As discussed above, children are immersed in a world of constant threats to their health and well being. This chapter looks at specific threats of major importance to children, including water and sanitation, chemical pollution, air pollution and natural resource degradation. The next chapter looks at certain global environmental issues, such as climate change and the impact they have on our children’s health.

**Lack of Safe Water and Sanitation**

**Water quality and quantity**

Water is life. It is essential for sustaining basic human functions, health and food production, as well as for preserving the integrity of the world’s ecosystems. Access to safe drinking water is a basic right for all human beings. A child’s well-being is highly dependent on both the quality and the availability of water and how well we manage this precious resource.

Around the world, both biological contaminants and chemical pollutants are compromising water quality. This section focuses...
on biological contaminants, as these cause a series of deadly childhood illnesses in developing countries. Some important chemical pollutants in water will be discussed in the following section.

Biological contaminants of water sources, also called pathogens, include parasites, bacteria and viruses. They get into drinking water when the water source is contaminated by waste material, such as human or animal waste and sewage. The most important source of water contamination in developing countries is human faeces, due to the lack of adequate sanitation facilities. Today, about 2.4 billion people do not have access to even a simple latrine\(^1\). As a result, human waste heavily pollutes many rivers and lakes in developing countries. For example, in Asia’s major rivers, faecal coliform counts can be 50 times higher than the guidelines set by WHO\(^2\). Children face dangerous health risks when come into contact with such water through washing, bathing or drinking.

Low or non-existent capacity in wastewater treatment is another major factor causing water pollution in most parts of the developing world. In Latin America, only about 14 per cent of urban wastewater receive proper treatment before discharge. Although the level of sewage treatment is reported to be higher among Asian cities (on average about 35 per cent), it is still unacceptable that most of the wastewater is directly drained to various water bodies\(^3\). Standard wastewater treatment is almost non-existent in many African cities\(^4\).

Moreover, poor water management strategies, combined with habitat modifications (such as land conversion and forest clearance for roads and agriculture), and changing ecological conditions also give rise to water quality degradation and consequent increased vector-borne disease transmissions. The construction of dams and reservoirs, inadequate drainage in irrigation schemes or poor urban water management creates increased quantities of standing surface water. These stagnant water bodies provide the ideal breeding grounds for mosquitoes, which carry various deadly or debilitating diseases, such as malaria.

The amount of water available is as important as its quality.
Environmental Threats to Children

The amount of water available is as important as its quality.
Already, one-third of the world’s population lives in countries facing moderate to high water stress and water tables are falling on every continent. If present trends continue, it is estimated that two out of three people on earth will live in water-stressed conditions by 2025. Even where water quantity is not a concern, rural and low-income population’s access to safe drinking water poses a major challenge. Globally, 1.1 billion people are without access to clean water supply, such as groundwater drawn from a borehole or protected dug well, rainwater, or protected spring. Too little water makes it virtually impossible to maintain the necessary sanitary conditions in the home, which can lead to the outbreak of debilitating or fatal diseases for children.

Sanitation
Poor sanitation is common in most developing countries. Human excreta, including that of children, contain all sorts of microorganisms from parasite eggs to viruses (see box 7). Unsanitary conditions and practices at the household level, such as absence of sanitary latrines, unsafe waste disposal and unhygienic behaviour in childcare and food preparation, create a dangerous environment with health risks to children. A lack of sanitation facilities in schools helps transmit diseases and keeps millions of girls out of school.

Waste dumps sit in the outskirts of almost all major cities in developing countries, creating not only an unsightly view and unpleasant smells, but also hazardous environmental conditions to those living nearby. While relatively few scientific studies have been conducted regarding adverse health effects of waste landfill sites, a recent study found that living near a landfill can raise the risk of having a child with birth defects such as Downs Syndrome by as much as 40 per cent.
Environmental Threats to Children

Selected Facts

- At the dawn of the 21st Century, about 18 per cent of the world's people do not have access to safe drinking water, and nearly 40 per cent lack adequate sanitation.  

- In Africa, 30 per cent of the rural water supplies are not functioning at any one time. In Asia and Latin America and the Caribbean, the numbers are respectively, 17 per cent and four per cent.

- Only about 35 per cent of the urban wastewater was treated in Asia in 2000 and 14 per cent in Latin America. Only a negligible percentage of treatment was reported for Africa.

- In large cities of developing countries, the percentage of unaccounted-for water is around 40 per cent, while often below quality standards.

- Diarrhoeal diseases claim the lives of nearly 2 million children every year and have killed more children in the last 10 years than all people lost to armed conflict since World War II. In 1998, over 99 per cent of these deaths (for children under 14 years of age) occurred in developing countries.

- In 1998, malaria killed more than 1 million children under the age of 15, and was the second leading cause of death in the world for the five-to-14 age group. Sub-Saharan African countries are the worst hit worldwide, where nine out of 10 malaria cases occur.

- Schistosomiasis affects over 200 million people worldwide, of whom 88 million are under 15 years of age, with the heaviest infections being reported in the 10-to-14 age group in Africa and South America.

- Globally, dengue hemorrhagic fever (DHF) has re-emerged as a major cause of hospitalization and death over the past 20 years. This is partly due to insecticide-resistant vectors and reduced preventive measures, such as environmental controls of vectors. In 1998, more than 2.5 billion people
Children in the New Millennium

lived in areas of risk. Each year, there are approximately 50 to 100 million cases of dengue fever and 500,000 cases of DHF.19

Health impact of unsafe water and poor sanitation

Contaminated water causes a range of diseases which are often life threatening (see box 8). Of the water-borne diseases affecting children, the most deadly are diarrhoeal infections. Children are the most frequent victims of diarrhoeal diseases, with an estimated 80 to 90 per cent of the disease caused by environmental factors.20 Depending on the severity of the infection, intestinal diseases can result in poor nutrition, anaemia, retarded growth and death. Although diarrhoeal diseases still account for 17 per cent of childhood mortality,21 wide application of oral rehydration therapy and increased access to sanitation and water supply have resulted in a significant decrease in diarrhoeal disease mortality rates for children under five in certain areas of developing countries. Morbidity rates, however, have not decreased largely due to the slow pace of change in hygiene behaviours.22

Cholera, one of the most severe diarrhoeal diseases, is present in faecal-contaminated water. The cholera bacteria thrives best in coastal estuaries and generally only inhabits rivers and other freshwater sources if nutrient levels from organic pollution, such as human faeces, are quite high. Whoever drinks the contaminated water, without treating or boiling it, becomes an ideal candidate for cholera infection and the ensuing fatal dehydration. Children are most susceptible to this disease.

