places where their ancestors live. Contrary to "developed" society, such work as cultivating land or herding cattle can fulfill a spiritual function and be one of the community's sacred rituals. Oral culture expresses local values and is preserved in ballads, legends, myths, poems, proverbs, songs, riddles and stories. It can help to adapt water education messages to the local language and customs. Flexibility is the key to a culturally sensitive approach.

Anthropology has shown that thinking processes are equivalent for all humans, whatever their culture and linguistic expression. An educational project can be presented as a series of events. In many traditional communities, such as those found in rural tropical areas, people often use events to measure time. Where clocks are absent, the state of daylight organizes the household's routine work, which should never be disturbed by the introduction of a water education project. Competition for time with household and farm chores should be avoided in designing the children's schedule for water education.

Much has been said about women often having primary responsibility for providing the community with water. This said, their role and status vary from one society to another. Sometimes, women don't have much of a say in decision-making because certain communities tend to maintain barriers between the sexes. These traditional barriers should be respected when designing a water system. Yet, involving both boys and girls equally and at an early age in a water education project can also help educate parents about the value and importance of the education of girls.

PRACTICAL MEANS OF ADDRESSING WATER EDUCATION

Some tropical countries have already launched health education programmes and promoted water safety. Mass-media, such as radio, television and newspapers, achieve a wide coverage. On the one hand, although radio, television, videos and movies are taking on greater importance in developing countries, they can hardly be used where electric power facilities are absent or where batteries or electric power generators are too expensive. On the other hand, mass-media on their own are inadequate for stimulating the two-way dialogue that will provide opportunities to clarify any questions arising from the encounter of local traditional practices with "new" rules of basic hygiene. A two-way dialogue allows health educators to alleviate or even eliminate the community members' doubts and fears.



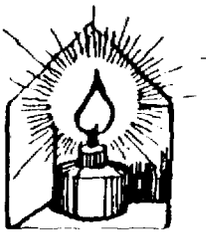
Although mass-media, when combined with person-to-person education, are ideal for rapidly encouraging behavioural changes, a more modest but highly efficient approach is the development of programmes aimed at specific groups whose behaviour contributes to water-borne illnesses. It is children who are most likely to change their behaviour. When education takes place early, new behaviour patterns last a lifetime and, thus, form a support base for generating political will and mobilizing both community participation and resources. The education of children is, thus, a realistic answer to the problem of how to improve water safety, domestic sanitation and personal hygiene.

The problem-solving approach

The objective of water education is to promote a behavioural change and make children aware of the need for hygiene and its importance.

The problem-solving approach to learning new behaviour patterns related to water use is based on experience. Learning has proved to be more effective and teaching more efficient when a child tackles real-life situations. In addition, children may gain in self-confidence once they have successfully accomplished projects that give them the feeling of having made a worthwhile contribution. The problem-solving approach also helps them to discover a number of professions concerned with construction techniques and basic skills in the operation and maintenance of the water supply and in sanitation.

Tropical regions need to increase the number of children knowledgeable of their nation's needs. When children gain a perspective of the general and infrastructural needs of their country, region and community, a crucial step has been taken towards employment: children are then better able to understand that a direct relationship exists between the jobs offered and the training required to gain access to a particular one.



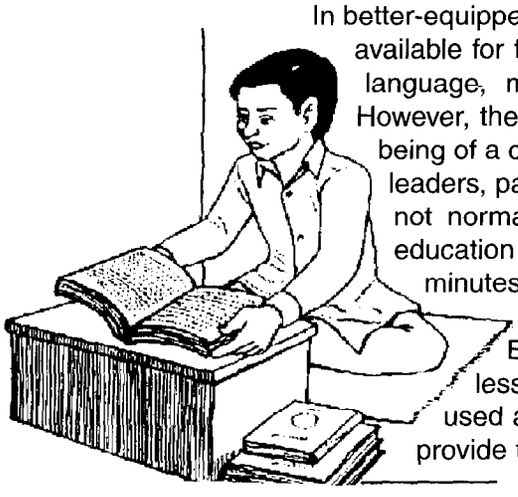
People generally remember something more vividly when they actually see what they need to memorize, particularly if they then write it down. However, the best way to recollect something is through practical experience. This especially applies to children where, the earlier a new behaviour pattern is learned, the longer it is likely to last. When one considers that verbal communication amounts to only 5 per cent of global communication, it becomes clear that seeing a phenomenon actually happen is the best way to memorize it. Chapter 4 is intended to provide ways of helping children to learn simple and adequate technologies that may contribute to improving the quantity and quality of the water needed by their household.

Key ingredients for learning

Basic education, a concept developed by UNESCO as early as 1948, improves cognitive and problem-solving skills that are largely lacking in low-income and lower middle-income communities where most adults have not completed primary education. For example, the World Bank estimated in 1990 that, in low-income communities, fewer than two-thirds of those who enrolled in primary schools completed the entire cycle. Unfortunately, this proportion is declining. In remote rural areas, schools and teachers are simply unavailable and a water education project will rely upon the goodwill of village committees and non-governmental organizations.

The World Bank estimates that, of the 115-145 million school-age children out of school in developing countries, the vast majority come from one or more of the traditionally disadvantaged groups. In villages and poor urban areas of tropical regions, the necessary supporting infrastructure is often unavailable. Although instructional materials are essential to learning, even when primary schools exist, children may lack books or at best be required to share books with others. Educational activities are often based on lectures and topic teaching alone, with no other equipment in the classroom other than a simple blackboard and chalk.

Whatever the circumstances, teaching small groups is better for generating discussion than are large group meetings.



In better-equipped schools, water education may compete with the time available for the existing curricula of traditional disciplines, such as language, mathematics, science, history, geography, arts, etc. However, the rewards of good health are so important for the well-being of a community that, after consultation with local community leaders, parents, local health workers -- and children! -- there will not normally be too many arguments against teaching water education as a specific subject. Short sessions of 20 to 40 minutes each, once or twice a week, can be sufficient to help children understand basic facts over the school year. Each child should be encouraged to keep records of the lessons, whenever possible. Their notebooks will later be used as a reminder of each unit learned and summaries will provide them with key information.

When they are available at school, felt-tip markers and paper flip-charts can be used for displaying information. Overhead projectors are useful for presenting information written directly or copied onto transparencies to be projected onto a screen. They enable the teacher to face the class while commenting on the material prepared from illustrations and tables photocopied from educational materials. Although videos and the necessary equipment are expensive and require some expertise (and maintenance), they constitute lively ways of presenting information that conveys credibility because the children actually see a reality. Easily adapted to local languages and traditions, they can stimulate discussion. Most international institutions and a number of non-governmental organizations (NGOs) have prepared teaching videos and documentaries that are readily available to communities upon request, either free of charge or at a low cost. In remote places, a mobile electric power generator is an asset for organizing educational rounds in poor, isolated communities.

Education certainly takes place in schools but not only in schools. Outside the classroom, community-based projects provide settings that can give children a better understanding of the role of family, culture and socio-economic factors by involving them in cooperative and practical work as teams. Water education projects can be accompanied by non-formal educational approaches, such as the use of illustrated stories and comic books presenting the basic contents and background information. A great number of adults in tropical rural areas still cannot read and, while illustrated stories are intended primarily for children, the illustrations to the stories, wall posters, flash cards, cartoons, etc., that children bring home can also be effective in conveying instructions from the children to their mothers and other members of their household.

Most societies have traditions whereby valuable ideas and actions are told in stories. These can be used to present messages about water, waste disposal, child-care and food preparation that will be enjoyed by the children.

The "Papoco" Project of the Brazilian Ministry of Education & Culture, in association with the Federal University of Ceara, in Northeastern Brazil, inaugurated this method as early as 1980. It has issued a very successful series of literatura de cordel. The following example can inspire the use of songs in vernacular languages:

We want everybody to know,
With certainty and confidence,
Everything about hygiene
Because cleanliness is wealth,
Offering you youth and joy
Much wealth and beauty.
To avoid falling sick,
Worms and yellow fever,
We must never walk barefoot
And always wash our hands
Especially before going to bed
And before every meal.

Water is the carrier
That brings illnesses to you.
It should never be drunk
Before it's boiled or filtered,
But the filter's core and jar
Must be regularly washed.
For your own well-being
And to ensure that you stay healthy:
Don't forget from time to time
That you must enjoy yourself.
Forget your problems and strain
To avoid seizure of the brain.

Community participation

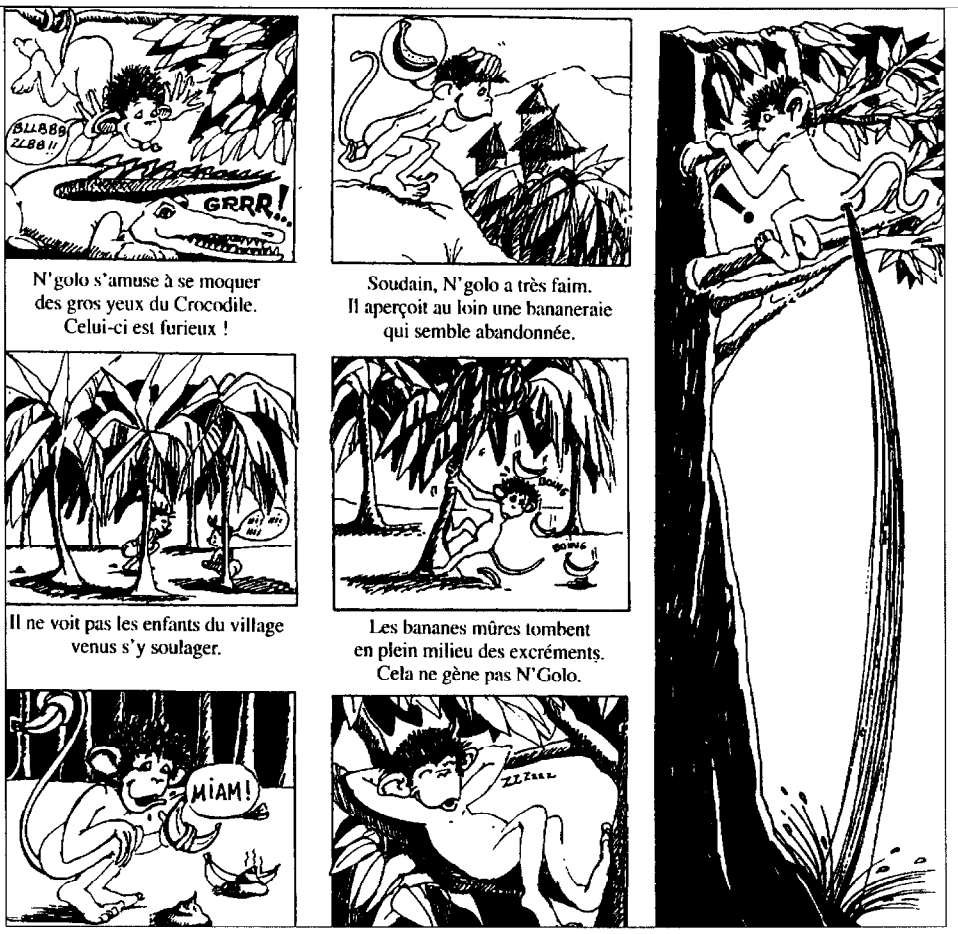
Illustrated stories and examples are useful for fostering a community's cohesiveness and for joint action through group meetings, talks and discussions organized weekly about the prevention of enteric diseases, safe drinking water and safe food handling, hygiene and waste disposal. Comic books can be produced at little cost. Throughout the world, they are widely read and it is now believed that they may be as powerful a means of mass-education and communication as television. Although some decision-makers may still scorn them -- mostly because their views rely on a "top-down" approach and because they do not sufficiently take into consideration the culture of the grass-root audience -- comic books have proved to be very efficient educational tools when designed for a specific community.

Perception of objects and situations differs from culture to culture and sometimes from village to village. Hence, the development of visual materials should preferably be entrusted to someone with experience in working with the local population. When facing a community where illiteracy or semi-illiteracy prevail, however, it has been documented that time and effort spent on attempting to communicate solely by means of pictures may be wasted (Communicating with pictures in Nepal, Report of a Study by the National Development Service and UNICEF, Kathmandu, 1976).

The involvement of a local graphic artist is important to ensure that the images and symbols used are culturally appropriate and to identify the best way to illustrate certain messages. In all cases, illustrations must be pre-tested through discussions with as many local children as possible to make sure that they recognize the objects portrayed and understand the message intended. When words are used, they should be few and simple, and printed or painted with large letters. The messages must be limited to no more than eight to ten different points in a single poster, pamphlet or cartoon. The target audience should have the final say in terms of contents, symbols (illustrations) and sequence. Sequence is as important as content: a child who "reads" the pamphlet, poster or cartoon should be able to link and connect messages.

Cultural diversity can be handled when an illustrated story or a cartoon is pre-tested. The test should detect, for example, whether the balloons or bubbles presenting the dialogues are being confused with flowers, or even with clouds (which in certain regions symbolize dust).

Colours should also respect local symbolism and values because they are meaningful in many cultures. Whereas, in West European culture, red is the colour of anger, it represents joy and happiness in eastern Europe, Asia and sub-Saharan Africa. While black is the colour of the dead in European culture, in Africa it is used to keep death and "evil spirits" away. Some populations may use four or five words for colours. It does not mean that they are somehow "colour-blind" but rather that they simply have little use for certain tints.



Ngolo is playing along the river. He suddenly feels hungry and goes to a banana plantation that looks abandoned. He does not notice that some children have come to the plantation to defaecate and that the ripe bananas have fallen into their excrement. Ngolo gulps down the bananas then takes a nap. Suddenly, he feels a great pain in his tummy -- the dirty bananas have infected him, causing diarrhoea! -- This tale was imagined by a group of children at the Rural Centre of Technical Support (C.R.A.T.), SAÂ, Cameroon, and produced by l'Enfant pour l'Enfant, Institut Santé et Développement, Paris.

When illustrated stories present a fictitious local family in local settings, they can provide children with a mirror-image of their own situation. Thus, they are more likely to learn the intended messages. Cartoons are more entertaining and usually provoke greater participation than other formats. Cartoon characters are preferable to photos or real life figures: activities like defecation, for example, are less sensitive when presented in sketches. They prompt laughter and tension release over embarrassing issues, whereas photographs may be too detailed and thus divert attention from the main message. On the contrary, simple line drawings provide a minimum background. Similarly, stories will fail if they point out too many behavioural changes or merely list improper behaviour. One simple message at a time, such as the following examples, is more effective than a complicated story:

- How diarrhoeal diseases are transmitted.
- Hand-washing with soap helps to prevent them.
- Why protection of water storage and handling is important.
- Keeping animals out of the kitchen and, generally, the home helps to control water contamination.
- Why it is important to use the latrine and keep it clean.
- Why and how to build a latrine.

Posters can be made from blown-up photographs or reproductions of some particularly striking sketches. The production costs are reduced when they are printed in black ink on different-coloured sheets of paper. The variety creates an impression of (more expensive) multicolour printing. Felt-tip markers and water-paints can be used by the children or the teacher to colour the sketches and the messages written on the posters. The same applies to calendars. Illustrated by the children for their own households, *calendars* constitute a permanent and "decorative" reminder of particular messages, one for each month throughout the year.

Recreational activities, such as games and theatre plays, also allow the expression of messages promoting new uses to protect water and promote sanitation. Chapter 6 presents activities that will encourage the expression of positive and negative feelings. It aims to strengthen the children's self-confidence, creativity and sense of responsibility in the hope that it might foster a spirit of cooperation and greater solidarity.

Listing *key questions* and *reasons* for initiating a project is the first step in helping children to form opinions and gain confidence in their ability to learn new skills. The more motivated they are, the better they will perceive how things are going to change and evolve.

Be prepared!

The identification of problems and priorities boosts the rural adult population's confidence in the contribution it will be able to make to the children's water education. A clear schedule helps parents to make the necessary decisions and to convince them that they will benefit from their children's efforts to carry out a project.

A framework is essential to make the children understand why the project is being undertaken, to distribute tasks and avoid duplication and to identify resources and problems. The design of a training project based on the problem-solving approach should begin with an evaluation of the situation and plan of action. While ensuring that it is adapted to local needs, the project can be organized step by step as follows:

Identification of the community members involved

- Who are the most at risk in the community?
- Which households most need to improve the quality of their water?
- Which community members, in addition to children, can be reached by the project?
- Do the children think that the adults will multiply the experience?

Along the Amazon river to fetch water for the family. / WHO Photo by P. Almasy

- Which children will be involved as team members? Being "officially" confirmed as team members usually encourages children. Having their names written on a board gives them constant recognition of their efforts. This kind of reward is particularly important when, owing to their other activities (at school, in the household, etc.), they cannot devote much time to the project, which consequently may not provide them with immediately visible feedback.

Identification of resources

- The children's "headquarters" can be established in a school, a non-governmental organization's local office, a church or in the village committee rooms.
- The donors: as a matter of fact, the location of the children's headquarters chosen to initiate the project will often belong to the institution that is either contributing to the acquisition of the necessary equipment or entirely funding the project. It should be explained to the children that the funding institution has a legitimate need to be kept informed of the progress the project is making and to be assured that the funds are being used appropriately.

Identification of multiplier effects

Other people and institutions may be indirectly interested in the children's experiences:

- Articles from local and national media can help to convince other communities to launch their own projects. Articles can be reproduced in other countries to increase public awareness in temperate and developed countries of conditions in tropical regions. These articles may also draw other donors eager to fund the projects and ensure their continuation.
- International governmental or non-governmental organizations are interested in hearing about new experiences in order to duplicate them in tropical regions throughout the world.

Identification of activities

- Organization of children into small groups (from 5 to 10 children each) in order to better encourage dialogue within each group.
- Assessing the real and felt needs by asking the children questions which make them realize what a significant contribution they will be making to the well-being and health of their own community. The following questions are just examples and should clearly be adapted to local conditions: What sources are being used for the children's household drinking water? How many homes have access to a pit latrine? What are the main water-borne diseases in the community? What do their families believe is the cause of schistosomiasis, diarrhoeal diseases, etc.?
- Setting clear objectives and deadlines for reaching these. For example, the number of households to be visited in order to identify what should be improved to protect water in the kitchen and

outdoors, number and location of latrines to be built, what water sources can be constructed or improved?

Identification of the community members potentially involved

- Which adults are willing to attend the children's meetings?
- Which parents openly encourage the children and are willing to support their children?
- Who besides the children provided ideas for action and solving problems?

Identification of the future assessment of the project

It usually helps the children to identify the past, present and future in order to experience "time". Some populations living in tropical regions (e.g. in Africa) have no word to express the concept of future (which is often denoted in Western cultures by their conjugation of verbs). Making a distinction between the past, present and future has no meaning in communities where little changes over the years. Hence, questions like the following may help children to visualize the potential results of their action in the future:

- Who in your family will remember the experience a season from now, by the next harvest?
- Which of your family members will have changed their behaviour by the end of the dry season?

Have the project's objectives been met?

The preparation of a final assessment of the children's project will require that objectives are clearly defined to reflect the community's real and felt needs. The assessment can stimulate efforts to achieve desirable results.

- Has the number of participants increased?
- Which children are able to appreciate the value of safe water?
- Which parents are able to do the same?
- Which children and adults changed their habits after the project ended?
- How have the newly-built equipment and improved water sources improved the community's well-being and health?
- How much time is saved daily in the household and by whom compared to before the project was launched?
- Has the incidence of water-borne diseases been reduced; for example, the number of cases of diarrhoeal episodes, etc.?

Is the project really appropriate and efficient?

A weekly or monthly evaluation should ideally take place in order to ensure that progress continues throughout the project and that changes can be introduced to improve it when necessary.

- How do the children feel about their experience after a week, a month, a year?
- How do the adults feel about their children's training?
- Has the experience brought any unforeseen changes in the community's daily life or in the relations between the members of the children's family?

- Should the community extend the project? For how long?
- What other approach could achieve the same or better results with less effort and at less expense?

The ultimate objective is not only to change water-related habits. The project also seeks to enable children to eventually participate in designing, managing and implementing their own local development. This democratizing process is encouraged when:

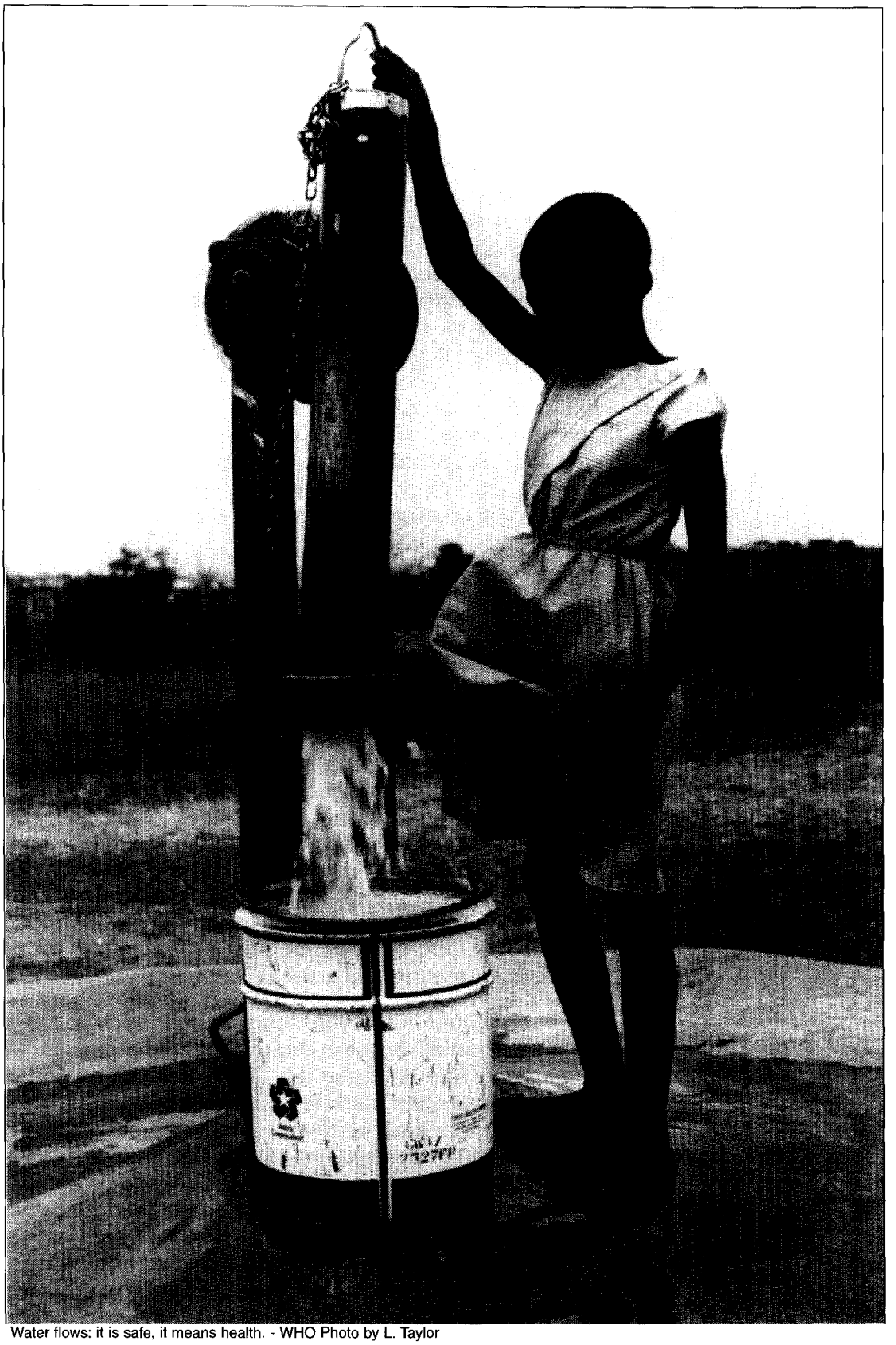
- children are invited to participated in the process of deciding what should be done;
- the project leader does not listen only to those children constantly taking the lead in discussions but also to those who may be too shy to speak out at first;
- techniques used match the skills of children, increasing their feelings of solidarity;
- children can see their own achievements through the eyes of other children conducting similar projects in neighbouring villages or neighbouring urban areas. Visits provide the children with perspectives on their achievements and with new ideas. It helps them to do self-evaluations and to socialize with new acquaintances, both adults and other children.

A positive and healthy understanding

Water needs are particularly acute in rural areas or in emergency settlements like this refugee camp in the State of Quintana Roo in Southern Mexico / WHO Photo by D. Bregnard

Improved understanding centred on a feeling of enhanced well-being can be a decisive factor in gradually bringing children and their communities to accept behavioural changes which might not have been possible at first. This is especially true when environmental factors include poverty and ignorance of the mother and her need to work because, perhaps, the father has abandoned the family. In all societies, the intensity of the thought, hope and will is a decisive factor in innovation and the undertaking of creative action. These are human characteristics and explain why incantations and prayers, for example, are used in magic rituals of traditional societies: one of their functions is to strengthen the will to make an action successful.

When instructors present the background and justification for the course clearly to the parents, water education may gradually bring them to support their children's efforts and to correct their own habits. Children can help their families to recognize situations where health improvements cannot be achieved without drastic change and to see that safe use of water is better than remedial actions. The connection between ill-health and unsafe water uses may be used to highlight inter-relationships between ill-health and other causes, such as poor hygiene, malnutrition (unbalanced diet), insecure storage of crops, etc.



Water flows: it is safe, it means health. - WHO Photo by L. Taylor

2. THE CHILD'S NEEDS AND ACTIVITIES ... AND THE RELATED RISKS

BASIC FACTS

Environmental factors

The impact of environment on children's health is the result of many factors. Health (the ancient Greek root *holon* means "totality") depends on a number of individual characteristics, such as genetic make-up, sex, age, absence or presence of disease, physical condition and personality. Common environmental factors in tropical regions that can affect the child's health are chiefly:

- Psychological factors: stress generated by bad relationships within the family, poverty, civil and military strife...
- Physical factors: crowded housing, noise, heat and humidity...
- Chemical factors: chemicals, dust, drugs, tobacco...
- Accident factors: natural and man-made disasters, traffic, influence of drugs and alcohol...
- Biological factors: bacteria, parasites, viruses.

These factors can interact and open the road to illness. Most are man-made. Preventive measures, if learned from an early age, can reduce them. Throughout the world, in both developed and developing regions, temperate and tropical countries, youngsters can protect their future once they know how to identify sources of risk and potential sources of contamination because of changing environmental and even climatic conditions.

Children are more at risk than adults

Whereas the average daily consumption of a person weighing about 60 kg is usually less than 2 litres of fluid, there can be considerable variation between individuals due to differences in climate, physical activity and cultural background. For example, at temperatures above 25°C (which commonly occur in tropical regions throughout the year), there is a sharp rise in fluid intake needs to meet the demands of an increased rate of perspiration. According to WHO standards, a 10kg child will consume 1 litre of fluid per day, whereas a 5kg infant in good health may consume only 0.75 litre per day. These daily fluid intakes are higher than for adults on a body-weight basis.

Infants and children are more exposed to health risks because they need higher intakes of fluid. Although this period of their life is relatively short, it is the time when they are most sensitive to certain toxic agents. Some of the effects felt at an early age may be irreversible and will cause greater social and health damage than those from which the child fully recovers with timely treatment.

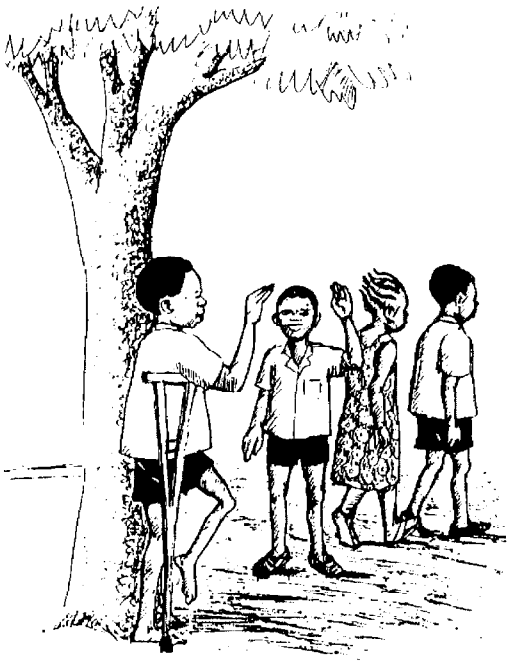
Boggy and dirty surrounds contaminate the water-pots. / WHO Photo by F. Perabo

Recent outbreaks of infectious diseases, such as cholera and other diarrhoeal diseases, in Latin America and tropical Africa show that when severe problems arise very quickly, children are the first victims of the disaster. In a number of tropical regions, typically in rural and poor urban communities, piped water of good quality continually available to household connections is the exception. The vast majority of children living in the underserved slum-outskirts of big cities collect water from sources away from their home and usually store it under unsanitary conditions. Moreover, even when they can be provided with an adequate water supply, storage tanks and domestic plumbing are often sources of contamination owing to a lack of resources for their proper installation and maintenance. Water stored in the household is often the most important source of microbiological contamination. The easiest preventive action to counteract the risk that this represents to human health is education with regard to water handling and storage.

Prevention of suffering also includes protection of open surface water, such as rivers, irrigation canals, long coastal zones and lakes. Even though this is too often only possible over limited reaches, it is well worth the effort.

It is almost always better, easier and much less expensive to protect water from contamination rather than to treat it after it has been contaminated and is causing health problems.

Water sources and storage facilities must be protected from human activities such as dumping of hazardous wastes, mining and quarrying, agricultural use of fertilizers and pesticides, and the limitation and regulation of recreational activities. Springs and wells should be sited and constructed so as to be protected from surface drainage and flooding, from public access and from animals. They must be kept clear of rubbish and should be sloped to prevent the collection of pools in wet weather. The same applies to water pools around the illegal settlements or shacks built by squatters near new roads or embankment works and to the coastal zones where high concentrations of heavy industries, added to the lack of sewers for disposal of human wastes, multiply the risks of ill-health and deformations among infants and children. Fortunately, chemical pollution of water that can lead to acute health problems is not a common occurrence and usually only happens through massive accidental discharge. Furthermore, experience shows that, in these circumstances, taste, odour and the appearance of the water are very often unacceptable.



In poor tropical regions, children under the age of five are too often sick over long periods of time. Infectious diseases, combined with malnutrition, make the sick child weak and feverish for long periods, sometimes for months. Their ability to speak and walk may thus be delayed.

As the family typically waits for the child's condition to improve, it is often too late to help the child by the time the parents discover that it has become disabled. Hence, motor difficulties are more common in tropical regions where, for example, the virus of poliomyelitis is still present (an estimated 5-10 million people throughout the world are disabled as a result of poliomyelitis). Impaired sight and blindness are more common in communities living under poor hygienic conditions in areas with a high incidence of measles or onchocerciasis. Hearing and speech difficulties are more frequent in regions where meningitis is still prevalent. All of these add up, making learning difficulties common whenever malnutrition is combined with infectious diseases.

Difficulties experienced by disabled people

In 1992, there were around 300 million moderately or severely disabled people worldwide. Approximately 200 million lived in developing countries, most of them in tropical regions, where water and sanitation services are still lacking. By 2025, the number in developing countries is expected to increase to about 435 million. Mobilization of the family and the community is the only credible basis for a programme of "rehabilitation for all" to alleviate the difficulties experienced by the disabled.

Functional limitations

- moving (including dexterity, fingering, gripping, holding);
- speaking, hearing (listening), understanding speech;
- feeling (reduced skin sensation)
- learning (acquisition of knowledge, skills and behaviour;
- ocation in time and space (memory);
- self-awareness (inappropriate interpretation of, and response to, external events, confusion);
- decreased consciousness (including epileptic fits).

Activity restrictions

- personal care (dressing, bathing/washing, eating/drinking, toilet);
- being mobile (e.g., moving in bed, sitting, standing, walking, running);
- communicating;
- participating in education;
- work performance, including household duties;
- behaving and socializing;
- childcare

Source: *Prejudice and Dignity. An introduction to community-based rehabilitation*, E. Helander, UNDP, New York, 1993.

Many developing countries suffer from a lack of clear policies aimed at helping disabled people with adapted housing, access to public buildings, transportation, employment opportunities and financial assistance. Disabled people are generally perceived to be "useless", if not a burden.

As pointed out by the World Health Organization, "The judgment of safety -- or what is an acceptable level of risk in particular circumstances -- is a matter in which society as a whole has a role to play." Children need higher water intakes and their activities lead them to be more exposed to health risks. Hence, identification of their specific uses of water is crucial for a better understanding of their educational and specific training needs, locally adapted, to ensure they get a proper grasp of the potential consequences for their health of poor hygiene, lack of safe water, inadequate handling and treatment of sewage, and of inappropriate behaviour in dangerous environments.

According to WHO, the toll of some diseases related to unsafe use of water, poor hygiene practices and lack of immunization amounted to the following figures, in 1993:

Disease	*Death toll*	*Infected persons*
measles	about 1.2 million children	more than 45 million children
poliomyelitis	5 500 children	
neonatal tetanus	560.000 newborn babies	
dracunculiasis		2 million people

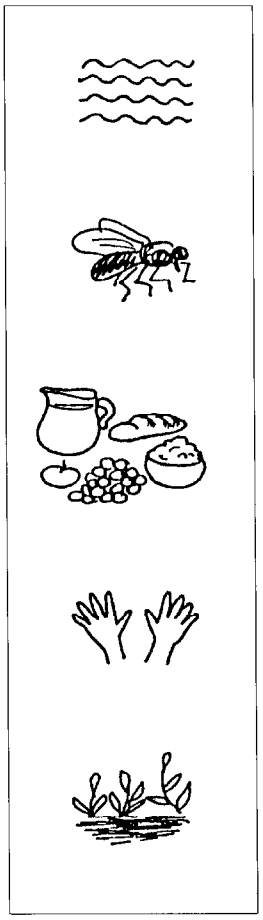
WATER-BORNE DISEASES

Health risks resulting from poor hygiene practices, lack of both safe water and adequate sewage, and inappropriate behaviour

Human and animal waste can contain a variety of bacterial, viral and protozoan pathogens and helminth parasites, or "worms". The greatest microbial risks are associated with ingestion of water contaminated by human and animal excreta. Together with the debilitated, the sick and the elderly, infants and children are at greatest risk from water-borne diseases (see Water and Health in this series). As already pointed out about toxic agents, infants and children are more sensitive to infectious doses than are adults.

Running streams provide clear drinking water.
WHO Photo by J. Abcede

Pathogenic micro-organisms still represent the geatest danger to drinking water in both developed and developing countries. They rapidly proliferate in tropical waters and may often discreetly adhere to suspended solids in water -- which makes the likelihood of being infected difficult to predict. For example, *Escherichia coli,* which is abundant in human and animal faeces, may multiply in tropical waters that are not contaminated by human faeces but rather by those of wild animals, including birds. Those sources can never be eliminated and, thus, can never be ignored. Water-borne diseases may be transmitted by person-to-person contact or by contaminated food. However, the chances of spreading these diseases through these various routes, which might result in the simultaneous infection of a high proportion of infants and children, can be reduced by the provision of safe water.



Transmitted infections of high priority present in drinking water:

- **Bacteria:** *Campylobacter coli, Campylobacter jejuni, Escherichia coli, Salmonella* spp., *Shigelia* spp., *Yersinia enterocolitica, Vibrio cholerae,* etc.

- **Viruses**: Adenoviruses (a group of viruses causing latent infections of the upper respiratory tract), Enteroviruses (which enter the body through the gastro-intestinal tract where they multiply then may invade the central nervous system), several hepatitis viruses and newly discovered viruses.

- **Virus-like organism** *Chlamydia trachomatis* is a disease of dirty hands rather than a water-related disorder. When it inflames the conjunctiva of the eyelids and goes untreated, it is usually followed by blindness.

- **Parasites**:
  - **protozoa** such as *Balantidium ocli, Cryptosporidium parvum, Entamoeba histolytica, Giardia intestinalis,* etc.
  - **helminths** such as *Dracunculus medinensis* (its elimination from water intended for drinking has been given high priority by WHO; in 1991, its General Assembly decided to eradicate it). In most cases, the normal mode of transmission is the ingestion of the eggs in food contaminated with faeces or faecally contaminated soil (in the case of *Taenia soleum,* ingestion of its larva in uncooked pork) rather than ingestion of contaminated drinking-water;
  - **amoebae** *Naegieria fowleri* (responsible for primary amoebic meningo-encephalitis) and *Acanthamoeba* spp. (responsible for amoebic meningitis and puimonary infections).

- **"Opportunistic" pathogens** which are not formally regarded as pathogens but which can produce various infections of the skin and of the mucous (or moist) membranes of the eye, ear, nose and throat in people with an impaired immune system, such as infants, the elderly, people suffering from burns or extensive wounds and in those suffering from AIDS.

- **Algal toxins** which can have adverse effects on health including reversible liver damage. Warm temperatures in the Tropics accelerate the production of blooms of *Cyanobacteria,* or blue-green algae in lakes and reservoirs used for the drinking-water supply. Three types of toxin can be produced, depending upon the species:
  - **hepatotoxins,** produced by *Anabaena, Microcystis, Oscillatoria* and *Nodularia,* which induce death by circulatory shock and massive liver haemorrhage within 24 hours of ingestion;
  - **neurotoxins,** produced by species of *Anabaena, Aphanizomenon, Cyiindrospermum, Nostoc, Oscillatoria*;
  - **lipopolysaccharides.**

- **"Nuisance organisms"** have no public health significance but they are undesirable because they produce turbidity, an unpleasant taste and odour or may appear as visible animal life in water.

In tropical regions, serious illnesses can also result from inhalation of water in which pathogens multiply because of the warm temperature and the presence of nutrients generated by the rapid decomposition of organic tissues (vegetal and animal) in the water. These include Legionnaires' disease *(Legionella* spp.).

Source: *Guidelines for drinking-water quality. Recommendations,* Vol.I, WHO, Geneva, Second edition, 1993.