U n t r e a t e d cholera frequently results in high mortality rates. It is a recurring problem in many areas of the world and has become endemic in some regions. Indeed, the number of reported cases worldwide nearly doubled in 1998 as compared to 1997.23 In Africa and Latin America, several factors play a role in the dramatic rise in cholera cases: deteriorating water and sanitation systems, poor living conditions, malnutrition or the consumption of contaminated seafood, crowding, use of wastewater to irrigate crops near urban areas, and political and economic turmoil.24
Water-washed diseases arise from insufficient water to permit regular washing of the hands, face, body and clothes, and cause skin and eye infections. For instance, trachoma is an infectious disease associated with dry, arid areas and lack of accessible water supplies. Children are a major reservoir of the trachoma-causing bacteria, but the blindness due to trachoma most frequently occurs in women in their mid-life and beyond. Women have a two to three times higher rate of trachoma and risk of blindness than men, since caring for children is a risk factor for active trachoma and for the progression to trichiasis and blindness. Though the disease-causing bacteria begin in childhood, it progresses over the years as repeated infections cause irritation and scarring on the inside of the eyelid. This infection is easily spread as the children then touch the faces of their mothers and other children. One of the best interventions is surprisingly simple: increase hands and face washing among children.

Water-based diseases are transmitted through aquatic organisms such as aquatic or amphibic snails. The aquatic organisms serve as intermediate hosts to the parasites during certain stages in the life cycle of the parasites. In the case of the schistosome parasite that causes schistosomiasis and the guinea worm, the intermediate hosts are small freshwater crustaceans that are ingested in drinking water. Schistosomiasis is detrimental to the growth and develop-

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**Box 7: Fæces – the most dangerous pollutant**

One gram of human excreta can contain:

- 10,000,000 viruses
- 1,000,000 bacteria
- 1,000 parasite cysts
- 100 parasite eggs

Box 8: Examples of Main Water-Related Infections

Waterborne (and water-washed, also food-borne)
- Cholera
- Diarrhoeal diseases
- Enteric fevers: typhoid
- Infective jaundice
- Polio
- Roundworm
- Whipworm

Water-Washed
- Scabies
- Trachoma
- Leishmaniasis
- Typhus
- Lice

Water-Based
- Bilharzia (Schistosomiasis)
- Guinea worm

Water-Related Insect Vector
- Malaria
- Sleeping sickness
- Breakbone fever (Dengue)
- River blindness
- Yellow fever
- Filariasis

Source: Adapted from Satterthwaite, David et al., The Environment for Children. United Nations Children's Fund and Earthscan, New York, 1996.

...ment of school-age children and is associated with anaemia, malnutrition and stunting. Guinea worm causes a disfiguring and disabling disease. It breeds in open waters and infects people who drink contaminated water. Fortunately, with decades of concerted effort worldwide, the number of infected people has been drastically reduced, from an estimated 50 million people infected with guinea worm disease in Africa and Asia in the middle of the 20th century to only 96,000 by 1999. This success is attributable to the provision of safe water supplies, identifying and treating of...
infected people, and effective community monitoring in infested areas. Because of these proactive measures, it is within the realm of possibility that this disease could be completely eradicated in the near future.

Several water-related, vector-borne diseases are particularly dangerous to young children, including malaria, Japanese encephalitis and dengue. Malaria occurs in some 100 countries, causing 300 to 500 million acute cases in people each year. In 1998, 90 per cent of deaths were children under 14. In Africa, where 90 per cent of malaria cases occur, the mosquito vector has developed insecticide resistance to one or more insecticides and the parasite’s resistance to chloroquine is also widespread. Malarial symptoms include fever and aches, as well as more severe vomiting, diarrhoea, liver and kidney failure, convulsions and death. Children in infected areas can suffer an average of six bouts a year and it is the most common cause of children missing school. In Africa this disease is responsible for an estimated economic loss of $2 billion annually.

Japanese encephalitis (JE) endemic regions are mainly in Asia, where high population density puts approximately 3 billion people at risk. Young children under 10 years of age are more likely to die of JE, and if they survive, they are likely to have residual neurological deficits. The disease can have case-fatality rates as high as 30 to 50 per cent. Although a higher case-fatality rate is reported in the elderly, serious neurological and psychiatric permanent effects are more frequent in the very young.

The dengue haemorrhagic fever is also a major killer of children, whose mosquito vector has even infested all major urban centres of the American tropics.

In developing countries, a lack of water often forces people — usually women and young girls — to spend a lot of time fetching water, often at great distances from the home, or to extract water from alternative, unsafe sources. Lack of access to safe water and sanitation facilities has important implications for the education of children, especially girls since they bear the major burden of carrying the water home from distant sources, preventing them from attending school.
from attending school. In developing countries, lack of sanitation facilities is a major reason for girls dropping out of school. Finally, poor people are more likely required to purchase water at highly elevated costs. When their dwellings are not connected to municipal sources, they are often forced to buy water of doubtful quality from vendors.

**Taking action**

Governments, international organizations, donor agencies and other relevant civil society organizations should strive to:

- Achieve the target set by world leaders at the UN Millennium Summit in September 2000, to halve the percentage of the world’s people who are unable to reach or to afford safe drinking water by the year 2015;
- Fulfil the commitment made at the UN Millennium Summit to stop the unsustainable exploitation of water resources, by developing water management strategies at the regional, national and local levels, which promote both equitable access and adequate supplies;
- Strengthen the enforcement of existing environmental regulations on water quality and resource protection; and
- Closely monitor drinking water quality in decentralized supply systems, such as wells and ponds.

Communities should strive to:

- Promote hygiene education and behavioural changes among parents, childcare givers and children, including hand washing as a simple but effective way of blocking hand-to-mouth disease transmissions;
- Develop effective programmes on: school sanitation, proper water handling and storage and protection of water sources.
- Avoid the creation of mosquito breeding grounds through using proper irrigation and drainage techniques, adequate draining in swampy areas, eliminating areas where water
In developing countries, a lack of water often forces people–usually women and young girls–to spend a lot of time fetching water, often at great distances from the home.
collects and stagnates such as discarded tires, improving latrine designs and using sound agricultural practices such as integrated pest management.

Examples of What Works

- The simple act of washing hands with soap and water reduces incidents of diarrhoea from shigella and other causes by up to 35 per cent\(^37\).

- Water, sanitation and hygiene interventions have been shown to reduce sickness from diarrhoea by between 25 per cent and 33 per cent\(^38\).

- Experience shows that communities that have taken health into account have greatly enhanced the efficiency of water projects\(^39\).

- Since children are the most vulnerable to water-related illnesses, their risk factors must be the primary consideration in developing the drinking water standard. As such, the US Environmental Protection Agency’s standards for lead, nitrates and nitrites in water are specifically based on risks to children\(^40\).

- Solar water disinfection has proven to be an easy, low-cost, small-scale and immediate technique for providing safe water.

- In Indonesia, when farmers synchronised their rice-production system to allow rice paddies to dry out completely during certain periods, the transmission of malaria was drastically reduced\(^41\).

- In Sri Lanka, the breeding of malaria mosquitoes was suppressed in small rivers and irrigation canals by regularly flushing them out\(^42\).
Environmental Threats to Children

Chemical Pollution and Radiation

The production and use of toxic chemicals pose a major and relatively new threat to humankind and the environment. Synthetic chemicals were virtually unknown at the turn of the last century, but there are now between 50,000 and 100,000 of them being produced commercially. Many of these chemicals have not been thoroughly researched for their effects on human health. Rapid industrialization, urbanization and intensified agriculture all account for the increased chemical pollution worldwide. In certain developing countries, vast amounts of unused pesticides have piled up in storage—some are even stored in houses—and these can pose serious health threats.

The emissions from cars, industrial processes, waste treatment processes, such as incinerators, hazardous materials and the excessive use of pesticides and fertilisers for agricultural and domestic purposes, all release toxic substances into the air, food or water (see tables 3 and 4). Heavy metals and persistent organic pollutants (POPs), such as polychlorinated biphenyls (PCBs), dioxins and DDT, are of particular concern since they do not degrade in the environment for decades and accumulate in, and are toxic to, plants, fish, animals, and humans. These substances also can travel long distances, easily moving from one medium to another in the environment.

The following chemical pollutants are particularly worth mentioning with regard to children's environmental health.

Pesticides

Since synthetic pesticides were first introduced in the early 1960s, their worldwide consumption has grown markedly, with total consumption reaching 2.6 million metric tons of active ingredients in 1995, increasing at about one per cent per year. Developed countries have been the major users of pesticides, consuming about three-quarters of the world total.
Pesticides are integral to agriculture and vector-control programmes worldwide, yet children are uniquely susceptible to the health threats that they pose. Once released in the environment, pesticides can pollute rivers, groundwater, air, soil, and food. Human exposure occurs from breathing, drinking, eating, or through skin absorption.

A child’s exposure to chemicals can occur as early as the prenatal phase, and during infancy through breast-feeding. Organochlorine pesticide residues present in mothers’ milk may pose a potential hazard for breast-fed children. A striking example is the presence of chemicals in the breast milk of the Inuit peoples of the Arctic region. Although the region is largely free from polluting industries, some chemicals entered the ecosystem and accumulate at every stage on their way up the food chain: from plants and fish to seals, whales, polar bears and humans. However, breast milk remains the best source of nutrition for infants and is strongly recommended by UNICEF and WHO. Therefore, it is crucial to protect mothers from exposure to toxic agents.

Synthetic chemicals may interfere with natural processes that regulate growth and development. These chemicals are called endocrine disrupters. Examples of endocrine disrupters are PCBs and DDT. Infants are particularly at risk due to the role the endocrine system plays in young children’s growth and development. Research on how endocrine disrupters may damage the ability to fend off diseases, learn, integrate socially and reproduce is steadily advancing.

The impact on human health from pesticide exposure depends on a number of factors, including the kind of pesticide involved and its toxicity, the amount or dose of the exposure, the length of exposure, and the way in which the exposure occurs. Specific effects believed to be linked to pesticide exposure are outlined in box 9.

**Lead**

Although lead is naturally present in the earth’s crust, human activities bring it into air, water, food and soil in an amount up to 300 times greater than its natural occurrence. Lead is often found in:
Environmental Threats to Children

Box 9: Possible Health Effects of Pesticide Exposure

In addition to acute pesticide poisoning that can result in death, a growing body of epidemiological research and studies of laboratory animals suggest the possible link of long-term exposure to certain pesticides and:

- Abnormal growth and development, and failure to acquire normal organ function;
- Endocrine/hormone disruption: certain pesticides in very small doses may mimic or block hormones or trigger inappropriate hormone activity, which can cause, for example, sterility, lowered sperm counts and breast cancer;
- Impaired development of the nervous system that can result in lowered intelligence and behavioural abnormalities;
- Cancers, including leukaemia, sarcoma, lymphoma, Wilm's (malignant tumour of the kidney) and brain cancer in children. Studies have indicated that the risk of developing cancer might be higher if exposure to carcinogens begins in childhood; and
- Compromised immune system, which in children further exacerbates the risk of infectious disease and cancer, thus increasing mortality rates. This is of special concern in developing countries where people can be simultaneously exposed to both pesticides and infectious pathogens when their immune systems are already compromised by other factors, such as malnutrition.

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- Air, as a result of gasoline additives;
- Dust from soil and airborne pollutants, from agricultural practices, or from parents who bring it into the home after having been exposed to it at work;
- Water from lead pipes and faucets, or from fallout from leaded gasoline which leaches into the groundwater;
- Food, particularly green leafy vegetables, growing near polluted areas;
- Drinks in cans which contain lead;
- Paints, which are the primary source of lead in homes;
- Ceramic ware;
- Folk health remedies with high lead content, especially in developing countries; and
- Lead smelters, incinerators and battery recycling plants.

Lead is a significant child health hazard. It can even be a threat before birth. If a pregnant woman is exposed to lead, it can be transferred to the unborn child and cause premature birth, low birth weight, or even abortion. Lead is toxic when ingested and inhaled. Encountered in the environment, it enters the bloodstream, where it reaches the kidneys and the brain and deposits in bones and teeth. Growing epidemiological evidence suggests that lead in a child’s body, even in small amounts, can cause disturbances in early physical and mental growth and later in intellectual functioning and academic achievements, hindering the child’s ability to reach full potential. Studies have concluded that there is a direct effect of low-level lead exposure on IQ of children. Furthermore, undernourished children are more susceptible to the toxicity of lead and more likely to be adversely affected by lead exposure. This may in part reflect the competition between lead and calcium for absorption, so that diets low in calcium allow greater lead absorption. This has significant implications for children in poor urban communities of developing countries where leaded gasoline is still prevalent and under-nourishment remains a
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key problem. Specific effects of lead are summarised in table 3.

Since the United Nations Commission for Sustainable Development in 1994 called upon Governments and international institutions to take action to phase out leaded gasoline, some progress has been made. Thirty-six countries had already phased out the use of leaded gasoline by 1999 and this will likely rise to 55 countries by 2005\(^48\). Many of the countries phasing out the use of leaded gasoline are in the developing world. About 78 per cent of all gasoline sold in the world is currently unleaded and this will likely rise to more than 84 per cent by 2005\(^49\).