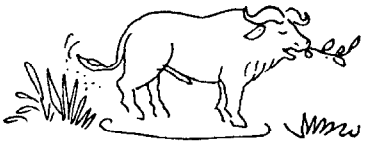
Infants and children make up the group most likely to suffer from cholera and other diarrhoeal diseases and from intestinal helminths. When they live near irrigated lands and reservoirs, the risks are increased by vector-communicated diseases associated with water, such as:

- **Dengue fever** (also known as the "break bone fever") and **malaria** -- both transmitted by mosquitoes.
- **Dracunculiasis** -- a condition due to larvae of the female Guinea worm (60-120 cm long, thread-like) that live in tissue beneath the skin. It is transmitted by small crustaceans called *Cyclops.*
- **Filariasis** -- caused by the presence of the *Wuchereria bancrofti* and *Brugia malayi* worms in the lymph vessels. It is transmitted by several species of mosquitoes. They cause inflammation that eventually blocks lymph vessels, which causes the surrounding tissue to swell or leads to rupture of the urinary lymphatics.
- **Onchocerciasis** -- caused by the parasitic worm, *Onchocerca volvulus* (transmitted by black flies). Fibrous tumors grow around the worm and, when secondary bacterial infection occurs, they may develop into abscesses. The migration of the larvae into the eye causes what is often called "river blindness" in Africa. It also occurs in Central America.
- **Schistosomiasis** (sometimes called bilharziasis) -- a major parasitic disease of tropical and sub-tropical regions. It is chiefly spread by contact with water during bathing or washing. The larvae (or *cercaria)* released by infected aquatic snails penetrate the skin. In contaminated areas, safe drinking water (even though it is often not readily available) should be used for washing in order to reduce the risk of being contaminated by surface water.
- **Trypanosomiasis** -- a disease caused by parasitic protozoa transmitted through the bite of the tsetse fly, is known as "sleeping sickness" in Africa, and "Chagas" in tropical America.
- **Yellow fever** -- principally transmitted by *Aedes mosquito,* is a kind of jaundice with a 60-75 per cent mortality rate due to the alteration of liver and kidney functions.

Why do so many children fall sick and die when simple measures could be learned to protect their health? An evaluation of the specific uses of water could rid them of many troublesome conditions that generate diseases as a result of the lack of proper hygiene and poor sanitary conditions.

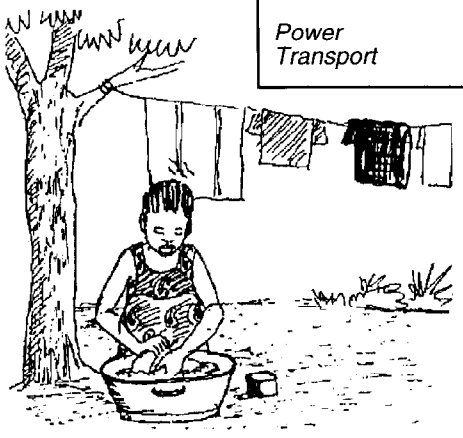
A COMPREHENSIVE APPROACH

Some simple questions can help in designing a water education project: Where are children most at risk? When? Why? The answers can give clues as to how risks may be reduced. The following list of activities, all of which are risky for a child's health, should be adapted to the local context.

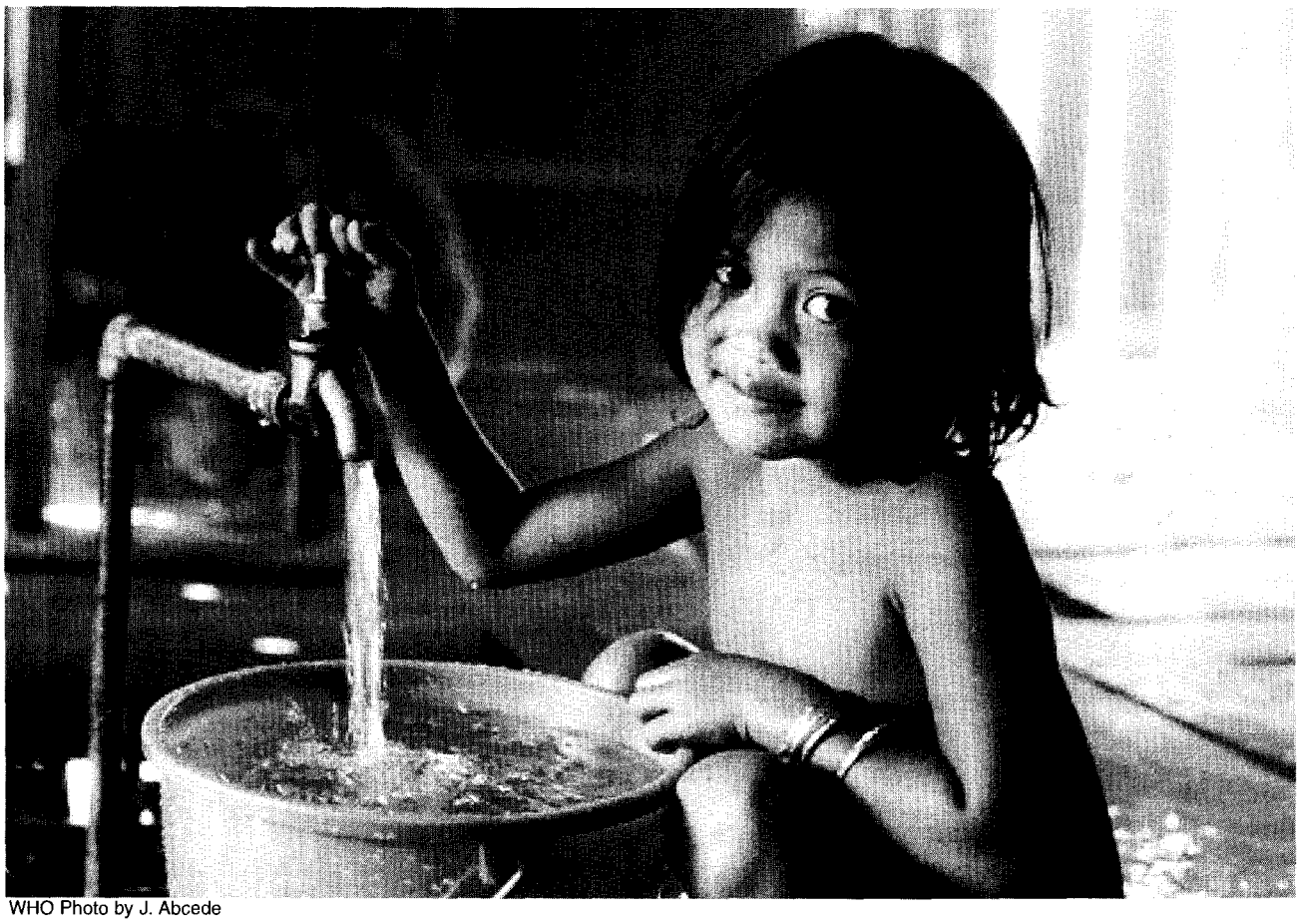


IDENTIFICATION OF RISKS

	Where? (location)	**When?** (hours)	**Why?** (causal agents)
PERSONAL HYGIENE			
Drinking	springs collected rain-water stored-water	any time	pathogens & other infectious agents
Eating at home + outdoors	raw leafy vegetables + fruit grown in contact with soil	meals any time	contamination through human & animal waste, manure + watering with contaminated water
Body washing & bathing	home rivers lakes	morning & evening	pathogens parasites mosquitoes
DOMESTIC USE			
Food preparation	home	meal time	no hand washing
Clothes washing	home rivers, lakes	to be identified	unsafe water supply contaminated water (pathogens, parasites and/or chemicals)
Miscellaneous cleaning	home	idem	idem
Sanitary disposal	home public settings	any time any time	spread of infectious agents idem
PRODUCTIVE & RECREATIONAL ACTIVITIES			
Watering	garden, lawn	?	idem
Growing crops	irrigated fields	daytime	idem
Swimming	rivers, lakes pools coastal zones	? ?	idem + toxic algae
Fishing	idem	?	idem + toxic algae
Breeding cattle	home + fields	?	pathogens, parasites
Power	water wheel	?	idem
Transport	boats	?	idem



Identifying children's activities related to water use in the household, at school, in the fields and elsewhere in the open air is very useful. It helps children to understand how much their life and that of all living creatures on Earth depends on water. Simple experiments can be proposed to children to throw light on the phenomenon. Since, throughout the world, older children usually help in caring for their younger siblings, they are likely to perform the experiments for their younger brothers and sisters once they themselves have understood the importance of the educational games. Enhancing children's creativity is a way of making them more self-confident and self-reliant.



WHO Photo by J. Abcede

Water and the human body

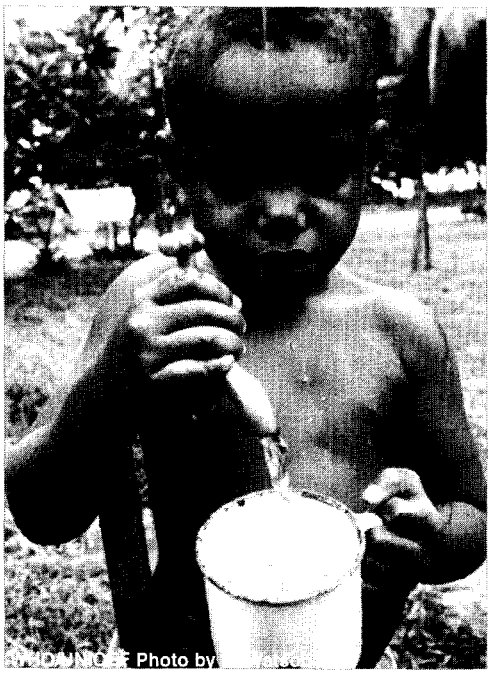
A very simple experiment can help children to understand that humans, like all living beings, depend upon water. A small branch or a flower is put into a glass of water. Mark the level of water with a felt-tip marker. A few days later, the water will be lower but the plant will still be alive. A second plant left without water in another glass will have faded.

Explain to the children that, by weight, a human body is about three-fourths water and that, to survive, the water loss in sweat and through passing urine or faeces, humans need to compensate for the loss. Take two plastic bags. Fill both with water, make a hole in one and hang it over a tin. When it is empty, flat and wrinkled, explain to the children that the same happens when they suffer from diarrhoea. Fill the empty bag with the original water from the tin. The deflated bag will be restored to its original shape and the importance of giving liquids to infants and children with diarrhoea may be stressed at this point.

Presence and growth of infectious agents

Explain to the children that all living things depend so much on water that some very small creatures may actually live and develop in water. They may be invisible to the naked eye. Put some fresh leaves in a glass filled with water. During the following days, ask the children to observe the

water becoming opaque owing to the development of some whitish flocs around the mouldy leaves. The local health centre may have a microscope. Use it to help the children to observe the tiny creatures developing in the water and point out that a similar process happens in their own bodies when infectious agents and other dissolved materials pass into them via their drinking water.



The children should then be able to accept that micro-organisms can develop and proliferate whenever they find the right conditions -- air, water, food and warmth -- as is the case in humans and other animals.

Children know by experience that fire and a very high temperature for a long enough time can kill them. Remind the children that boiling is the only sure method of killing "germs" in contaminated water. Point out that boiling and the use of chemicals like chlorine are the simplest methods for obtaining safe drinking water. However, firewood and chemicals may be in short supply (boiling 1 litre of water means burning about 1 kg of wood) and, in those circumstances, alternative (and simple) methods can be taught. These include the use of sunlight and various means of filtration, such as those presented in Chapter 4. Children will, hopefully, end up understanding why it is safer to drink water only from the supply at home, at school and other places where it can be adequately prepared for drinking, rather than from rivers, ponds, springs and unsafe public pumps.

Children's awareness of the importance of drinking only safe water can be stimulated by asking them how much water they are used to drinking throughout the day and from what supply.

Invite the children to record the quantity of water and other liquids (tea, coffee, cow and soya milk, fruit juices, etc.) they drink from the time they get up in the morning until the time they go to bed at night. Each child should try to use a glass or cup of a similar size. The common volume will later be used as a standard measure to help the children establish how much water is drunk by each of them in a day; who needs to increase his/her intake; and how it can be done. Explain to the children that the food they eat also contains water -- meat, cereals and, more especially, vegetables and fresh fruit.

Take this opportunity to indicate to the children that water contained in food helps to turn it into materials that can be absorbed by the body. Dry cereals, for example, cannot easily be eaten when not mixed with water or milk to become gruel.

Water and food

The following information may help the teacher to introduce the digestive process:

- In the mouth, the teeth and the tongue grind and chew in order to mix food with saliva and form small balls which go from mouth to stomach through a tube (the oesophagus consists of rings of muscles).
- Juices made by small glands in the bag of the stomach help it to churn the food and reduce it to mushy matter.
- The small intestine tube also produces digestive juices and, mixing these with the juices additionally secreted by the liver and the pancreas, it squeezes the food. There, the materials contained in the digested food are absorbed into the blood through the walls of the small intestine tube and carried throughout the body.
- The remnants are now pushed into the large intestine where most of the remaining liquid is absorbed before the waste is pushed out through the anus.

The water intake, including that contained in food, represents the power of life for the human body. In some ways, water is similar to oil or electric power used by engines. Flowing through our bodies, it allows us to function.

Once children have understood that water is present in all living creatures but that it may contain germs invisible to the naked eye, they should be warned about the contamination of food and water at all stages -- by dirty hands, as well as by human waste (urine and faeces).

Healthy decisions about healthy eating

Once children have accepted that water may contain invisible enemies, it should be explained to them that the atmosphere around them may also contain numerous tiny living creatures, visible -- such as flies, mosquitoes, spiders, ticks, etc. (ask the children to list the ones they know) -- and invisible to the naked eye. It may be difficult to get the message across but the whitish mould developing in water they had previously observed may help the children to understand that there are minute living organisms all around them: in water, in the air, on skin and on clothes, in excreta and even inside themselves, on animals, on insects and in the soil. Once they do, they are ready to understand that water and food may be contaminated at any stage and that contamination may start in the way food is produced -- from growing the crops to the harvest, from the slaughter of edible animals (game and livestock) to the eating. Stressing some risk factors to food safety then becomes a matter of keen common sense:

- Leafy vegetables eaten raw and fruit grown in contact with the soil constitute an important source of contamination when untreated human and/or animal waste is used as manure to grow them and /or when they are sprayed or irrigated with contaminated water. Cereals can also be contaminated by germs in the soil.

- Food -- more especially raw meat and fish -- are real "goodies" for flies! They can also be contaminated by the hands of sellers.
- Food that is dropped onto a dirty surface.
- Food and water cans that are kept uncovered.
- Dirty kitchen utensils and tables.
- Dirty cloths used for cleaning kitchen utensils and tables.
- Dirty hands when preparing food and eating.

An easy way for children to remember the essential rules of cleanliness consists of using the melody and rhythm of a popular song, or of a nursery rhyme (see Chapter 1). Once translated into the local language and adapted to the local circumstances, some basic rules, such as the following, can be repeatedly chanted by the children:

Photo UNICEF

After using the latrine, I always wash my hands...
always wash my hands
with clean water and soap.
And you...do you wash your hands, do you?
Before preparing and eating, I always wash my hands...
always wash my hands
with clean water and soap.
And you...do you wash your hands, do you?
When I have patted my pet I always wash my hands...
always wash my hands
with clean water and soap.
And you...do you wash your hands, do you?
When I have touched or held money,
as many hands have done before,
in the market place or in a store,
I always wash my hands...always wash my hands
with clean water and soap.
And you...do you always wash your hands, do you?

Explain to the children that washing their hands with soap is the best way to avoid contamination in any circumstances. Whenever possible, this should be done under running water or from a water tank with a tap, or in a bowl to use as little water as possible when it is in short supply. As stressed in Chapter 1, the problem-solving approach is very effective. In addition, teaching the children how to make soap themselves, even when it is already available, may stimulate them to use and take advantage of something they have become familiar with. A simple way to make soap at a very low cost is explained in Chapter 4, along with other simple and adequate technologies which can help to improve cleanliness, as well as the quality and quantity of water needed in their households.

Cleanliness everywhere prevents water-washed diseases

Diminishing water-washed diseases (see the booklet Water and Health in this series) requires increasing the quantity of water available for ensuring personal and home cleanliness. The more abundant the water, the lesser the risks. When water is available in unlimited quantity, a lack of cleanliness in the household can easily be brought under control, bringing about a diminution in diseases sensitive to hygiene practices, such as diarrhoeal diseases, and skin and eye infections.

WATER-BASED AND WATER-RELATED DISEASES

Can they be prevented?

In tropical regions, whether in rural communities or in poor urban outskirts, many children can only wash, bathe and help to wash clothes in surface waters (streams, rivers, lakes, ponds and irrigation canals). These are also sources of water for miscellaneous cleaning. Hence, children should also be trained to protect the community sources of water from infectious agents that can contaminate their supply and rapidly spread diarrhoeal and other diseases.

Ask the child to list the sources from which their families collect water and the watering places for cattle. Ask them to make a map of their village or neighbourhood (with your help) on which they will indicate the wells, streams, rivers, pools, etc. Take the children to visit each place. Is the drinking water collected, as it should be, upstream from the place where people bathe in the river, wash their clothes or lead the cattle to drink? Are the wells covered when not in use? Do people or cattle go into these places? Are walls raised around the wells to protect them from animals? Are the latrines at least 20 metres from the wells? Are the springs enclosed by brick or concrete and equipped with a pipe outlet to protect the water? Are buckets and tanks to collect rainwater covered? After the visit, the children may draw or pin small flags on the places they have examined. Where they have noted that people collect and use water correctly, the flags might be coloured in blue (or any colour locally meaning "harmony" and therefore "health"). The map should be exhibited in front of the school, the community hall, or the village council where children can explain to their families what changes can be made and where and how to better protect the community's water supply (Chapter 6 indicates ways of stimulating children's active participation in promoting collective changes). As improvements are made, the number of "acceptable" marks or small coloured flags will increase on the map and, proportionally, so should the community's pride.

Prevention during productive and recreational activities

A number of productive and recreational activities can lead children to use or come into contact with surface waters contaminated with vectoral diseases (listed in Water and Health). Their greater physical strength means that boys are more likely than girls to be involved in watering gardens and lawns, growing crops (often in irrigated fields), breeding cattle, producing power with water-wheels and sometimes working on transport boats. Girls tend to look after their younger siblings and maintain the household. They can be infected when washing clothes and utensils. Laundry facilities built at a community water supply site reduce the need for women and girls to use contaminated surface water. Yet, both boys and girls may be infected when washing themselves after defecation or when bathing in contaminated water.

Schistosomiasis is endemic in 76 developing countries and widespread among children living in tropical regions.

Canals and lake shores are ideal habitats for the snails transmitting schistosomiasis. These man-made perennial water supplies bring water closer to people who, consequently, are more likely to come into contact with the water and contaminate it.

Although many experiments have been tried, killing the vector-snails has never been highly successful. Yet, transmission of infection can be controlled when urine and faeces from infected people are not released into surface water.

Children -- and adults -- are infected through contact with water contaminated with *Schistosoma cercaria,* the larvae released by some freshwater snails. On contact with a human, the larvae penetrate the skin and develop -- within the body -- into small worms which infest the blood vessels of the intestines and those of the bladder. At the adult stage, the worms produce microscopic eggs which can pass through the walls of the intestines and the bladder to be released in urine and faeces. When the eggs come into contact with fresh water, they in turn release other larvae -- or miracidia -- which seek out and infect snails.