Mercury

Mercury is a toxic heavy metal normally existing in liquid or gaseous forms and found in water, air or food, most often in freshwater fish or on coated-seeds. Mercury occurs naturally in the

<table>
<thead>
<tr>
<th>Table 3: What is Known About Lead and Lead Poisoning?</th>
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</thead>
<tbody>
<tr>
<td>At low levels, lead poisoning in children causes:</td>
</tr>
<tr>
<td>- Reduction in IQ and attention span;</td>
</tr>
<tr>
<td>- Reading &amp; learning disabilities;</td>
</tr>
<tr>
<td>- Hyperactivity &amp; behavioural problems;</td>
</tr>
<tr>
<td>- Impaired growth;</td>
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<tr>
<td>- Impaired visual &amp; motor functioning;</td>
</tr>
<tr>
<td>- Hearing loss.</td>
</tr>
<tr>
<td>At high levels, lead poisoning in children causes:</td>
</tr>
<tr>
<td>- Anaemia;</td>
</tr>
<tr>
<td>- Brain, liver, kidney, nerve damage;</td>
</tr>
<tr>
<td>- Coma;</td>
</tr>
<tr>
<td>- Convulsions;</td>
</tr>
<tr>
<td>- Death.</td>
</tr>
<tr>
<td>Effects of lead poisoning on children can be:</td>
</tr>
<tr>
<td>- Long-term and potentially irreversible;</td>
</tr>
<tr>
<td>- Intensified with repeated exposure &amp; accumulation of lead in body.</td>
</tr>
</tbody>
</table>

environment in very small amounts in oceans, rocks and soils, but it also enters the environment in greater amounts through human activities such as coal-fired power generation, waste incineration, certain manufacturing processes, mining activities and medical and dental uses. Mercury is also used in some common household products including fluorescent lights, thermostats, thermometers, and even in some children's toys. At school, mercury may be used in science and chemistry labs, the nurse's office and electrical systems. Methylmercury, an organic mercury compound, is more readily absorbed by humans than elemental mercury and thus is more toxic.

The most common way of exposure to methylmercury is from eating fish from contaminated areas. Methylmercury can be found in freshwater and saltwater fish. In January 2001, the US Environmental Protection Agency (US/EPA) and the US Food and Drug Administration (US/FDA) issued advice to women who are pregnant or may become pregnant, nursing mothers and young children to limit consumption of certain fish to one meal per week because of a concern for mercury contamination. Although fish can be an important source of nutrition for developing children, some fish, such as shark, swordfish, mackerel and tuna, may contain high levels of mercury.

Mercury is a potent neurotoxin pollutant, which passes more easily into the brains of the foetus and young child. The developing brain is particularly sensitive to methylmercury. Depending on the dose and exposure level, to varying degrees it can interfere with brain development and cause mental retardation, cerebral palsy and seizures. Mercury may cause cancer and damage the stomach, large intestine and lung. It also may permanently harm unborn children.

Nitrates

Nitrate pollution is now considered to be one of the most serious water quality problems in the world. Nitrogen is a basic ingredient in artificial fertilisers. The use of fertilisers has been rapidly increasing, causing excessive nitrogen loading of the environment...
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on a global scale. Global fertiliser use soared from less than 14 million tonnes in 1950 to 135 million tonnes in 1996. As a result, nitrogen levels have risen in surface and groundwater sources, resulting in elevated levels in drinking water supplies. Untreated wastewater discharge has also contributed to the nitrate pollution of water resources.

Nitrate absorption is most often associated with the “blue baby syndrome” (methaemoglobinaemia). Infants under six months of age are particularly vulnerable to high levels of nitrates in drinking water. This is because nitrite (nitrate reduces to nitrite once entering into a human body) interferes with the blood’s ability to carry oxygen to the body tissues, resulting in a bluish colour of a baby’s skin. Levels higher than 10 milligrams of N/litre (US Standard) can have toxic effects on infants. Adults and older children are able to withstand much higher levels with no risk of methaemoglobinaemia.

Excessive nitrates in rivers and lakes cause eutrophication in many regions of the world, which disrupts aquatic ecosystems through oversupply of nutrients that cause the mass growth of algae and plants. This process eventually depletes most oxygen in the water and kills the aquatic organisms, rendering the water body lifeless and sterile.

Arsenic and fluoride

Some dangerous chemicals also occur naturally in groundwater, notably arsenic and fluoride. In Bangladesh, high concentrations of arsenic have been found in tube wells in 61 out of 64 districts. Excessive arsenic levels in groundwater are also found in some parts of Argentina, Cambodia, Canada, Chile, China, India, Japan, Mexico, Philippines, Viet Nam and the United States.

Arsenic can cause severe and irreversible health effects – even in very small amounts. Early symptoms can range from the development of dark spots on the skin to a hardening of the skin into nodules, often on the palms and soles. Over time, the symptoms can become more pronounced and in some cases internal organs
including the liver, kidneys and lungs can be affected. In the most severe cases, cancer can occur in the skin and internal organs and limbs can be affected by gangrene. The damage due to arsenicosis in humans is irreversible. There is a need to know much more about the health impacts of chronic and relatively low levels of exposures to arsenic.

Another problem is high levels of fluoride in some groundwater sources. Although fluoride is found in all waters at some concentration, high fluoride concentrations are found mostly in calcium-deficient ground waters in certain geographical belts, such as one along the East Africa Rift and another from Turkey through Iraq, Iran, Afghanistan, India, northern Thailand and China. With large populations in developing countries directly consuming groundwater, excessive levels of fluoride in groundwater pose serious health concerns. These range from dental fluorosis (discoloured, blackened or mottled teeth) to crippling skeletal fluorosis (permanent spine, bone and joint deformations). As with arsenicosis, the damage caused by fluorosis is irreversible.

Although the total number of people at risk with fluoride is not known, a conservative estimate would number in the tens of millions. In India, 16 of its 32 states have been identified as endemic for fluorosis. Fluorosis is prevalent in large parts of China, and is caused not only by drinking fluoride in groundwater, but also by breathing airborne fluoride released from the burning of fluoride-laden coal. In fluoride-affected rural areas in these countries, children with dental fluorosis are a common sight, as are severely crippled adults, illustrating the disabling effect of chronic exposure to excessive fluoride.

Radiation

Radiation is another type of pollution that causes adverse health effects in children. Examples of exposure to ionizing radiation include the Chernobyl nuclear power plant accident in 1986 and the use of radioactive materials during war. Depleted uranium, a weak radioactive material, is sometimes used as the heads of
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rounds fired from aircraft. During the Kosovo conflict in 1999, about 31,000 depleted uranium rounds were fired at targets on the ground\textsuperscript{64}. Fact-finding missions by UNEP and WHO looked at the environmental and health impacts, respectively, of the use of depleted uranium in the conflict. Although the missions found no convincing evidence to indicate any health impact to people in Kosovo, it was noted that people could come into contact with depleted uranium by picking up objects from the ground. Naturally, children may be particularly at risk from exposure to depleted uranium because of their curiosity and lack of knowledge about the contamination.

Overexposure to ionising radiation, such as from nuclear fuels and radioactive isotopes used in medical facilities, can induce cancers, birth deformities and psychiatric disorders\textsuperscript{65}. Studies of the health impacts of Chernobyl have associated a sharp increase in the incidences of childhood thyroid cancer with the accident\textsuperscript{66}. The investigation of brain damage in utero found evidence suggesting retarded mental development and deviations in behavioural and emotional reactions in children who had been exposed\textsuperscript{67}.

Radioactive pollution also includes radiation from non-ionising electromagnetic fields, such as radio waves and microwaves. Knowledge of the potential health effects of chronic and low exposure to electromagnetic fields is extremely limited. For example, some epidemiological studies have suggested an increased risk of leukaemia in children living near power lines. Whether this is due to exposure to extremely low frequency magnetic fields or some other factors in the environment has not been determined\textsuperscript{68}. A recent study has suggested that exposure to radio frequency fields increases the incidence of lymphomas in genetically manipulated mice, but until at least two more large studies are conducted, the issues raised by that study cannot be fully answered\textsuperscript{69}. Most known adverse health effects related to electromagnetic fields occur from exposure to radio frequency fields between one MHz and 10 GHz inducing heating in the body. Induced heating may adversely affect the development of a foetus\textsuperscript{70}. 
Selected facts

- About 50 million people work on plantations in developing countries and are in direct contact with pesticides, while over 500 million more are exposed through other forms of agriculture\(^71\). In Egypt, over 1 million children between the ages of seven and 12 are hired by the agricultural cooperatives to take part in cotton pest management and are at risk of pesticide exposure\(^72\).

- About 78 per cent of all gasoline sold in the world is unleaded and this will likely rise to over 84 per cent by 2005\(^73\).

- Toxic poisoning in children accounts for about two per cent of all deaths by injury in children in developed countries and about five per cent in developing countries\(^74\).

- In the Philippines, mining waste leaching into bays, streams, or lakes presents a serious concern. One mine dumped 40 billion tonnes of mining wastes into the ocean, just offshore, which resulted in elevated mercury levels in fish 100 miles away\(^75\). In the Amazon River basin, at least 130 tons of mercury is released into the environment every year from gold-mining activities at more than 2,000 mining sites using mercury amalgamation\(^76\).

Taking action

- Communities and their governments worldwide should phase out the use of certain toxic chemicals, such as lead in gasoline and paint and the pesticides already banned in industrialized countries but still used in developing countries.

- Local communities and their local and national governments should recognize, evaluate and act with urgency to protect children from the effects of chemicals that are present in the environment. This applies to all countries, but especially to those in the developing world and in Eastern
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Europe and countries of the former Soviet Union. In those countries the health impact of toxic exposures can be magnified by the unsafe use of chemicals, the lack of awareness about chemical risks and the effects of pollutants, and by an interaction among toxins, malnutrition and infectious diseases.

- Academic institutes, research laboratories and universities should expand toxicological studies to take into account synergistic and multiple effects of pollutants. They should also expand the existing bank of research on the specific toxicological effects on children in order to set safety limits and guidelines on a child's vulnerabilities rather than the current 'average adult' who is well nourished and healthy.

- Health-related research should be supported and assessments carried out to determine the health impacts of specific chemicals. The international community recently requested UNEP to undertake a global study of the health and environmental impacts of mercury. Among other things this study will undertake an assessment of the cost effectiveness of current mercury anti-pollution measures and technologies.

- Communities and their local and national governments should promote the development and use of clean energy sources whenever possible.

Examples of what works

- In December 2000, over 100 countries agreed to regulate the production, import, export, disposal and use of 12 Persistent Organic Pollutants (POP) - including DDT, polychlorinated biphenyls, dioxins and furans. Most of the 12 chemicals are subject to an immediate ban, with the exception of an exemption for DDT when it is used to control mosquitoes. The Convention on POPs was formally adopted and signed by ministers and other government representatives at a diplomatic conference in May 2001 in Stockholm and will enter into force when 50 Governments have signed and ratified it.
As a result of the phasing out of lead additives in gasoline, which was part of the agreement reached in the Partnership for Pollution Prevention at the 1994 Summit of the Americas, the average gasoline lead content in North America is now among the lowest in the world. In the United States emissions of lead have decreased nearly 90 per cent over the last 20 years, mainly due to the phasing out of leaded gasoline. A parallel decline in blood-lead levels accompanied the phase-out of leaded gasoline and the introduction of catalytic converters in 1973.

Extensive clean-up activities have recently begun in Ethiopia, where the UN Food and Agriculture Organization (FAO) estimates there is the largest build-up of obsolete pesticides in Africa. Nearly 3,000 tons of obsolete pesticides stored throughout the country could be leaking into the soil, polluting water supplies, and threatening the health of thousands of people.

More than 1 million people in Latin America, including women and children, are involved in small-scale gold mining, which involves the use of mercury. With international support, a local NGO in Venezuela introduced an alternative mining technology, which uses less mercury and can increase gold recovery, to Bolivar’s Caroni River region. Gold miners participating in the project received practical information and medical advice, in addition to learning the technique, and continued mining with reduced hazards and boosted production.