Infected children may suffer from an enlarged liver or spleen, a condition later associated with an increased risk of bladder cancer. The number of worms increases through re-infections by repeated exposure to contaminated surface water.

In tropical regions, especially in sub-Saharan Africa (see map), the incidence of schistosomiasis is so high that over 70 per cent of village school children may be infected. In some regions, the prevalence of the infection reaches a peak in children aged 10 to 14 years. Haematuria, the classic symptom of urinary schistosomiasis, is so common in male children within living memory that some communities believe it to be associated with puberty -- similar to menstruation among girls. The most efficient preventive measure against all kinds of contamination is to improve water supplies to minimize the need to bathe or wash in contaminated surface waters and to reduce children's recreational contact with it. Even so, community standpipes and household water supply connections may be too expensive for people struck by poverty or living in remote areas.

In villages, dormant waters also are a breeding ground for health risks...

It can be done!

Dracunculiasis (or Guinea worm infection) is a debilitating disease that is transmitted solely by drinking contaminated water and has no other reservoir than the human population. It is most prevalent from the age of 15 years. It may produce temporary disability for weeks or months and, consequently, has a severely adverse effect on school attendance and on the national economy. About 0.5 per cent of those contaminated suffer from permanent physical disability, usually due to frozen joints or contractures. A survey supported by UNICEF in southeastern Nigeria showed that, in an area of 1.6 million people, dracunculiasis was the cause of a yearly economic loss amounting to over US$ 20 million in profits from rice production owing to farmers' physical incapacity.

In the face of these dramatic social and economic consequences, WHO has called for the global elimination of dracunculiasis by the year 2000. In the late 1980s, the Japanese International Cooperation Agency funded two rural water supply projects worth about US$ 6.0 million each in heavily endemic areas of Nigeria (in Anambra State) and in the northern region of Ghana. A dramatic reduction in dracunculiasis was achieved very rapidly: in twenty villages of one Local Government Area of Kwara State in Nigeria, a UNICEF rural water supply project reduced the average rate of Guinea worm infection from 59.6 per cent during the 1983-84 season of Guinea worm transmission to 11.3 per cent during the 1986-87 season. The rates in three villages in the same area were reduced to zero (from 62.0 per cent, 52.7 per cent and 44.8 per cent).

One solution is to recommend that children never urinate or defecate in the open, especially in surface waters. Whenever families have no access to latrines, children may be trained to make a small model with the teacher's help. Sticks, hard paper and clay or plasticine are sufficient to construct a simple pit. It can then be explained to the children that putting a cover on the pit keeps smells in and flies out. Invite the children to build a real latrine where there is none at school (see Chapter 5). It may create an opportunity to gather the children's families and local leaders together to discuss other means of preventing vectoral diseases and worm infestation, and to promote behavioural change related to the choice of places to defecate and urinate. Simple messages can be written on posters shown around the meeting place and these may also be chanted by the whole assembly:

Latrines should always be built away from where animals graze
We use latrines only to protect our health security.
In the latrine, we never leave any cleaning paper lying around.
After using the latrine, we always wash our hands...
with clean water and soap.

The same applies to coastal zones where seafood is increasingly being contaminated by pathogens because lower-income populations gather on cheap sites lacking basic sanitation, too often near stagnant water pools. In addition, industrial pollution -- although still less common in tropical areas than in the developed countries -- may result in an increase in that growth of toxic algae that make fishing a dangerous activity and a threat to children's growth. Poisoning may have long-term effects which debilitate children and prevent them from attending school. Although fish is a precious source of proteins (sometimes called the "building blocks" of the body because it contributes to the body's growth and self-repair), it should be replaced by other sources of proteins whenever blooms of toxic blue-green algae occur. In these circumstances eggs, milk and cheese may replace fish, when they are available. Other foods that are not classically ranged in the "body-building" category but, rather, in the "energy-giving" one, can contribute other precious sources of proteins, e.g., rice (which, according to WHO estimates, provides 80 per cent of the protein required by Bangladeshi children), maize (which supplies 60-70 per cent of proteins for children in Mexico) and soybean (which contains as much protein as steak).

A smile from Moniya,
a basic literacy centre where appropriate technology for food processing is supported by IITA, Nigeria.

Throughout Asia, soybean is a traditional daily food. Tofu is the Japanese name for a protein-rich light soybean "cheese". It can be dried, cooked in cakes or puffs, grilled, presented in flour for making gruel and in instant powder to prepare "milk".

Research pioneered by the International Institute of Tropical Agriculture, Nigeria, shows that soybean could from now on constitute a precious source of proteins to counteract malnutrition -- especially kwashiorkor, common in some African children aged between one and three years and resulting from protein deficiency. It can be adapted to farming conditions in West Africa and, when soybean/maize rotation systems are used, farmers need purchase little fertilizer, if any.

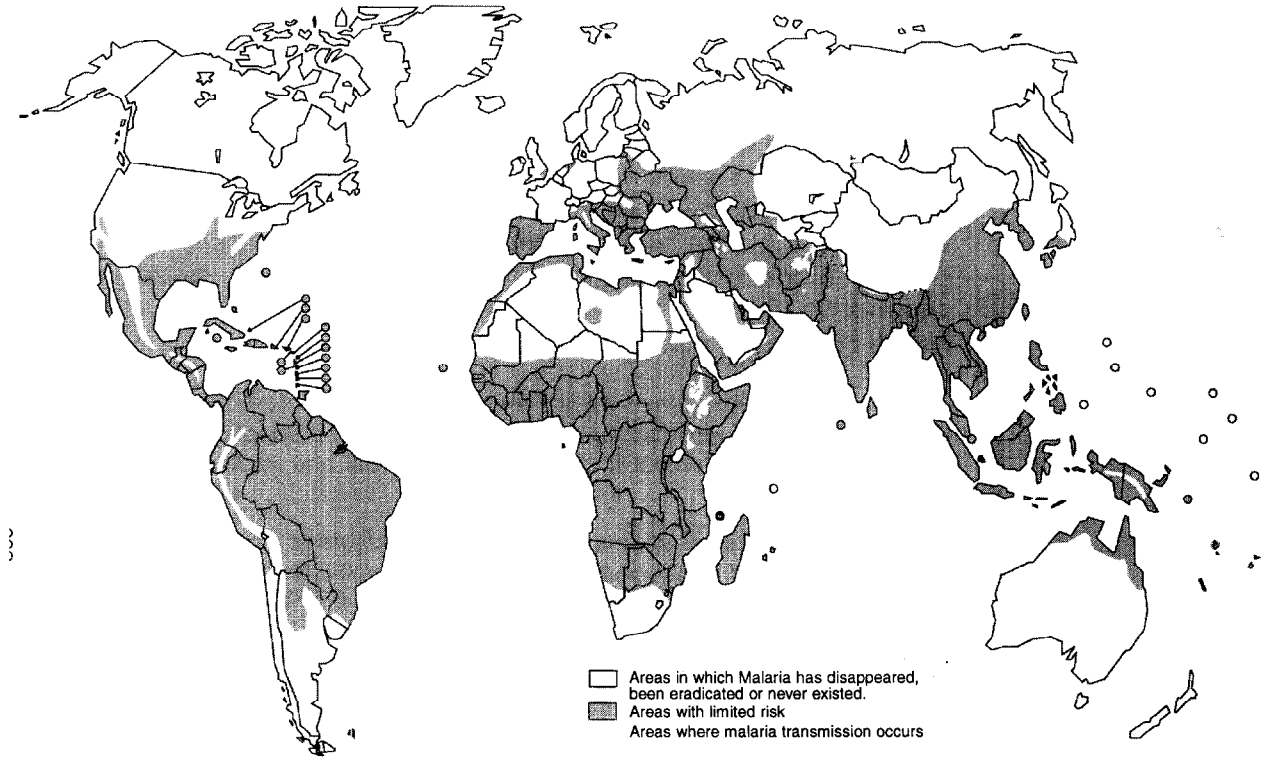
Fighting mosquitoes

Mosquitoes carry malaria and other serious diseases. For example, in 1995, the toll of large outbreaks of dengue, also called the "break-bone fever", amounted to more than 140,000 cases [to more than 3,500 cases in its more serious form, dengue haemorrhagic fever (DHF), in twelve Latin American and Caribbean countries]. That year, in Brazil alone, 88,000 cases of dengue were reported. When, in 1981, Cuba experienced the first DHF epidemic in the world, children made up two-thirds of the deaths. WHO estimates that malaria is by far the world's most major tropical parasitic disease. It kills more people than any other communicable disease except tuberculosis. Yellow fever can be controlled through vaccination but when it strikes during or after civil wars, large-scale population displacements may spread the disease. Immunization is difficult in such circumstances. Up to 50 per cent of persons infected during outbreaks of yellow fever may die from the disease. Many of them will be women, infants and children, the most vulnerable segments of the population.

Chronic malarial infection is an important cause of childhood anaemia and low birthweights in endemic areas. Malaria during pregnancy increases the risk of miscarriage and of maternal and neonatal deaths. The worldwide incidence of malaria amounts to 300-500 million clinical cases yearly. More than 90 per cent of all malaria cases occur in sub-Saharan Africa. Afganistan, Brazil, Colombia, India, Sri Lanka and Viet Nam make up two-thirds the remaining 10 per cent.

Malaria: the struggle for control

Geographical distribution of malaria before 1946



Source: World Health Report 1996, WHO, Geneva

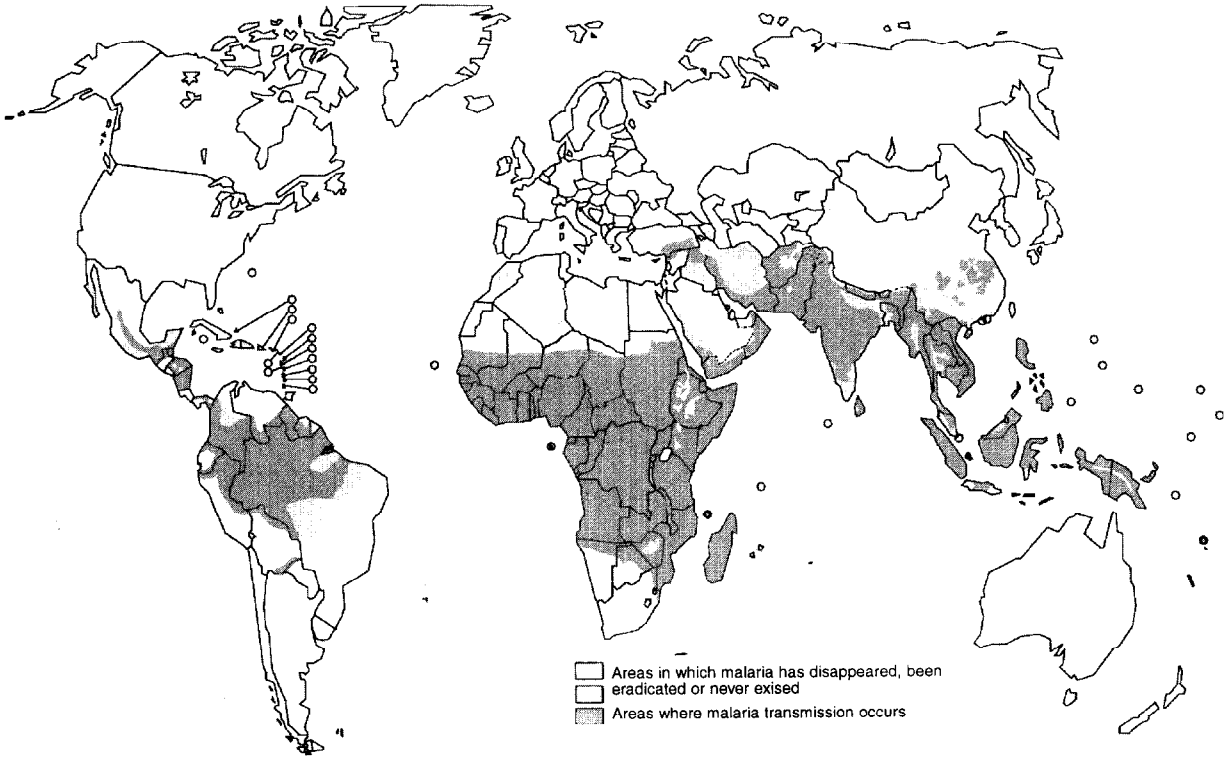
When children are told that mosquitoes can breed in less than a cup of water, they then understand why covering buckets and containers used for their family's water supply is so important. Invite them to clean up the household environment, starting with the removal of rubbish that might hold water and serve as a breeding place for mosquitoes. Filling puddles near their houses and unblocking drains are simple tasks that can be easily carried out by children organized into small groups and effective ways of getting rid of most of the mosquitoes.

Successful water education depends on working with families and their communities

What is sometimes called the "virtuous circle" of the primary health care approach can progressively replace the "vicious circle" of infection and malnutrition. When nutritious food, safe water and a clean environment are coupled with personal hygiene, both infection and malnutrition can be defeated and sustainable development accelerated. Infants and children are the first ones likely to benefit from it. Throughout the generations in all cultures, humanity has relied on close and voluntary cooperation to protect itself. Similarly, any successful water education project will depend upon working with the children's families and their communities.

Although the geographical area affected by malaria has shrunk considerably since the Second World War, controlling malaria is becoming increasingly difficult. The parasite's resistance to chloroquine has become commonplace throughout Africa, as has its resistance to sulfadoxine-pyrimethine in South America and South-East Asia. The disease spreads with new agricultural and irrigation projects, road building, mining and logging.

Epidemiological status of malaria, 1996



Source: World Health Report 1996, WHO, Geneva

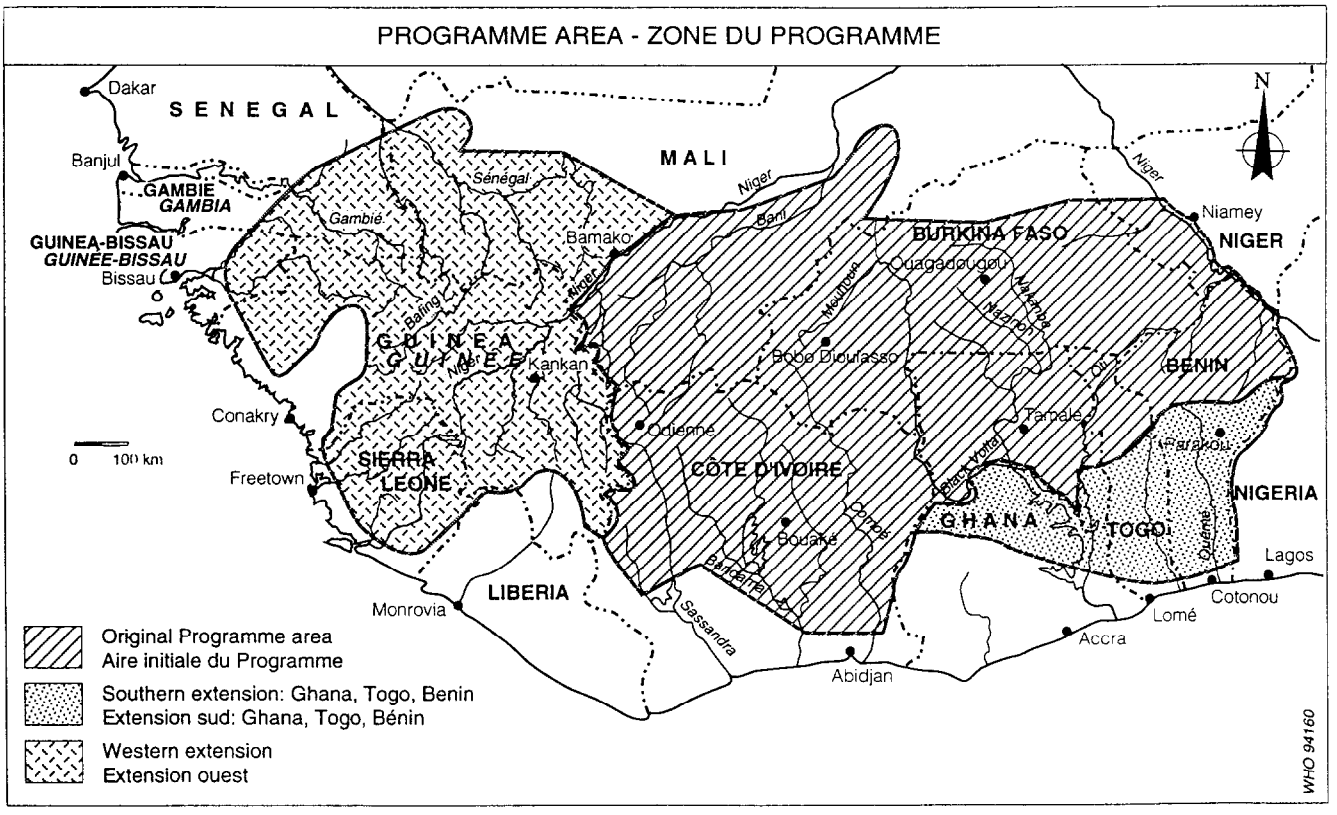
Children free from onchocerciasis!

When the Onchocerciasis Control Programme (OCP) was launched in 1974, it originally encompassed seven countries in West Africa. At that time, more than 1 million people suffered from onchocerciasis, 100,000 of whom displayed serious eye problems, including 35,000 who were blind. Today, the number of infected people within the original area of operations is practically nil. Since its inception, OCP has been jointly sponsored by the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), the World Bank and WHO, and supported by 22 donor countries.

- Some 1.5 million people in the area who were once infected with onchocerciasis no longer have any trace of the disease.
- About 10 million children born in the area since the programme's inception are now free from any risk of contracting the disease.

The method used by OCP breaks the cycle of transmission by eliminating the blackfly. Larvae are destroyed by applying selected insecticides through aerial spraying of breeding sites on rivers. Once the cycle of river blindness has been stopped for 14 years, the reservoir of adult worms dies out in the human population and the disease is eliminated. To complement vector control, OCP distributes the drug ivermectin free of charge to more than 2.2 million people in the operations area.

"In 1995, the operational area of the Onchocerciasis Control Programme (OCP) covered 1.23 million km² and a population amounting to about 30 million people."



3. MOTHERING THE COMMUNITIES' FUTURE

The first international conference on women was organized in Mexico City in 1975. The period 1975-1985 was declared by the General Assembly of the United Nations to be the Decade for Women. The Convention on the Elimination of All Forms of Discrimination Against Women was signed in 1979, followed by a second World Conference held in Copenhagen in 1980, a third in Nairobi in 1985 and a fourth in Beijing in 1995. They raised great hopes. However, although much progress has been achieved in better understanding women's role as caretaker of the family, the interrelation between health, women and the environment still deserves more attention if the health of children is to be improved from birth.

Despite cultural variations which may favour male children, boys and girls are equally concerned by infant mortality: one out of two infant deaths occurs during the first month of life

In tropical countries, about 70 per cent of women are responsible for water collection and most of the agricultural work. They are usually helped by children, especially girls. The wet season is the busiest period of the year for agricultural work. Transplanting rice seedlings, for example, involves standing in water from early morning until evening. Consequently, women and girls come into greater and more frequent contact with contaminated water and are at greater risk of infection than males. Drinking water may be supplied from a local stream or river because safe water must often be carried too great a distance from the home to the farming site.