Indoor and Outdoor Air Pollution

Air pollution – both indoor and outdoor – is a major environment-related health threat, causing a range of respiratory and cardiovascular ailments. Unhealthy air is breathed by an estimated 1.1 billion people and claims 3 million lives a year.
### Table 4: Examples of chemical pollutants

<table>
<thead>
<tr>
<th>Chemicals found in food and water</th>
<th>Chemicals found in the home and workplace</th>
<th>Chemicals found outdoors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Carbon monoxide from combustion of fossil fuels</td>
<td>Lead from automobile exhausts and external paint</td>
</tr>
<tr>
<td>Deliberate or accidental food adulteration</td>
<td>Lead from paint</td>
<td>Sulfur dioxide and oxides of nitrogen from industries, power stations and auto engines</td>
</tr>
<tr>
<td>Nitrites in drinking water</td>
<td>Tobacco smoke</td>
<td>Ozone and photochemical smog</td>
</tr>
<tr>
<td>Aflatoxin and other natural food toxins</td>
<td>Asbestos</td>
<td>Carbon monoxide from combustion of fuels</td>
</tr>
<tr>
<td>Trace pesticides in water supply, many from agro-chemicals</td>
<td>Smoke from combustion of coal, wood or other biomass fuels</td>
<td>Cadmium, mercury compounds and other heavy metals</td>
</tr>
<tr>
<td>High mineral content in drinking water</td>
<td>Insecticides and herbicides used around the home</td>
<td>Dioxins, PCBs and pesticides</td>
</tr>
<tr>
<td>Aluminium</td>
<td>Mercury</td>
<td>Agricultural chemicals</td>
</tr>
<tr>
<td>Arsenic in groundwater</td>
<td>Radon</td>
<td></td>
</tr>
<tr>
<td>Fluoride in groundwater</td>
<td>Formaldehyde from insulation</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury in fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCBs/dioxins in food</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental Threats to Children
Air pollution – both indoor and outdoor – is a major environment-related health threat, causing a range of respiratory and cardiovascular ailments.
Environmental Threats to Children

Indoor air pollution

Indoor air pollution occurs when fossil or biomass fuels are used for cooking and heating in crowded and poorly ventilated settings. Of all forms of air pollution worldwide, indoor air pollution from open fires or inefficient stoves is the single greatest cause of ill-health.

About 2.5 billion people are dependent on biomass fuel for cooking and heating, of whom 75 per cent are in developing countries. Of this 2.5 billion population, approximately 800 million depend on agricultural residues and animal dung as sources of fuel due to severe fuel wood shortage.

These people often use low-efficiency, smoky cooking stoves. For example, the efficiency of the three-stone fire traditionally used in many developing countries is only about 10 to 15 per cent. They cooking stoves produce heavy smoke with fine particles, carbon monoxide and carcinogenic compounds such as polycyclic aromatic hydrocarbons (PAHs). Measurements of indoor particle concentration in rural households of developing countries greatly exceeded the 1987 WHO recognized guideline values and air quality standards used in the United States and Europe, typically by some 20 times higher.

Indoor air contamination is also caused by biological particles, such as pollen, mould, the droppings of mites, insects, microorganisms, as well as the non-biological particles, such as lead, carbon monoxide, asbestos and synthetic chemicals. Women and children, who spend the most time indoors, are the prime victims of the resulting indoor air pollution. These dust particles contain irritants and infectious agents that can cause or worsen ARI. Another very important source of indoor air pollution is tobacco smoke.

Outdoor air pollution

Outdoor air pollution is a particularly serious threat to the swelling populations of the world’s cities. With the increased combustion of fossil fuels, industrial processes and growing car use, urban populations are exposed to a long list of pollutants that
include sulphur dioxide, nitrogen oxide, nitrogen dioxide, carbon monoxide, ozone, lead, dioxins, suspended particulate matter and a host of volatile organic compounds. Open burning of urban waste with high components of plastics like polyvinyl chloride (PVC) is also a significant source of dioxins, furans and heavy metals in many communities. People who are poor often live close to these sites or work in them.

Cities in developing countries have much higher average pollutant concentrations than cities in industrialized countries (see figure 6). In the late 1990s, the average annual concentration of PM 10 (small particles with diameters less than 10 microns) in North American, Western European and Japanese cities ranged from 30 to 45 micrograms per cubic metre. Chinese and Indian cities, on the other hand, had averages of nearly 200 micrograms per cubic metre of PM 10\textsuperscript{89}.

In addition, forest fires, whether accidental or started to clear forestland for agricultural purposes, have been the cause of severe smoke haze pollution in Asia, Latin America and North America – causing serious health concerns for children and the elderly. In addition, dust storms in many regions of the world (especially in Central Asia), the magnitude of which is aggravated by desertification and deforestation, represent another significant source of outdoor air pollution.

**Impact of air pollution on children**

Children are most susceptible to air pollutants in the first month of life\textsuperscript{88}, particularly during episodes of severe pollution. Although the risk declines with each passing month, air pollutants remain a risk to children. The health effects of air pollution depend in large measure on the types of pollutants inhaled and the exposure level (i.e., frequency, concentration, etc.) of the child. Estimates suggest that up to 60 per cent of the global ARI burden of disease is associated with indoor air pollution and other environmental factors such as ambient air pollution and housing conditions\textsuperscript{90}. Infants and young children, particularly girls, who are often requested to help their mothers in household chores, are most at risk.

Infants are exposed to pollutants while resting on the backs of
Environmental Threats to Children

their mothers as they tend fires. Girls are exposed as they assume their share of household cooking. In India, respiratory infections linked to solid fuel use are estimated to cause 290,000-440,000 premature deaths a year in children under five years of age. The small particles in polluted air enter deep into the lungs and respiratory organs, causing viral and bacterial ARI, the most severe being pneumonia. ARI account for 67 per cent of deaths in the world’s children from birth to 14 years. Irritation that would not significantly affect adults may result in more severe obstruction and damage in a child’s lungs since they are still forming and are more vulnerable. Childhood ARI-related death rates are high even in nations where the infant mortality rates are low. In high-

**Figure 6: Air Pollution in cities of developing countries**

income countries, ARI is the third leading cause of death in children under four. In developing countries over 64 million cases of ARI are reported per year.\(^93\) Indoor air pollution is not only linked to ARI. Studies in developing countries have linked exposure to indoor air pollution with chronic respiratory diseases such as asthma (see box 10), chronic obstructive pulmonary disease, lung cancer, stillbirths and low-birth weight. Lung cancer has been found to result from long-term exposure to cooking with coal in China.\(^95\) Outdoor air contamination can also cause pulmonary irritation, interfere with foetal growth and infant development, impair lung functions, exacerbate viral infections, bronchitis and pneumonia and worsen heart problems, asthma and emphysema.

Adults who smoke can also put children at risk for tobacco-related illnesses. Environmental tobacco smoke (ETS) has been linked to a number of serious health problems in children, including upper respiratory infections, chronic coughs, asthma, chronic ear infections and sudden infant death syndrome.\(^96\) A 1997 study also connected ETS to abnormal cholesterol levels in children. It found that children who were exposed to environmental tobacco smoke at home had high-density lipoprotein cholesterol levels—the so called “good” cholesterol—as much as 10 per cent lower than the levels of children who came from non-smoking households.\(^97\)

**Selected facts**

- Sixty per cent of deaths caused by acute respiratory infections (ARI) occur in children under 15 years of age, mainly in low and middle-income countries. Globally, this amounts to an estimated 2 million deaths among children and to over 64 million reported cases of ARI. It is the second leading cause of disease for children under four years of age in these countries.\(^99\)

- Outdoor air pollution causes more than 50,000 premature deaths and 400,000 new cases of chronic bronchitis per year in 11 East Asian cities alone.\(^100\)
Environmental Threats to Children

Box 10: Asthma

In developed countries, asthma is the leading chronic disease among children. In the United States alone, it affects 4.8 million children under the age of 18 and asthma-related hospitalization and death rates are increasing.

Air pollution, both indoor and outdoor, is one of the triggers for asthma episodes. A recent study was able to associate high concentrations of ozone in the air with the development of asthma in children exercising outdoors.

Indoor air pollution in developed countries can be attributed to factors such as:

- Increased use of household chemicals;
- Use of synthetic building and furnishing materials;
- Increased insulation and decreased ventilation; and
- Tobacco smoke.

Sources: Morain, Claudia et al., “Understanding Asthma”, Health Management Bulletin-Information for Asthma Patients and Their Friends, American Medical Association (Division of Clinical Immunology & Allergy, Children’s Hospital), Los Angeles, 1997.

- It has been estimated by the World Bank, which is providing technical assistance to Bangladesh to cut lead poisoning, that the country could avoid 15,000 deaths and save $200 million to $800 million annually by reducing air pollution in the cities of Dhaka, Cittagong, Rajshehi and Kluna.

- In the United States, the number of children with asthma has doubled in the past 15 years and there is now an estimated one in 15 children under age 18 who has asthma.

- As a result of forest fires in Indonesia in 1997-98 it is generally believed that the health of approximately 20 million...
people in the region was adversely affected by the smoke, particularly through upper respiratory tract infections and asthma. Skin and eye diseases were also prevalent\textsuperscript{103}.

- In some parts of Europe and Central Asia, the concentrations of nitrogen oxides and particulate matter are up to three times higher than the WHO recommended levels\textsuperscript{104}.

- In 1994 it was estimated that in developing countries, over 80 per cent of children from urban areas between the ages of three and five years of age and 100 per cent under two had average blood levels of lead exceeding the threshold of 10 _g/dl set by the U.S. Centers for Disease Control and Prevention\textsuperscript{105}.

**Taking action**

- Air pollution control regulations should be enforced in cities, especially phasing out leaded gasoline, controlling pollution from coal-fired boilers and substituting cleaner or renewable energy for fossil fuels.

- Sustainable energy use should be promoted to alleviate energy problems in rural and urban developing areas, such as dissemination of improved cooking stoves, development of alternative, environmentally sound household energy sources, improvement of kitchen ventilation and community forestry.

- Environmental management strategies should be combined with improved nutrition, clean water, adequate sanitation, prenatal health care, immunization programmes and early childhood care programmes. These measures will help prevent low birth weight, strengthen children’s natural defence mechanisms and help protect them from illnesses and disease.

- More research should be conducted to better understand the relationship between childhood illness and air pollution, in order to formulate integrated health and environment approaches, which reduce childhood exposure to air.
Environmental Threats to Children

pollutants. ARI, particularly pneumonia in young children, can be reduced effectively by environmental and nutritional improvements.

Examples of what works

- The most successful sustainable energy projects in the field are those that support greater income-generating projects and economic opportunities, mainly for women. For example, in Mali, a recent project trained women’s groups to operate diesel generators as formal businesses. They became energy entrepreneurs, selling energy, which in turn increased economic activity in the community.

- Cars using alternative energies are being developed and are now being introduced to the mass market. Electric, hybrid electric, compressed natural gas and fuel cell vehicles are likely to be available to consumers in the near future.

- Alternative cooking stoves that are more energy efficient and promote a shift from using traditional fuels (wood and charcoal) and significantly reduce exposure to indoor air pollution must be encouraged. In areas where these stoves are not yet available, some community leaders are promoting the use of a cooking window or a chimney as a way of evacuating smoke from the cooking area.

Natural Resource Degradation

Currently, there is enough food to feed the world; yet, 149 million children are still malnourished. A nutritionally adequate diet for the world’s rapidly growing population will necessitate tripling food production over the next 50 years. This task will be an enormous challenge in the face of growing environmental degradation and contamination - two factors that often compromise household food security and health, especially for children.
Land degradation

The distribution of fertile soils and favourable growing conditions does not match that of the world’s population. Global projections for food supplies by region suggest that future problems will be mainly concentrated in sub-Saharan Africa and South Asia\(^\text{110}\). The worldwide loss of arable land is exacerbated by land and natural resource degradation caused by a series of processes and human activities, such as deforestation, desertification, soil erosion, over-grazing, over-use of fertilisers and pesticides, lack of watershed management, excessive withdrawal of groundwater, pollution, poor land-use planning and uncontrolled dumping of wastes. Moreover, the rising demand for meat, fish, poultry and dairy products encourages farmers to raise livestock, displacing subsistence food crops for growing fodder and feed crops for animals, hence, making less efficient use of the land\(^\text{111}\).

Fisheries

Nearly 1 billion people depend on fish as their primary source of protein\(^\text{112}\). For them, increasingly difficult times lie ahead. The degradation of coastal marine environments, the modification and destruction of habitats, over-fishing and pollution have compounded the overexploitation of an estimated 70 per cent of marine fisheries (see figure 7), causing catastrophic reductions of annual harvests for local fishing communities throughout the world.

Selected facts

- Nearly 30 per cent of the world’s population suffers from one or more of the multiple forms of malnutrition\(^\text{113}\).
- 149 million children are malnourished, two thirds of them in Asia. The absolute number of malnourished children has increased in Africa\(^\text{114}\).
- In Africa, only North Africa has been able to make major increases in the per capita calorie supply. Land degradation
Environmental Threats to Children

Nearly 1 billion people depend on fish as their primary source of protein.
Children in the New Millennium

Figure 7: Marine Fisheries

![Pie chart showing marine fisheries status: 50% Fully exploited, 15% Overfished, 13% Depleted, 6% Recovering, 50% Moderately exploited, 6% Underexploited. Source: Food and Agriculture Organization at http://www.unep.ch/earthw/em17.htm]

and drought are important causes of the decline in southern Africa\textsuperscript{115}.

- Roundworm, whipworm and hookworm (helminth diseases) affect about 400 million school-age children throughout the world\textsuperscript{116}.