Child care is culturally varied. Boys are often seen as being of greater value and, consequently, are treated better than girls. For example, they are breast-fed longer. Thus, they are exposed to contaminated water and food later than are girls. They are also typically taken for treatment earlier and more often. Malnutrition, which increases susceptibility to diseases, is more common and often more severe in girls. Although worldwide figures broken down by sex are still unavailable, sample surveys have indicated that more girls die from diarrhoeal diseases than do boys.

Overwork (water carrying alone may use up to 12 per cent of daytime energy), discriminatory eating habits that perpetuate malnutrition and infections can have serious consequences on girls and in turn, on the entire population. The high levels of female illness and death in tropical regions indicate that mortality due to complications in pregnancy or childbirth may be 100 to 200 times greater than in temperate regions. Mortality rates among new mothers may be as high as 5 to 10 per 1000 live births. The main causes of death are haemorrhaging (often linked with anaemia), infections resulting from poor hygiene and eclampsia (which is also a threat to the baby). Imagine the crisis when the mother -- the axis of the family life and economy -- dies.

Newborn mortality is, of course, related to the health of the mother and strikes male and female babies equally. However, the most frequent disorders occurring during the crucial perinatal period (from the 28th week of the pregnancy to the end of the first week of the newborn's life) can be prevented. Intra-uterine disorders may be the cause of a low birthweight, which makes the newborn more vulnerable to infection.

Environmental factors interact with foetal development. Anaemia is still one of the most frequently observed diseases throughout the tropical regions. It is especially prevalent in young children and in women of reproductive age. The causes are multiple. Anaemia may originate from a daily diet poor in iron to replace the loss in blood during menstruation. Compounded with malaria and/or other parasitic infections, the toll of nutritional anaemia is veritably devastating. About half of pregnant women in low-income communities may be affected. Pregnant women suffering from anaemia often give birth to low birthweight babies because of the foetus's particularly high iron requirements for growth (as also the growing child's).

The main visible symptoms of anaemia are great fatigability, breathlessness on exertion and poor resistance to infection. In the early 1990s, a survey conducted by USAID in Mangochi District, Malawi, showed that, of a total of 4,220 pregnant mothers and their children studied, 44.5 per cent of all the women and 67 per cent of those pregnant for the first time (primigravidas) were infected with malaria. Even though immunity to the malaria parasite had been acquired in some women through repeated exposure, the study showed that, at delivery, placental malaria was identified in about 20 per cent of the women (30 per cent in primigravidas and newborn babies) and that 16.6 per cent of the newborn had low birthweights (less than 2.5 kg). Low birthweights resulted from prematurity and intra-uterine growth retardation. The heavy death toll of malaria each year (1.5 to 2.7 million deaths throughout the world) is particularly high among young children in Africa. Also, there is a worsening problem of malaria parasitic resistance to first-line drugs. When this is combined with the poverty of the populations suffering most from the disease and the vicious problem of their poor resistance to the infections malnutrition generates, it becomes difficult to develop a large-scale remedial action.

Improving the survival rates of both male and female children will provide safeguards for the most precious capital of humanity -- its younger generation. As part of their water education, it is important that children learn about childbirth and the many problems and complications that can affect both the mother and the newborn infant.

Clean birth for all

Human life relies on clean births. Appropriate birth care is determined by a number of factors, from the birth-attendant's cleanliness and that of the necessary instruments to the national health care coverage, available resources and local cultural practices. In developing countries, there are few doctors and midwives. The majority of babies are delivered at home by traditional birth attendants helped by female family members.

Since the *Declaration of Alma-Ata on Primary Health Care* in 1978, UNICEF and WHO have widely promoted the training of traditional birth attendants in better labour monitoring. As early as the late 1970s, in Zimbabwe, traditional birth attendants learned to monitor the maternal pulse and even the foetal heart beat through the use of locally made foetoscopes (from dried gourds, wood, clay or even paper rolls). They were also shown the importance of cleanliness in their practices, in addition to exercises simulating the birth process, placental management and prevention of heat loss in the newborn.

Clean hands, a clean surface, a clean umbilical cord-cutting instrument (which may be replaced by a razor or bamboo blade), clean cotton wool or clothes and clean strings or tapes are the best means of ensuring a hygienic delivery and adequate umbilical cord care. Clean towels and a blanket should also be prepared for drying and wrapping the baby in and for preventing heat loss from evaporation after delivery. Soap is the most practical means of ensuring cleanliness (a simple way to make soap is presented in Chapter 4).

Dirt under and around the fingernails is a continual danger. Training children at an early age to wash their hands and thoroughly clean their nails with brushes (locally made from dried corn cobs) and wood (or bamboo) picks or slivers should be a routine. The lives of many mothers and babies may be saved when birth attendants and family members caring for the newborn baby have clean hands and nails.

A simple grain bag may be used but any surface for giving birth should always be thoroughly washed and cleaned with soap. Clothes, rags, towels and blankets to be used during and after the baby's delivery, and strings or tapes and blades used for umbilical cord care should be boiled for a minimum of twenty minutes. Where water and/or fuel are scarce, clothes should be boiled in a 2 per cent soda solution for at least five minutes.

Sunlight radiates ultraviolet energy. It helps disinfect water (see Chapter 4) and the surface of articles hung on a bush and sun-dried.

Diseases sensitive to hygiene practices, such as those causing diarrhoea, skin and eye infections, etc., may diminish when hygiene improves because water and sanitation-associated diseases originate and are passed in several different ways. They may enter the body via the mouth (e.g., with water, food, dirty fingers) or through the skin, either directly, from person to person, or via vectors (intermediaries). The contact of babies with contaminated water when they are being washed and bathed exposes them to a great risk of infection. The risks are compounded by malnutrition, which greatly increases susceptibility to disease.

Breast-feeding is important

WHO estimates that breast-feeding saves around 6 million infant lives each year by preventing diarrhoea and acute respiratory infections alone. Breast-feeding is also responsible for 25 to 35 per cent of the observed fertility suppression and can provide high-quality nutrition.

Breast-feeding favours skin-to-skin and eye-to-eye contact between mother and child. When a mother has unlimited access to her child, it facilitates bonding, permits breast-feeding on demand and allows closer contact with the father and other family members. In addition, the risk of neonatal infection is lower. Through contact with the mother, the infant's skin and gastro-intestinal tract are colonized with her micro-organisms against which she has antibodies in her breast milk and which, consequently, tend to be non-pathogenic. Breast-feeding helps the baby to develop an active immunity to these same organisms.

The colostrum, or first secretion from the breast (a thick, yellowish liquid), occurs shortly after, or sometimes before, delivery. Its high content of proteins and fat-soluble vitamins, and its anti-infective properties makes it of particular nutritional value to the baby and a barrier against infection. It is the newborn's first immunization. Unfortunately, in many regions, colostrum is still discarded or pre-empted by glucose-water, breast-milk substitutes or traditional mixtures.

The proportion of breast-fed children is generally higher among low-income groups in rural areas than in urban areas. In non-urban communities, breast-feeding often continues into the second year of life. Surveys show that up to 98 per cent of infants in Africa and 96 percent in Asia are breast-fed. Those mothers who do not breast-feed should understand how to correctly prepare breast-milk substitutes. The formula must be mixed exactly and the water boiled. All things considered, the formula is not as good as mother's milk and it is expensive. Furthermore, the bottle and nipple are difficult to clean and bottle-feeding represents a lot of work. Bottle-feeding may also entail risks of making the baby more vulnerable to diarrhoeal diseases and other infections. Although substitutes and bottles may often be presented as a desirable alternative to breast-feeding, mother's milk is easier, cheaper and much safer. Exclusive breast-feeding is the ideal norm for the first four to six months of life. A breast-fed infant usually does not need to be given other food or drink before four months of age.

A comprehensive approach to water education should positively orientate both boys and girls from earliest childhood towards breast-feeding. Regularly seeing women breast-feed, observing how they care for their babies, especially in the same family or social group, is an important factor in the prevention of infections in the next generation, since children are likely to adopt similar practices when they, in turn, become parents.

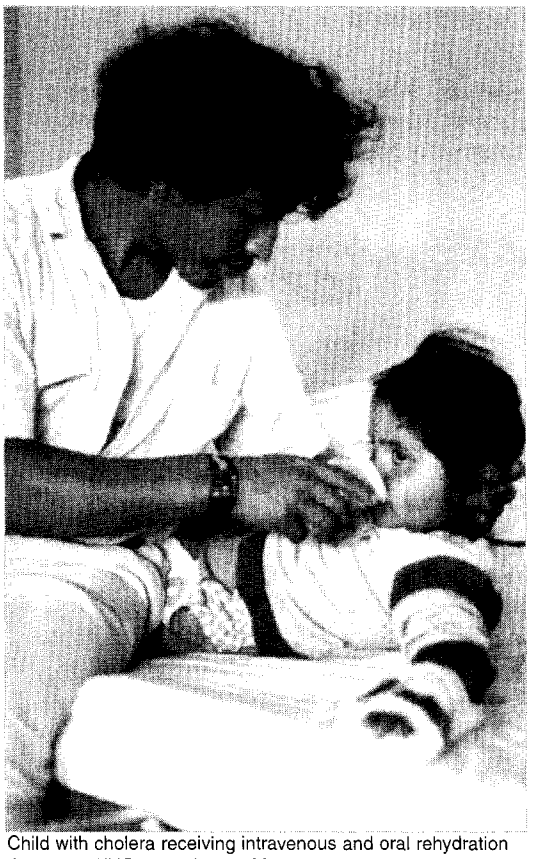
Since working women often cannot devote sufficient time to caring for their babies, children should also be trained in the correct preparation of breast-milk substitutes. UNICEF estimates that the lack of adequate child-care may result in the death of 650,000 children under the age of five annually in the poorest countries.

Safe water for weaning

The time is ripe for weaning (to begin feeding the infant solid food) when the baby is aged four to six months. At this stage of rapid development, the baby should be gradually accustomed to rely less on its mother's milk to meet its nutritional needs. The baby has a very small stomach and is best fed a little at a time, four to five times a day. Hence, four or five times a day, a separate cup and spoon should be washed after use in hot, boiled water and stored in a clean place.

Young mothers trained in these preventive measures at an early age value them as a simple routine rather than as what others would call an "additional workload". The same applies to mothers washing their hands when they use their fingers to feed the baby. Husbands trained at an early age in basic hygiene practices will hopefully be more inclined to help their wives or, at least, encourage them, for example, to cover up the baby's cup and spoon in order to protect them from flies and animals.

Safe weaning prevents kwashiorkor. This disease is common in infants between the ages of one and three years in sub-Saharan Africa. After prolonged breast-feeding, an inadequate weaning diet (deficient in protein and energy-producing foods) may result in malnutrition. The debilitated child offers little resistance to gastric infection and diarrhoea, usually associated with kwashiorkor.

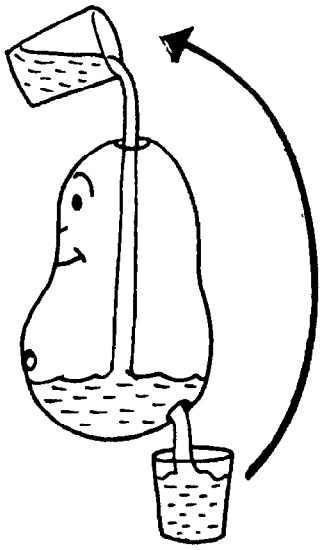


Child with cholera receiving intravenous and oral rehydration therapy. - WHO photo by Ph. Merchez

Weaning foods should always be given after breast-feeding. The weaning foods can be made of a creamy, soft yet thick gruel prepared with the local staple food. The gruel is made from small amounts of beans (bean skin is hard to digest so beans should be soaked, cooked until soft then broken up to remove the skins), cassava, maize, rice or wheat boiled in water or milk. Later, the baby needs other kinds of food, such as green leafy vegetables and orange vegetables, a little oil or fat, food from animals (meat, fish or eggs are not needed every day) and fresh fruit (bananas and mangoes are particularly good for the baby and can be mashed and added to its gruel). Freshly prepared food is safer than left-overs which, in any case, should be thoroughly reheated until they bubble to kill infectious agents.

Preventing and curing diarrhoea

Too many children in disadvantaged communities get diarrhoea (or loose watery faeces). Diarrhoea is extremely dangerous for infants because they lose too much liquid from their bodies and may begin to dehydrate (the exercise on page 24 shows what happens to a plant very quickly when it has no water).

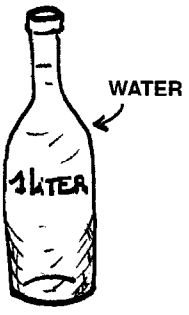


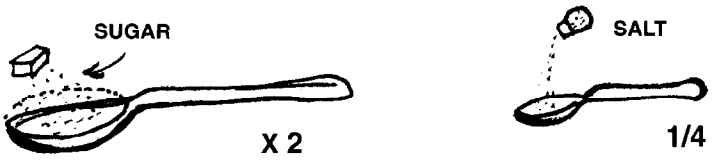
As stressed above, breast-feeding reduces the risk of the baby becoming infected. When a breast-fed child suffers from diarrhoea, the mother should continue to breast-feed it. Diarrhoea is caused by germs from faeces entering the mouth. Germs can be spread in water, by dirty food, dirty utensils, by the mother's dirty hands and by dirt under her nails when food is being prepared for the children. Adequate hygiene practices, use of the cleanest water and food possible and the use of covered latrines (also cleaning up of the baby's faeces) reduce the risk of diarrhoea that yearly kills about four to five million children under the age of five. Although no vaccine can prevent diarrhoea, immunizing young children against measles is very important: measles often leads to serious diarrhoea and makes the child susceptible to pneumonia and ear infections.

WHO recommends three rules for looking after a child with diarrhoea:

- Give the child more fluids than usual to replace the fluids and energy washed out of the child by the flood of faeces; continue breast-feeding; give oral rehydration salts, cooked cereals, boiled and cooled plain water, and soup, rice water, yoghurt, fresh fruit juice or young coconut water.
- A child with diarrhoea needs plenty of food to regain lost energy and weight. After the diarrhoea stops, give an extra meal per day for the next two or three weeks.
- Should the child's condition not improve in three days and he/she has repeated vomiting, fever, a poor appetite, many watery stools, bloody stools and a marked thirst, the child should be taken as soon as possible to the community health worker.

Where diarrhoeal diseases are common, showing children how to prepare a simple drink that prevents or treats dehydration is useful, even when oral rehydration salts (ORS) are readily available at the community health centre.





One litre of boiled (or chlorinated) water is poured into a properly cleaned bottle. The child then adds two level tablespoonfuls of sugar or honey and one-quarter of a teaspoon of salt. Invite the children to taste the drink: it should not be more salty than tears. Stress that a baby with diarrhoea needs at least one litre per day and a grown-up three or more litres a day. The drink should be given as sips every five minutes (day and night) in the case of severe dehydration.

Increased availability of clean drinking water and improved sanitation is essential for health and quality of life. Without them, no future is sustainable. These achievements are critical to communities for improving their children's health and maximizing use of their time and energy. The following chapter (Chapter 4) shows some practical means of achieving these goals in the household.

4. APPROPRIATE TECHNOLOGY IN THE HOUSEHOLD

Learning about appropriate technology appeals to people's sense of responsibility, be they children or adults. To be effective, it needs to be a continual process. The key to a successful learning experience lies in getting people to participate actively in finding solutions. Emphasis should be put on individual and collective wellness, as opposed to sickness.

Once children are aware that infectious agents can be killed or inactivated by boiling drinking water for one minute, they have progressed towards a state of health. Learning some simple alternative technologies and basic health messages will stimulate them to improve their families' hygiene and well-being. Children who can say "We did it ourselves" tend to make the best use of their new knowledge and skills. In turn, they will pass on to their parents the elementary rules of health.

In Latin America, children are taught hygiene and cooking. Maria-Luisa, aged 9 years, whose parents are farmers, shows her mother and elder sisters how to prepare the dish she was taught how to cook in school. - WHO Photo by P. Almasy

Make soap and wash your hands!

By now, children will know that they must wash their hands with soap to prevent disease. Yet, they need to be able to make or buy soap and have easy access to water. They will be more inclined to wash their hands with a bar of soap they have made themselves.

The following recipe can be used at school or at the community centre to teach them a cheap and simple way to make soap:

- The necessary ingredients are one cup (250 ml) of oil, or hard and clean fat; five teaspoons (25 g) of caustic soda (sodium hydroxide) crystal or lye; a half cup (125 ml) of water, and a few drops of perfume when available.
- Children should collect the necessary equipment from their household (this will tend to involve their families more in the experience). Basically, the necessary equipment consists of two large bowls or buckets, measuring cups (all should be made from iron, clay, enamel or plastic -- but never from aluminum which is destroyed by lye or caustic soda); wooden or enamel spoons (or alternatively, smooth sticks for stirring); watertight wood, plastic or waxed containers, or gourds, coconut shells or split bamboo halves, which will be used for moulds; and clean cloth or waxed paper to line the moulds for easy removal of the soap.
- Organize the children into small groups (3 to 5 children in each). Each group will be responsible for its own production. Explain the method and help the children to proceed as follows:

  - — Caustic soda is dissolved in water to produce "lye water".
  - — Oil is poured into separate containers. If fat is used, it must be clarified first by boiling it with water. Once it has cooled, ask a child to separate the clean fat (it can be done easily). The clean fat should then be heated and melted again for soap making.
  - — The lye water is slowly poured onto the oil by a child. If fat is used, allow it to cool before adding the lye water. In both cases, the liquid should be continually stirred in one direction.
  - — A third child adds a few drops of perfume, if available.
  - — Once the mixture is thick, a fourth child puts it into lined moulds.
  - — Leave it to set for two days (without moving the moulds) before removing it.
  - — Show the children how to carefully cut the soap bars into slabs and stack them on trays where they will be left to dry thoroughly for about one month.
  - — Once the slabs are dry, the children should wrap them in a piece of clean paper on which they may write a few words, for example: "dirty hands ruin our water!", or "dirty hands make boiled water dirty again", or more simply: "use me!"
- The slabs may be sold by the children. The money will constitute a chest to launch other water education activities, for example: to prepare a festival, a play or an exhibition (see Chapter 6). In this way, the problem-solving approach helps to link education on water and health to income-earning schemes.

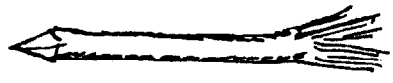
WHO Photo by J. Schytte

Focus on personal hygiene

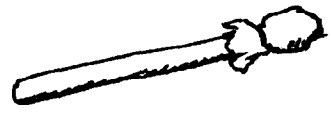
Making soap is a good introduction toconveying some basic messages related to personal hygiene. Although attitudes to personal hygiene, especially that of the genital parts of the body, vary from culture to culture, stress that children -- and adults -- should thoroughly wash their hands with water and soap:

-- before eating or handling food,
-- after using the latrine,
-- after handling animals,

and that they should wash their skin and hair regularly, and clean and brush their teeth daily. Plain salt or equal amounts of salt and bicarbonate of soda can replace toothpaste. Children should wet the brush before dipping it in the powder and learn how to remove plaque and clean between their teeth. You can easily show children alternative ways of making toothbrushes:



Sharpen one end of a wood twig and chew the other end to use the fibres as a brush.



Tie a piece of towel around one end of a stick

Schistosomes

In areas infested with schistosomes, emphasize that children should never urinate into natural waters. Stress also the need for sandals or any kind of footwear to avoid infection through sores and wounds.

Avoid little dragons

In African and Indian tropical areas, Guinea worm infection, or dracunculus (sometimes called the "little dragon"), is often a problem because infected people collect drinking water from open wells with steps. Wherever necessary, children should learn to filter the water through a finely woven linen cloth or nylon gauze. It can also be used as an alternative method for clearing water of "nuisance organisms" which may have no public health significance but which produce turbidity and appear as visible animal life in water.

Sunlight and disinfection

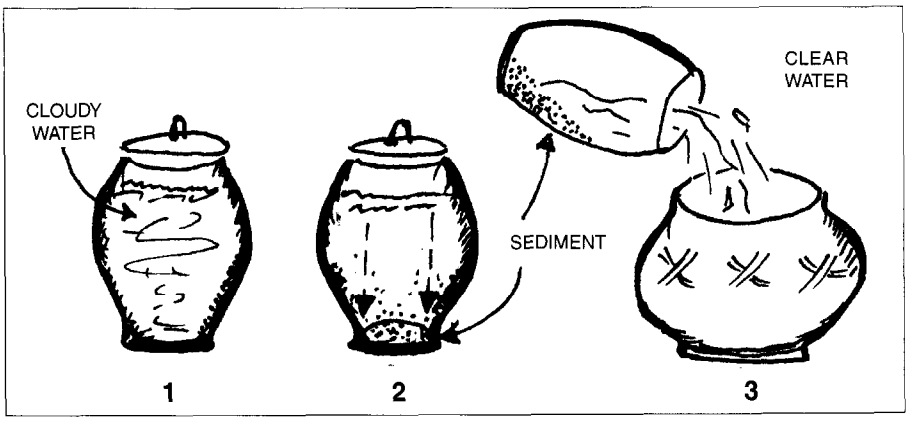
In the early 1980s, researchers working at the Department of Environmental Health, American University of Beirut, Lebanon, studied the small-scale disinfection of water for home use and noted that sunlight destroyed bacteria, including coliform pathogens, in a few hours. Colourless or light blue glass or clear plastic containers transmit the near ultraviolet and visible components of sunlight which destroy micro-organisms in polluted water. The method is currently being popularized by WHO and UNDP for use when neither boiling nor chlorination (much better methods of making water safe) are possible.

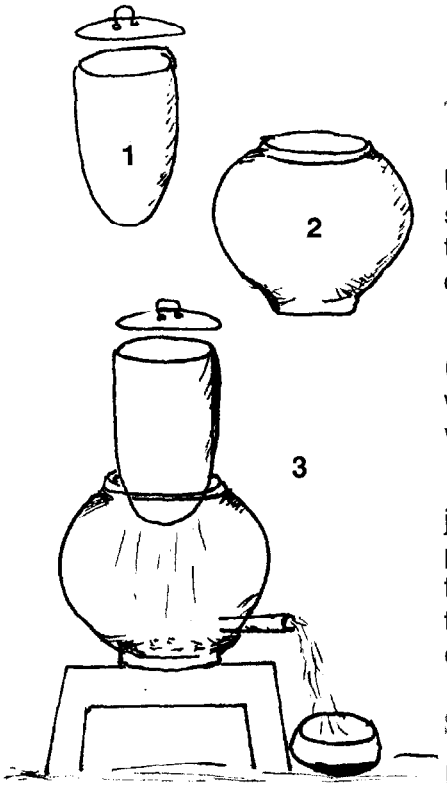
Firstly, avoid cloudy days! Children should collect clean, colourless or light blue bottles or clear plastic containers from their household. They should remove any labels. The bottles or containers should then be filled with clear water from the well or pump and carefully covered. With the help of the teacher, the children should prepare an open space where the sun shines all day long that is away from younger children and animals. Make sure that the children spread out the bottles so as to keep them from shading one another. The bottles should ideally stay in the sunlight from 10-11 a.m. until 3-4 p.m. (five hours, with maximum solar radiation at noon). The stronger the sunlight, the safer the water will be for drinking. It should be stressed that water cleaned by the sun should be used right away in order to avoid germs recontaminating the bottles.

The two-pot method

Another small-scale method can help children provide their household with safer drinking water (when neither boiling nor chlorination, which are much better methods, are possible) is the "two-pot" method.

Two large pots or containers made from colourless glass or clear plastic are needed for each group of two or three children. Ask each group to fill one container with water and cover it. Let it stand for three days. Invite the children to observe what happens in the water as early as the second day -- with a magnifying glass, when available. Children will see sediment beginning to appear at the bottom of the container. On the fourth day, show the children how to carefully pour off (or take off with a ladle) the clean water at the top of the pot and pour it into the empty one. Children should pour the remaining dirty water at the base of the trees, bushes or onto the school garden and carefully wash the empty pots which may then be filled with water and covered again.





Two jars for a better understanding of the filtration principle

Many rural communities traditionally use earthenware. The "two-jars" system is a very ancient and cheap means of filtering water. It is used throughout the world. This simple example of water filtration can help children understand the principle involved.

Ask a local potter to make two jars: the smaller should be porous (unglazed) and its bottom should fit into the neck of a second (glazed) one with a hole made at about 5-10 cm above its base. A 20-cm long flexible watering-pipe will be fixed to the hole.

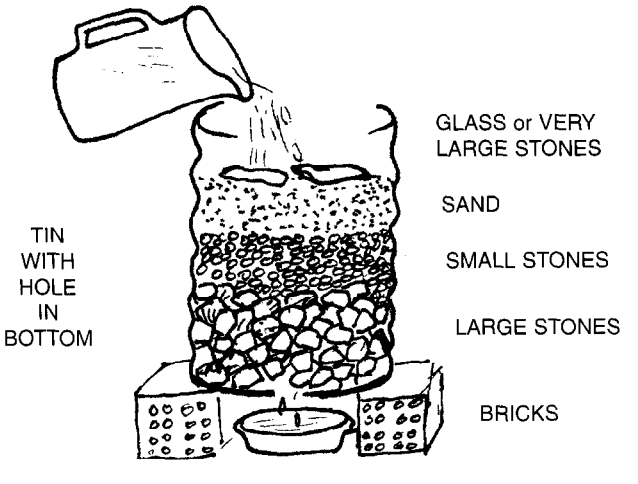
Pour dirty water into the upper jar. It will gradually seep through the jar's porous bottom into the lower jar. Show the dirt remaining inside the porous jar. Explain that, similarly, bacteria and parasitic eggs can be filtered out but that smaller germs (viruses) will pass through. Stress that filtered water should be used for cleaning and washing rather than for drinking.

Sand filtration

In remote areas, children may be trained to build a water filter at almost no cost to their families. Yet, they should remember that only boiling and chlorination are truly effective, although the sand filtration method can make water much cleaner.

The children should thoroughly clean the inside and outside of a one-metre deep, topless barrel. Make a hole at the bottom of the barrel into which a tap is placed. The children will place the barrel on a 50-70 cm high base made from stones so as to ensure that a jug can receive the water underneath the tap. During this time, other children -- perhaps the younger ones -- will have collected round stones about 2-3 cm in diameter. The stones should be placed in the barrel in such a way that they do not block off the pipe opening. Other children who have collected gravel or stones as small as peas will spread them to completely cover the first stones in a layer 15-20 cm deep. Another group of children will add a 50 cm-layer of fine sand and other children will carefully put flat stones or large (clean) pieces of glass on the top of the sand layer to keep it from being stirred up in the water. Now, the barrel should be filled with water (up to 3-5 cm from the top) and covered. The filter will need cleaning every two or three weeks.

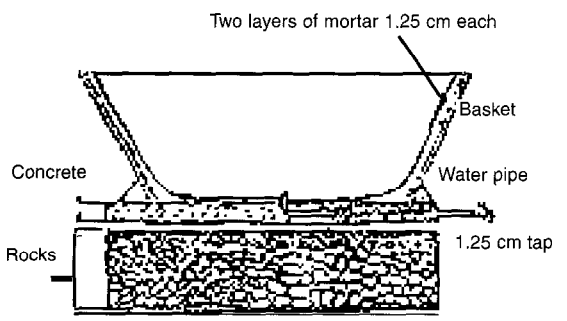
Children will compare the clear water from the barrel with the original muddy water



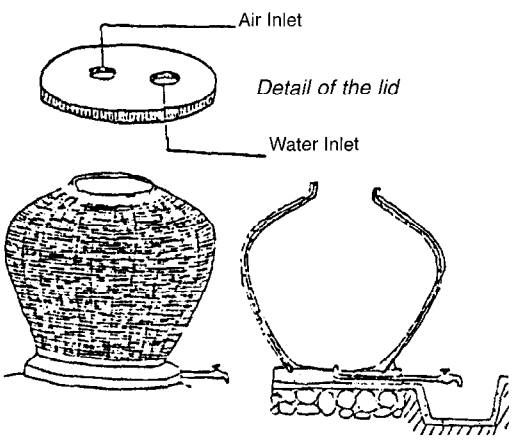
The water-basket

This concept originated in Thailand, where UNICEF discovered people carrying water in baskets sealed with an impermeable layer of tree resin. Such baskets can be made larger to replace barrels where the latter are unavailable.

Rural children usually know how to weave a basket frame into round shapes from shrub sticks or bamboo but the bottom should be omitted in order to bond the sides with the base. A local mason should build the foundation and position the bottomless basket onto a base of concrete over a pipe (see sketch) and cover the weaves inside the basket with two layers of mortar (about 1.25-1.5 cm each). The basket is then ready to be equipped with sand filtration material and covered.



Construction of the foundation and positioning of the basket



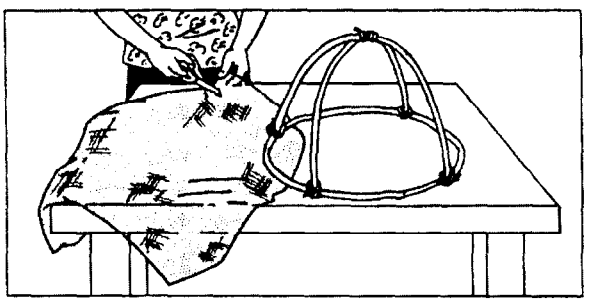
Simple messages and action to protect water and food

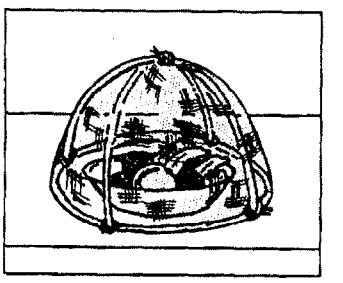
Water and all foodstuffs (including leftovers) should be protected from dust, germs, insects, rodents and poisons. If no refrigerator is available, it should be stressed to the children that drinking water and milk, meat, fish, poultry, vegetables and fruits (including leftovers) should be stored in a cool dry place and covered with a device made from fly screening or with a clean plate or bowl. Storing water and food at a low temperature, however, is often difficult in many communities in tropical areas. There are some alternative solutions: water and food containers can be stood in bowls of clean cold water put in a shady place (always above ground). Clay containers are very appropriate for keeping water and food cool.

It should be stressed that, in all circumstances, good food must not only be clean and well-balanced (the more variety, the better!) but also tasty and pleasant and that six basic rules must be observed:

- Animals must be kept out of the kitchen.
- After drinking, the container or pot must be rapidly covered again.
- Food must be thoroughly cooked in order to kill germs then eaten right away.

- After cooking, the cooking pot must be covered immediately.
- Milk should always be boiled, cooled and stored as soon as possible in a cool dry place.
- Any waste should be put in a covered bin, on a compost heap or buried away from the house.



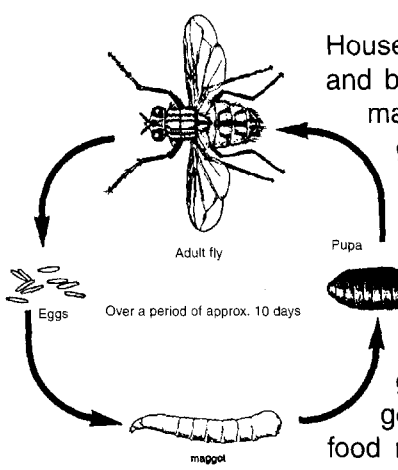


Stick on labels!

Invite the children to list the various household chemicals they know (insecticides, disinfectants, etc.) and to check if all containers are duly labelled. The next day, children will make labels and draw appropriate symbols to stick onto the containers with the missing labels.

Some basic rules of hygiene at home

Once the children understand that all living creatures need water and food to survive, ask them to list the pests they see in and around their homes. Beetles, birds, bugs, lice, cockroaches, flies, lizards, mosquitoes, rats, mice and snakes are likely to be mentioned in tropical areas. What are all the places where they might be found?



Houseflies are dangerous because their fine body hairs easily pick up dirt and bacteria (from animal and human nasal or eye discharge, faeces, manure and decaying matter). Later, the flies will contaminate any glass, cup, water-pot, food or utensil on which they land. Other insects can also spread diseases: for example, like flies, cockroaches contaminate food with their own excreta and the germs carried by their hairs.

Rats and mice also are particularly dangerous. They can contaminate water and food because their skin and faeces carry germs. They are attracted by crumbs and scraps and will greedily gobble up any left lying in and around uncovered bins. They also eat food needed for humans, destroy woodwork and materials, kill young chickens and bite both children and adults. Their fleas can transmit such diseases as the plague and typhus when they settle on and bite humans.

Organize a "rat and mouse hunt". Explain to the children that rats and mice can be kept away if they have no place to hide in the children's homes (for example, empty boxes); if holes in walls, floors and roofs are sealed; when drainpipes are screened with wire mesh.

Stress that the floor of the children's homes should be cleaned and, whenever possible, brushed with water and soap after meals, and that all possible nooks and crannies (when warm and dark, they make ideal breeding places) should be thoroughly cleaned. Organize an event in the community to identify and remove all possible outdoor breeding places close to houses.

A healthy home environment depends on many factors. A song can incorporate important messages:

To make our homes healthy,
we need:
a clean and safe water supply,
good personal hygiene,
safe food and a well-balanced diet,
cleanliness and tidiness everywhere at home,
covered pots, plates and bins.
Cleanliness, cleanliness everywhere,
keeps us safe and healthy!

Although it may be difficult to keep the place tidy in low-income households, the ground can be thoroughly cleaned with a broom after each meal. Plates and other utensils should be washed and hung on walls to avoid contact with disease-carrying animals and insects. - WHO / National Nutrition Institute Mexico

5. SKILLS FOR LIFE

Children learn more easily how to better protect their communities when water education projects (making fences to protect the water supply from cattle, improving latrines, etc.) are supported by social organizations.

It is not a spontaneous process. However, low-income urban and rural communities are not disorganized. Local institutions (political parties, women's organizations, labour unions, religious bodies, cultural and ethnic associations, and health committees) may have considerable power. Sometimes, they are formally affiliated to regional or national bodies. In addition, certain individuals, such as religious leaders, retired school-masters, etc., have some authority by virtue of their age, experience, education or wealth. Projects aimed at involving children in activities related to a community's water supply and environment should be discussed with local leaders. Anyone with experience in a development project knows that these individuals are usually very valuable "entry points". Their advice is usually extremely valuable for getting the initiative off to a good start. Consulting the local leaders also prevents the community from feeling slighted. The following factors can be highlighted to stimulate discussion and motivate everyone to participate in the project: comfort and safety, financial benefit, status and group pressure and, last but not least, the feasibility of the project.

Listen to those with moral authority, be ready to accept their cultural identity and you will learn what they believe to be the community's priorities, needs and potentials. Do they complain about flimsy latrines, diseases caused by unclean water, mosquitoes, many flies buzzing around, infants suffering from diarrhoea? Once children have learned simple ways of bringing about positive change, parents will also be ready to help.

Groundwater protection

Groundwater rehabilitation is a long-term, technically demanding and very costly process. That is why training children at an early age to preserve the natural quality of groundwater is very important. As a matter of fact, it should be part of basic education in primary schools to ensure that their own and future generations will always have access to safe sources of drinking water.

The objective is to make children understand clearly the reasons for groundwater protection and why their actions could cause problems for themselves and the community. This investment in education is particularly necessary in rural areas where the population is scattered and inspectors cannot regularly check every farm. Children who understand that good water protection is in their own best interests are an important means of reducing pollution.

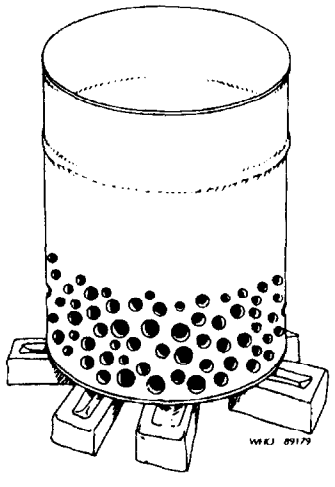
The following exercises can help to make children aware of the problem:

- With your help, the children should identify and list past (they may ask their grandparents or other aged people in the community), existing and potential pollution sources that are harmful to health, affect the taste, odour and colour of water, reduce the level of oxygen in water, make water more corrosive or raise its temperature.
- Help them to evaluate the nature and extent of these sources.
- Help them to draw a map that shows where under-protected wells and other endangered sources of water are located.
- Ask them to list the kinds of waste that could be reduced in their community.

Flies away!

There are various means of disposing of waste materials. These can be composted (for use to improve the soil quality), buried in the earth and covered with a 10 cm layer of soil or incinerated. The following steps must be considered if the choice is made to incinerate:

- *Choose a site that is unlikely to cause a nuisance to other people or be a fire hazard to surrounding houses, trees, bushes, etc.*
- *Explain that a number of holes should be made at the bottom of a bin to allow air through the fire.*
- *Explain that the bin should be carefully placed on bricks or stones to improve the airflow at the bottom of the fire.*
- *Demonstrate how to load waste into the incinerator: the easily combustible rubbish at the bottom, followed by less combustible materials.*



Protect water with fences at the right place!

In rural communities, it may happen that people collect water, drink and bathe alongside livestock. Progress in the self-development of the community can be achieved when simple fences are built to avoid the sources of water being used indiscriminately and simultaneously by humans and animals. Children should collect branches and build (with the help of volunteers) barriers to protect springs, streams, dams, wells, pools, etc.

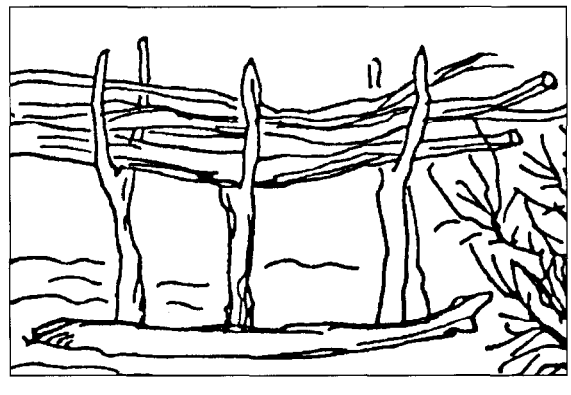
FENCES

To keep out livestock

Wells can be covered with thorny branches when rocks surrounding them make it impossible to build normal fences.