Impacts of natural resource degradation

Millions of children under five die each year in developing countries mainly from preventable diseases. It is estimated that half of these deaths are either directly or indirectly attributable to malnutrition\textsuperscript{117}. Foetal development also hinges on the mother's nutritional status. Under-nutrition during pregnancy and in early childhood can adversely affect physical and behavioural development, with short- and long-term consequences (see figure 8). Maternal anaemia (iron deficiency), which is often linked to pro-
Environmental Threats to Children

Protein energy deficiency, renders the mother more vulnerable to diseases and increases her chances of giving birth to lower birth-weight babies. Low birth-weight babies are vulnerable and more likely to die at an early age or face severe physical and developmental problems during infancy and beyond. Malnutrition has been linked to land degradation and natural resource depletion.

Malnourished children can be listless and have slow social and cognitive development, which can lead to poor school performance and disadvantages in later adult life. Furthermore, childhood micronutrient deficiency (vitamin A, iron) can retard child growth, increase the duration and severity of illness and render children more sensitive to toxic agents at lower levels.

Research suggests that child growth can be harmed in unhygienic surroundings even before acute infections occur. It is believed that early childhood nutritional deficits coupled with an unsanitary environment lead to impaired growth and a failure to maximize genetic potential. Even if a child is not obviously sick, an unclean environment poses a constant threat to the immune system. Nutrients from food that should help a child to grow are instead used by the body to support its immune system, thus impairing growth.

A hungry child is a weak child. A weak child is a sick child. Frequent illness will almost surely result in physical weakness and nutritional deficiency. Consequently, poor nutritional status further weakens a child’s immune system, making the child all the more susceptible to diseases and pollutants. For example, frequent and prolonged diarrhoea episodes are important contributors to malnutrition and malnutrition increases susceptibility to more severe diarrhoea, and, in turn, increases the likelihood of death due to this ailment\textsuperscript{118}. The cycle of “malnutrition → infection → malnutrition” (see figure 9) pushes children down the spiral of poor growth and early death. This vicious spiral can, to a large extent, be prevented. Environmental management strategies can have an important contribution to make in this regard.

Moreover, the amount of energy and time spent by women and children, especially girls, collecting water, fuel and fodder is pro-
portional to the abundance of natural resources. Often, girls will be forced to abandon school in order to meet their family's needs for these resources. All in all, environmental degradation intensifies the drudgery of women and children, further undermining their health and nutritional status.

Helminth diseases

The contamination of land and vegetables along with poor sanitation and hygiene is associated with another important problem for children – helminth diseases. Hundreds of millions of school-age children throughout the developing world are currently infected by roundworm, whipworm and/or hookworm, which cause

Figure 8: Consequences of malnutrition and its intergenerational cycle

Environmental Threats to Children

Helminth infections. Coming into contact with soil or vegetables that contain the eggs or young worms of these parasites infects children. The highest rates of roundworm and whipworm infections are found in the groups five to nine and 10 to 14 years old\textsuperscript{119}.

Worms consume the nutrients from the children they infect. Hence, the infected children are robbed of nutrients needed for their young bodies to grow, which, in turn, triggers or aggravates malnutrition, retards physical development, and stunts growth. These parasites destroy the tissues and organs they live in, causing pain and various health problems. Roundworms cause structural problems in the small intestine in children and also cause serious pulmonary disease in children. Severe whipworm infections are associated with high incidence of dysentery, chronic colitis, anaemia and growth retardation. Hookworm infections cause iron deficiency anaemia and may result in minor infections developing into severe anaemia in children and adolescent girls\textsuperscript{120}.

Taking action

- Communities and governments should strengthen support to programmes that reinforce local food systems, where possible, through measures to combat desertification. They should promote sustainable agricultural practices, water resource management and integrated pest management to minimise artificial pesticide use, encourage rural and urban kitchen gardens and give favourable economic incentives to farmers and low-income households (such as micro-credits).

- Communities and governments should alleviate the impacts of environmental degradation on women and children. An example of how this could be done is through supporting or strengthening water supply, agro- and social forestry, household energy and fuel-efficient stove projects. The participatory role of the community should be strengthened.
Children in the New Millennium

- Individuals and families can prevent helminth infections through proper management of human faeces and good hygiene so as not to pollute the ground or drinking water at the source and in the home.
- Individuals and their communities can promote health and hygiene education in schools.
- Schools should provide safe water and sanitary facilities to break the worm transmission routes.
- Three basic interventions are known to reduce helminth infections: for achieving sustainable results, drug treatment should be provided in combination with sanitary improvement and health education.

Environmental Threats to Children

Examples of what works

- Fifty per cent of the women and children of Bangladesh suffer from vitamin A deficiency - a condition that has been linked to growth retardation, blindness, increased susceptibility to infections, and sometimes death. It also increases the risk of maternal-infant transmission among HIV-positive women. To address this challenge, a community organization developed a home gardening assistance programme to promote year-round gardening and the diversification of fruit and vegetable varieties that are rich in vitamin A. This programme has also increased overall food intake of the targeted families and provided them with extra income from selling part of their fruit and vegetable production.

- In the Mysore District of Karnataka, India, most families are landless or small-land holders. With international support, a local NGO initiated a small project in 1991 to promote reforestation and horticulture. By 1999 the participating 100 families had substantially improved their livelihoods with diverse, ecologically sound activities, including developing vegetable gardens and mango and cashew orchards. They also are composting, growing tuber crops under the trees and processing and marketing their products in local markets. As a result, children in this community are better nourished and are enjoying a cleaner environment.

- The Indian farmers of Oaxaca, Mexico have been producing coffee for more than 120 years. In 1984, 17 communities wanted to break free from corporate intermediaries and the persistent side effects of the pesticides. They formed an organization, called the Union of Indian Communities of the Isthmus Region (UCIRI), and elected to produce their coffee organically. Today, international inspections take place twice a year and the group is exporting its organic coffee to several European countries, Canada, the United States and Japan. More than 250 organizations of small farmers are involved and more than
3,500 families have tripled their income (from a yearly income of US$ 280 in 1983 to US$ 860 in 1999). They have a higher yield of coffee, corn and bean production by means of organic management. Furthermore, UCIRI has initiated health care services, cooperative stores, improved housing, and built a training facility that educates young people from around the country in organic farming methodologies. The model has been documented and is now being replicated in other areas of the country, including Chiapas, Guerrero and Puebla. The entire project was done without any donations, only credit.
Environmental Threats to Children

Environmental degradation intensifies the drudgery of women and children, further undermining their health and nutritional status.
Global environmental challenges require concerted responses on the part of the international community.