To protect water from being muddied by animals

Around shallow wells, livestock can push their heads through wooden "window" structures to reach the water.

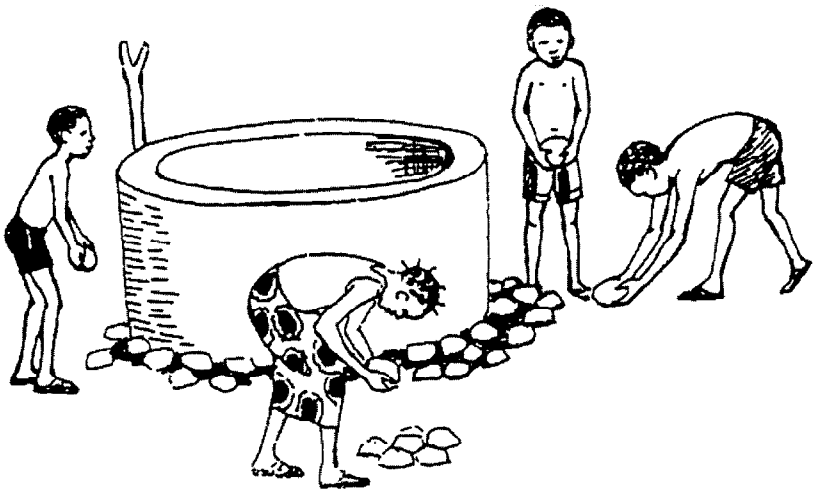


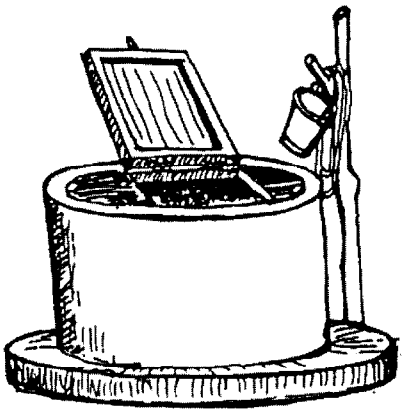
To keep water clear

Areas of stagnant water can be enclosed by dams of sand and mud. The water that filters itself through the sand and mud walls will be much clearer.

Well-cleaned wells

Organize the children into small groups. In turns, each group should be involved in overseeing the cleanliness of the community water supply.





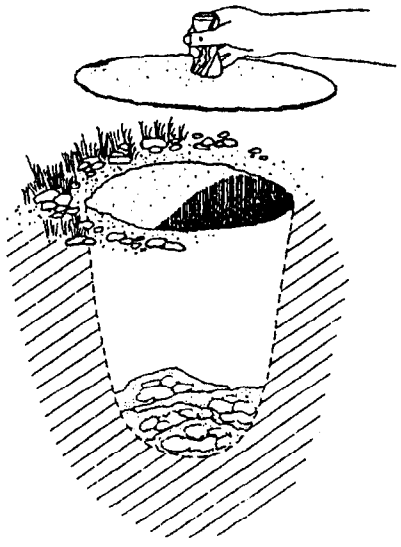
- To keep the community's well or other source of water from becoming muddy, the children can pave the surrounding area with stones.
- One group might take upon itself responsibility for cleaning the bucket and rope, and for ensuring that the bucket is hung on a post or stood on a small wall nearby rather than being thrown to the ground.
- Another group could make a lid for the well then be responsible for ensuring that it is always replaced after use.

Discuss latrines!

Discuss with the children the places where people go to defaecate. In rural communities, men often go close to the river early in the morning, whereas women look for some privacy behind bushes and trees. Both may use homemade latrines. Sometimes, children go just anywhere. Later, flies buzz into their homes, causing diarrhoeal and other infectious diseases. Explain to the children that the use of latrines improves people's protection from many diseases and that it also provides them with privacy. Stress that:

- open defaecation attracts flies which feast on faeces;
- in moist soil, the larvae of intestinal worms develop and may be carried on people's feet or shoes -- and from shoes to bare feet;
- surface water run-off from places where people defaecate can result in water pollution.

The "cat method"



Some communities are so poor that the "cat method" is an effective improvement where faeces are being scattered around the environment. Train the children to dig a 20 cm deep hole with a shovel. They should bury the faeces in the shallow hole. The method is also appropriate when people work away from home in the fields.

The "one day" latrine

This method consists of digging a hole (20 cm wide and 30 cm deep) in the ground. Children are asked to cover their faeces with a layer of soil and the hole with a sheet of metal. When the sun shines on the metal lid, the temperature will rise above 45°C and kill eggs and larvae of worms. A new hole is dug every day. It is appropriate when people live scattered in remote rural areas.

Children ensure privacy

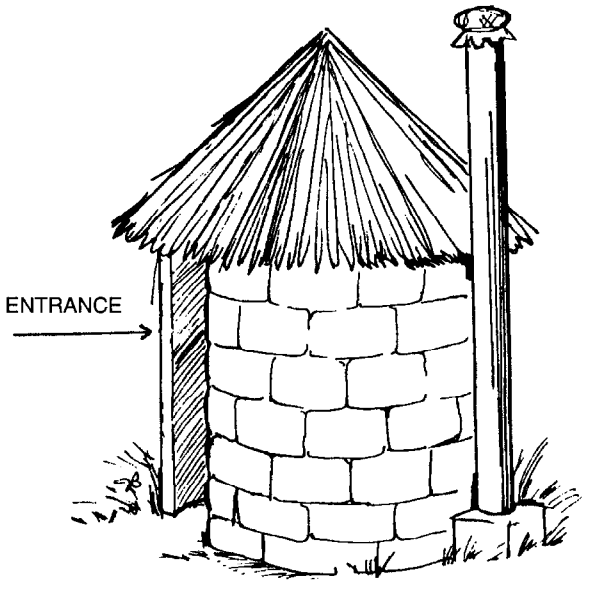
The hand-dug pit is the most commonly used latrine in low-income communities. Stress to the children that it should always be covered with a slab. They can add a structure made from reeds and grass around existing pits which will provide privacy.

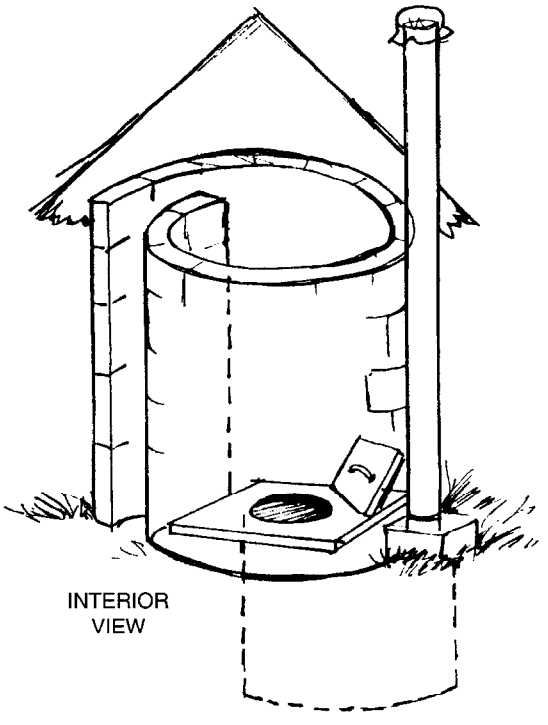
The VIP latrine keeps flies away

The "VIP latrine" (ventilated improved latrine) is equipped with a ventilation pipe system. It is used throughout Africa. Although it is sometimes considered too costly and complex to construct, in its simpler form, it does not require more than three bags of cement, a plastic pipe and a piece of wire mesh. The important points to make it work properly can be written or painted (in large letters) in the form of messages, each on a separate poster. All posters should be displayed around the community meeting place and throughout the village so that people are informed about the latrine during the week running up to a meeting on it.

Ten important messages about latrines

- Latrines should be built at least 20 metres (about 50 paces) away from homes and any water sources to protect the water supply from contamination by faeces.
- Choose a place where human waste cannot be reached by pigs or other animals.
- The pit should be about 2 metres deep (a 3 metre-deep dry pit will last a family of six about twenty years).
- Add a cover-plate (made of wood) fitted into the squat hole of the pit cover slab to keep out flies. When the cover is regularly used, the fly problem diminishes and smells are attenuated.
- Build a wooden or concrete slab on which to place your feet.
- Locate and place a bar to make sure that people will hold on to it when squatting and, thus, use the latrine cleanly and correctly.
- Inside the latrine, place a bucket filled with lime, sand or ash which people will throw into the hole after use to keep flies away.
- Ashes can be sprinkled onto the floor to keep the latrine dry.
- Place soap and clean water near the latrine so that people can wash their hands after use.
- When screened with wire mesh, an air vent pipe will keep flies away and reduce bad odours.





Keeping mosquitoes away

It should already have been explained to the children that mosquitoes can breed in less than a cup of water and why covering buckets and containers used for their family's water supply is so important (see Chapter 2). The children should already have been trained to clean up the household environment and to remove rubbish that may fill up with water and serve as breeding places for mosquitoes. In rural areas, children usually know at an early age how to cut grass and most of them have probably observed that mosquitoes use tall grass for resting. The children can easily clear grass and other vegetation from the immediate vicinity. Keeping the grass short will help to reduce the presence of mosquitoes around the village during the daytime and in it when the sun goes down. Children should be taught to protect themselves after dark by wearing clothes which cover their arms and legs.

Children should be told about fitting insect screens to windows so that they can be opened for better ventilation and also about hanging nets from the ceiling to surround their bed. All things considered, these are not expensive means compared to the cost -- in suffering, time and money -- of malaria. Nets should be regularly inspected and repaired so that no mosquito can get through the net while the child is asleep.

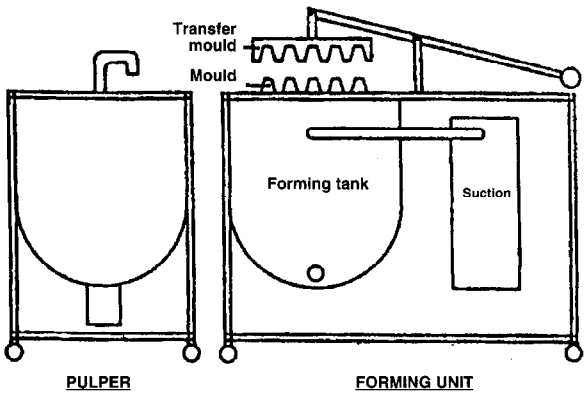
An income-earning scheme: "super pest" turned "wonder weed"

Huge amounts of money are spent on exterminating the water hyacinth: it reproduces very rapidly and is difficult to destroy. Chemicals may kill most of the weeds but they also decimate the animals and vegetation living in the river ... and the crops. Serious studies were undertaken as early as 1973. With the support of the Food and Nutrition Research Institute of the Philippines, FAO, American universities, the US National Aeronautics and Space Agency (NASA), the Regional Research Laboratory, Hyderabad, India, and the International Foundation for Science (IFS), Stockholm, Sweden, these studies have shown that the "super pest" can be turned into a "wonder weed".

Its high protein quality and vitamin content [vitamins A, B-2 (riboflavin), B-12, E] and xanthophyll make it an almost unlimited source of food materials, including a bread fortifier, that may help to control the toll of deficiencies in vitamin A and protein. When pulverized, its dried leaves, roots and stems can be turned into animal feed. They can also be used to make particle board for low-cost housing and furniture. The long fibres can be used to make paper (when mixed with pulp of jute stalks or waste paper) and textile staples (its fibre tensile strength compares favourably with that of cotton).

Last but by no means least, research conducted by NASA on the use of water hyacinth in space exploration has shown that the water hyacinth is potentially an interesting sewage disposal agent. It gets its nutrients from minerals (nitrate, phosphate, potassium) that dissolve in water -- and it even absorbs toxic chemicals such as lead, mercury and strontium 90 that have been linked to many degenerative diseases.

The water hyacinth is a symbol of life in Asia. Where it flourishes, it can provide youngsters with a means of learning new skills and a step towards employment. Children can be trained in small-scale technologies that use simple but efficient machines for the production of egg trays, boards and even small boats for fishing and light transportation.

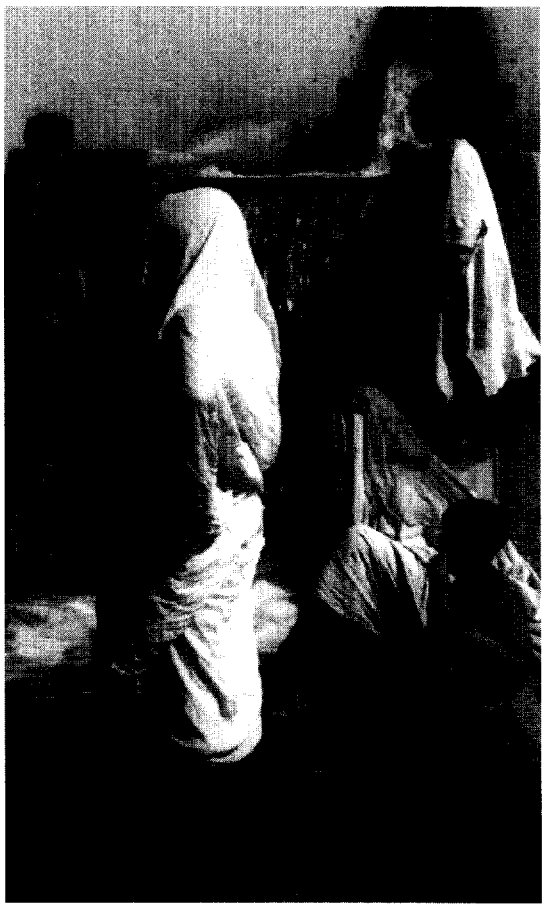


The machine designed by Third Scale Technology (Melbourn Bury, Royston, Herts, SG8 6DE, U.K.) does not require any special building work and only 20 m^2 for the total floor space, 18 litres of water/hour and 1 kWh of electricity. One semi-skilled operator can make up to 60 trays for 30 eggs each, or 120 6-egg cartons per day.

6. TOGETHER

A caring approach

Large-scale changes can be brought about by economic and political forces; these changes are directed from the top down with the aim of improving access to a higher standard of living. Changes can also be driven by idealism and concern. At the community level, however, the immediate reality makes it easier to understand people's real and felt needs. At that level, the relationship between the educator and the children is often much more important than abstract concepts. Motivation based on love for the children and a heart-felt solidarity with their community can do miracles when coupled with good organization. As stressed by Finnish educator Ria Van Hoewijk in an educational project, "the implementation phase involves social and emotional phenomena". It also implies that the educator has a sharp awareness of the community's cultural, technological and human potential.



UNESCO Photo by Bohm

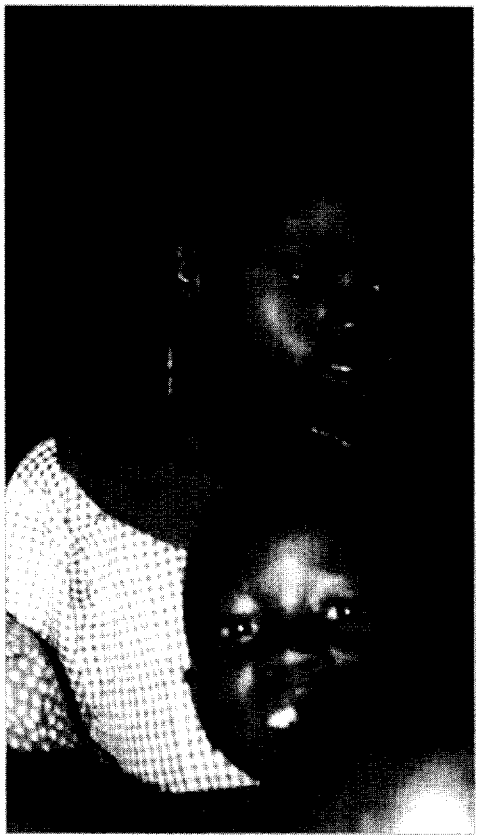
The common vision necessary to make a project successful results from each individual's understanding of a situation. Limiting our knowledge to thinking of the world as being made of "stuff" may hamper a water-education project in cultures where traditions are based on myths and rituals. Traditions may even seem to contradict the scientific perspective of the mechanistic, industrial world view. Yet, the function of those traditions was, and still is, to remind the people of their close interconnectedness with nature --an awareness that is now being rediscovered.

Life-related education

The educator takes a first step towards initiating a water education project when he or she discovers what the children already know about the issues and topics it is planned to teach. In gaining the community's trust, the educator takes another step forward. A community draws its efficacy and wealth from the dynamism and solidarity of the families who make it up. The influence of families and their friends is generally very powerful. The success of a water education project thus depends on the educator's close cooperation with the children's families, friends and the community in general.

Before the project is initiated, the community leaders, health workers and school teacher should first find out what the community is already doing in health education and its plans for future action to improve the community's access to safe water and sanitation. These authorities can support the educator's project by making available additional materials such as posters, leaflets, etc. Their interaction will certainly reinforce what the children learn.

Always make sure that the children are able to put what they learn into practice in their daily lives -- at home and in the community. Improving local conditions is the essence of self-development. Children learn more easily by doing than by simply listening. Dialogue and an exchange of knowledge and opinions should be fostered. The children should be encouraged to reach a common understanding of their respective roles. This will help them to organize their activities and build solidarity. The education of children is a human investment which will help future adults to cope with the particularly difficult conditions prevailing in tropical regions.



WHO Photo by P. Almasy

Africa's future:
its children, the priority of the 1990s

Following the World Summit for Children (1990), the Organization of African Unity (OAU) Summit, held in June 1991, decided to establish the African Decade for the Survival, Protection and Development of the Child. By 1992, 44 African countries had started to organize follow-up activities and devote greater resources to meeting children's basic needs: health, education, safe water and sanitation, food, housing and clothing.

Children create a water committee

Once children have gained some basic knowledge of water issues, help them to create a "Water Betterment Committee". They themselves should elect the board members. Ask for the support of people who are innovators and influential in the community: for example, schoolteachers or members of the municipality. Invite the children's families, especially mothers, to attend group presentations made by the children. Sometimes, children may feel shy and think they will be unable to organize their ideas or remember all the key issues to be presented. Story-telling is a useful memory guide for bringing out the key points. Meetings for group presentations usually stimulate behavioural change. Ideally, the meetings should be weekly and held for at least one semester. The story-telling sessions should be mixed with, and followed by, discussions and practical demonstrations.

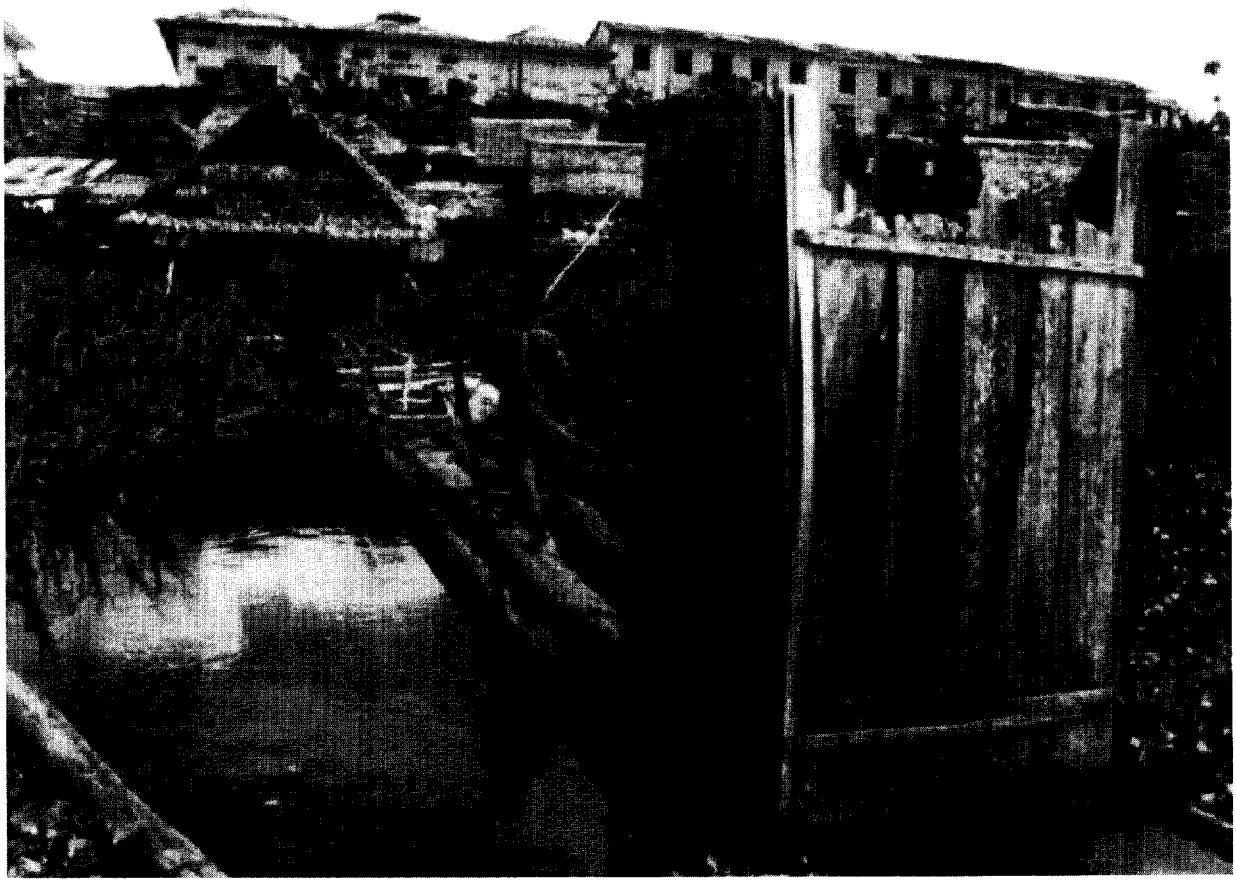
The municipality or a non-governmental organization (NGO) will often make available free sanitary packages (a plastic wash basin, bar of soap and a towel) which will be distributed -- at the conclusion of the series of sessions -- to those families who attended at least half of the sessions. Children who are members of the Water Betterment Committee will distribute the packages during a visit paid to these families and to the home of other children who participated in the project. Children who are Board members of the Water Betterment Committee should emphasize that the materials are to assist the household in hygiene promotion.

Children are usually very honoured and touched to be entrusted with the distribution of the sanitary packages. The entire process fosters the importance of undertaking betterment in the village and will encourage the children to proceed with the election of another Water Betterment Committee for the following year. The experience can be shared with neighbouring communities, thus building and strengthening networking. It will also create more opportunities for the children's future professional and economic activities.

Visits and discovery

Visits to local sources of water and the identification of the water cycle and its impact on the local landscape will help children to improve their knowledge of topography of the region and gain a better understanding of how the landscape is seasonally affected by rainfall. Within the community, visits can be organized to identify risks related to unsafe water sources and poor sanitation.

Visits to neighbouring communities can create opportunities to share knowledge and experiences, avoid duplication of mistakes and recognize gaps and failures.



When latrines contaminate drinking water, cholera danger lurks. - WHO/PAHO Photo by C. Gaggero

Children's theatre can spread water education

Group discussion can be used to present conclusions to other children. It can also provide them with sets of ideas to create stories. Children should be separated into small groups (of about 5 to 7 children each) and each group should prepare a purposely unfinished story that the other groups will add to.


UNESCO Photo by J.S. Bach

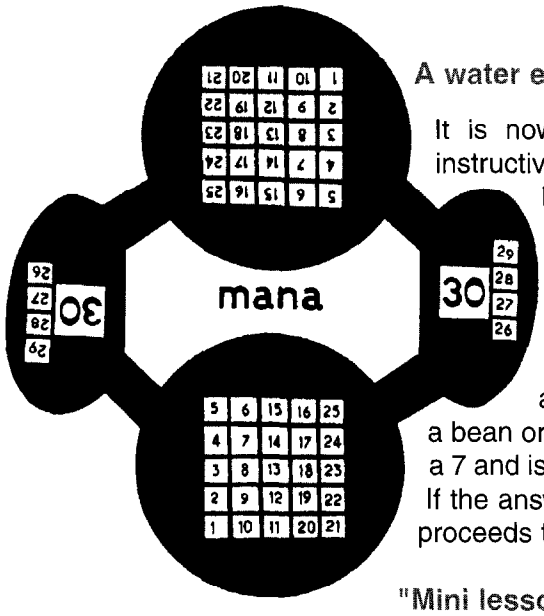
The stories can be developed as puppet-plays, as well as plays involving the children as actors. For example, stories and plays can present the roles of adults in the community and be accompanied by songs, dances and mime to express ideas about:

- how to use community and domestic water facilities;
- water conservation, protection and storage;
- reasons for washing hands;
- reasons for protecting water and food in the household;
- reasons for cleaning utensils and clothes;
- recognizing and treating diarrhoeal diseases in children.

Children's theatre for health betterment was used almost as soon as the Primary Health Care approach was launched by UNICEF and WHO in 1978. As early as 1981, the Zambia International Theatre Institute saw a means of meeting the needs of two such disparate groups as extension workers and performing artists. The Institute held a workshop to show how theatre could spread ideas on primary health care. Techniques studied included drama, song, mime and dance. From then on, interest in alternative communication techniques grew among development field-workers, particularly their interest in popular theatrical techniques familiar to audiences.

The techniques can be adapted to children. During the first week, in groups of 4 to 6, they should visit the village water sources and homes to find out what health-related problems community members are facing. Subsequent discussions will go over these problems, which are then dramatized using mime, dance-drama, puppetry or ordinary plays. During the second week, the children rehearse the play they have created and, during the third week, they perform it for the other children. Comments from the audience during or just after the performances will help to divide the audience into discussion groups. The children will then suggest ways of improving their own way of life, which they will hopefully later initiate themselves without waiting for an outsider to encourage them to set up facilities where none exist.

The experience should be shared with neighbouring communities and municipalities. Field-workers may be encouraged to join forces with local health centres and NGOs in organizing an inter-communal festival of children's theatre dedicated to a Water Betterment Campaign. The festival could be held as a competition and planned jointly with a clean-up campaign of the shores of rivers, lakes, reservoirs, etc. It could also be planned as a fund-raising event for a community water supply and sanitation activities, accompanied by the sale of soap made by the children.



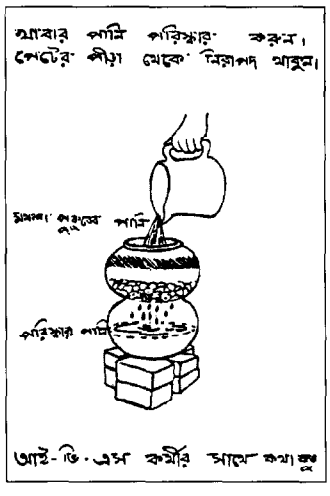
A water education game

It is now generally recognized that games can be creative and instructive. One health game, called Mana, designed by Dogbèri Badagbo Ehlan, former Chief of the National Health Education Service in Togo, has been used in primary education classes for many years. It is played on a board with 30 numbers corresponding to 30 questions on health. They can easily be translated into questions on what children can do to improve problems related to safe water and sanitation. To play, two players throw dice and put a chip, a bean or a stone on the number thrown. For example, a player throws a 7 and is asked question 7: "Did you cover the latrine after use today?" If the answer is "No", the player loses 2 points. If it is "Yes", the player proceeds to number 9 on the board. The first to reach 30 is the winner.

"Mini lessons" on postcards

Postcards can be put to use both as an educational tool for children and as a popular means of informing the adult population. Benedict Tisa, an American expert on communication for health, decided to deliberately use postcards for educational purposes when he was involved in an agricultural/functional literacy extension project in Bangladesh. He had noticed that the mailman glanced at the postcards he was receiving: the mailman felt they were public. Indeed, he was right, as long as they were not put in an envelope!

Tisa then tested his idea in three villages where a clean water campaign was in progress. Two postcards were mailed to the extension workers -- one illustrating a water filter and the other showing women drawing water from a tube-well. Extension workers were asked to monitor the villagers' reactions, noting both the comments and questions the villagers put to them directly and those formulated by the villagers as they talked among themselves. On the whole, they expressed interest and curiosity. The experiment took into account that:

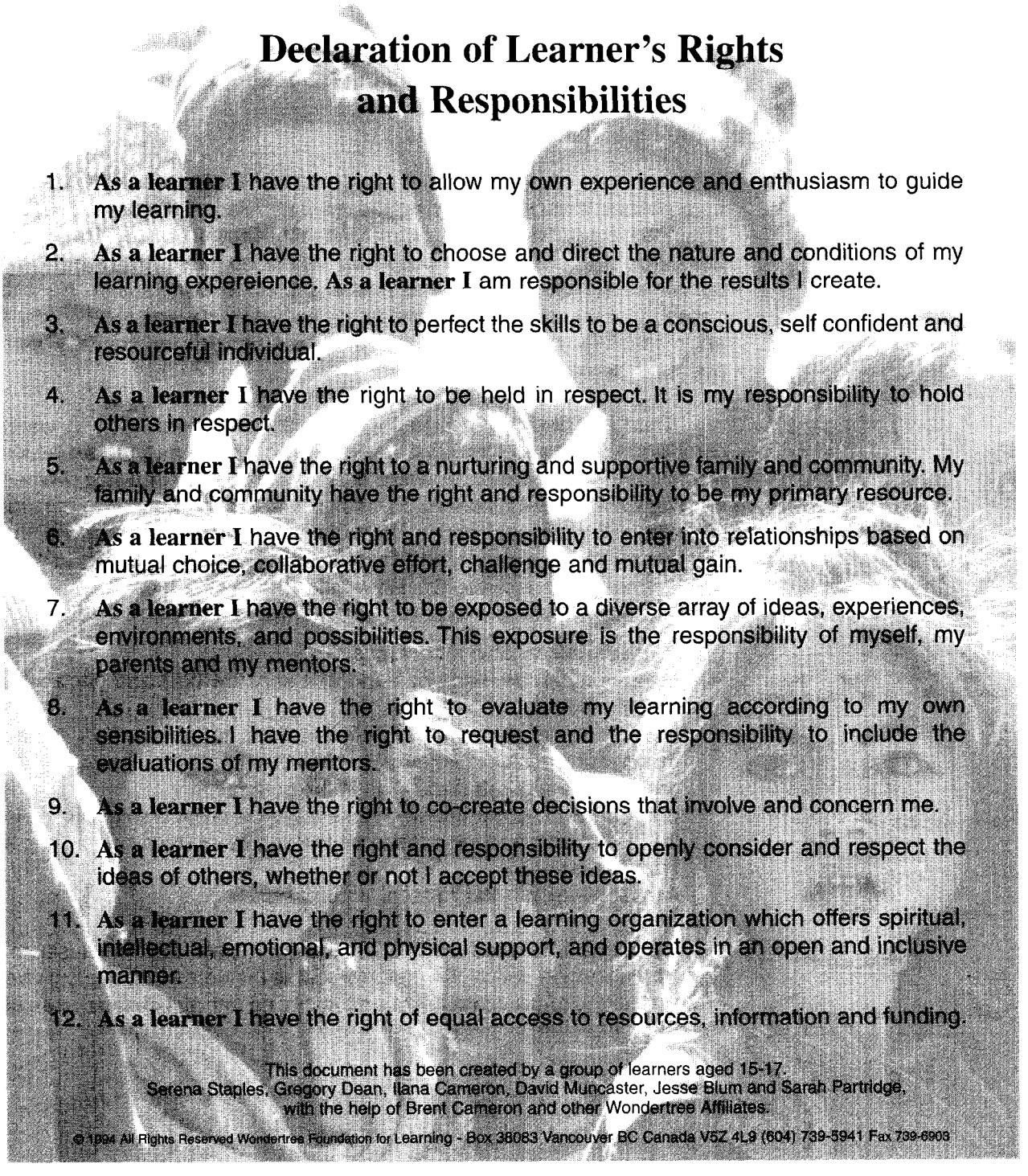


- Mail services exist in most areas.
- Postcards can be made by hand at a very low cost and postage is not prohibitive.
- Receipt of mail in some communities does not occur often, so the delivery of a postcard -- having to pass through several hands -- may provoke interest and discussion in the community.
- Local health and community workers are certainly willing to explain the illustrations and information on the postcards, thus constituting a "mini lesson".
- Almost everyone likes to receive postcards.

Postcards illustrated by children can stimulate their enthusiasm. They can also form part of the material sold at markets or during festivals and campaigns to generate funds and stimulate interest in safer uses of water and improved hygiene.

Rights and responsibilities

There can be no doubt that water and health education will contribute to improving the present and future general well-being of a community. Throughout the process, children will also become more aware of both their rights and their responsibilities. The sooner children learn that the two go together, the earlier they will "creatively" (with the enthusiasm only children can muster) demonstrate a willingness to change in the belief that it is something that really does matter.



Declaration of Learner's Rights and Responsibilities

1. **As a learner I** have the right to allow my own experience and enthusiasm to guide my learning.
2. **As a learner I** have the right to choose and direct the nature and conditions of my learning expereience. **As a learner I** am responsible for the results I create.
3. **As a learner I** have the right to perfect the skills to be a conscious, self confident and resourceful individual.
4. **As a learner I** have the right to be held in respect. It is my responsibility to hold others in respect.
5. **As a learner I** have the right to a nurturing and supportive family and community. My family and community have the right and responsibility to be my primary resource.
6. **As a learner I** have the right and responsibility to enter into relationships based on mutual choice, collaborative effort, challenge and mutual gain.
7. **As a learner I** have the right to be exposed to a diverse array of ideas, experiences, environments, and possibilities. This exposure is the responsibility of myself, my parents and my mentors.
8. **As a learner I** have the right to evaluate my learning according to my own sensibilities. I have the right to request and the responsibility to include the evaluations of my mentors.
9. **As a learner I** have the right to co-create decisions that involve and concern me.
10. **As a learner I** have the right and responsibility to openly consider and respect the ideas of others, whether or not I accept these ideas.
11. **As a learner I** have the right to enter a learning organization which offers spiritual, intellectual, emotional, and physical support, and operates in an open and inclusive manner.
12. **As a learner I** have the right of equal access to resources, information and funding.

This document has been created by a group of learners aged 15-17.
Serena Staples, Gregory Dean, Ilana Cameron, David Muncaster, Jesse Blum and Sarah Partridge,
with the help of Brent Cameron and other Wondertree Affiliates.

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Text and basic design by Dr. Claudine Brelet-Rueff,
International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.

Detailed layout by Yvonne Mehl.

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WHO - Abcede: 24; Almasy: 13; Bregnard: 15; Gaggero: 59; Merchez: 39; Perabo: 18; Schytte: 43; Taylor: 16; Längst: 2.

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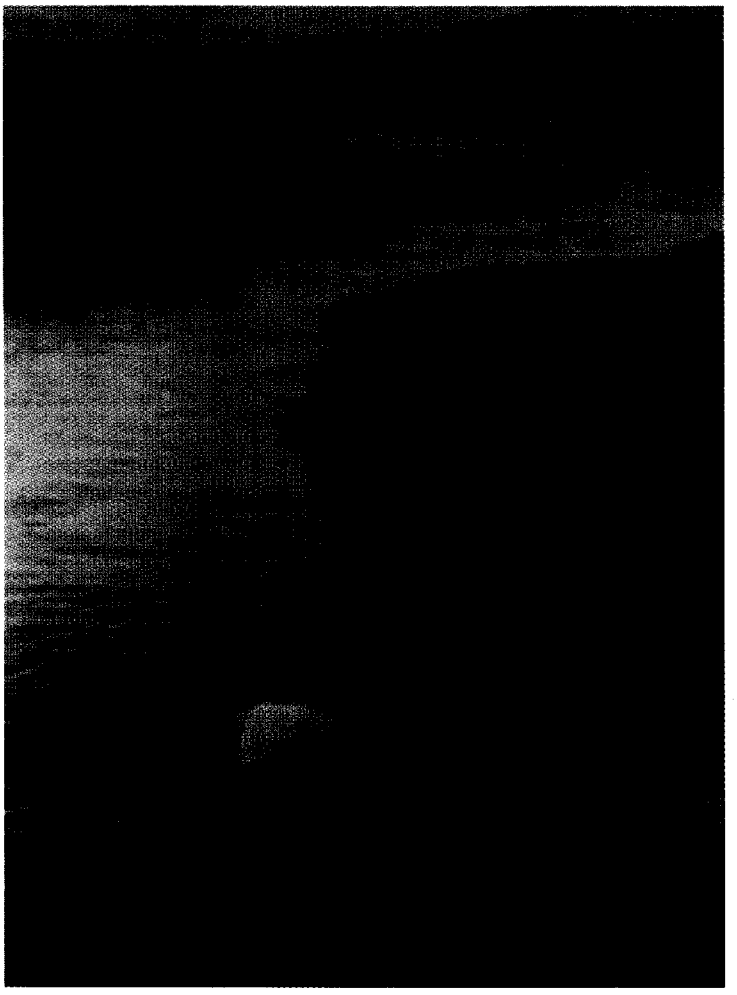

Scientific understanding of interactions between land, vegetation, oceans, atmosphere and human actions is one of the IHP's priorities in the humid tropics. By definition, the problems are multidisciplinary and the IHP encourages an integrated approach to studying the various links and linkages that make up the world's water cycle. This is accomplished through globally and regionally coordinated cooperative efforts by networks of experts and organizations, facilitated by the establishment of regional administrative centres — "centres of centres".

In the long run, of course, IHP wants to see the application of hydrological research results to integrated water management strategies. These include: improving agricultural productivity, providing water for irrigation and people, controlling urban water problems and developing land-use practices that meet these needs while, at the same time, reducing flood damage and the degradation of soils and water. It is expected that good water management in the humid tropics will also bring benefits to areas outside the region. Sustainable development and management is the key to long-term survival.

The Humid Tropics Programme,
September 1991.

For further information, contact:

UNESCO
Division of Water Sciences
International Hydrological Programme
7, place de Fontenoy
75700 Paris - France
(Tel. - 33 145 68 40 02)
(Fax - 33 145 67 58 69)