CHAPTER 14: GLOBAL ISSUES

This chapter provides a brief overview of linkages between environmental health and global issues. Coverage will be expanded in future versions of these guidelines, which, for the moment, concentrate on infrastructure sector linkages.

Key Environmental Health Issues

Global issues relevant to environmental health span many topics, including international travel, instantaneous communications, multinational companies, the flow of goods and resources, the changing face of disease, global warming, and ozone depletion. Each has some form of health repercussion. This chapter deals particularly with those environmental health issues that affect the planet as a whole, that is, they have the potential to affect everyone, in contrast to issues happening in many places simultaneously. Of this narrower set of issues, climate change, global warming, and ozone depletion are recognized as key issues.

Table 14-1 shows the range of health dimensions for climate change and ozone depletion and demonstrates the need to take a broad perspective, that is, find remedial measures both inside and outside the health sector. Linking changes in climate with those in disease patterns, in particular, raises appreciation for the complexity of interrelationships in a rapidly changing world. The potential for overall adverse health consequences is indeed staggering.[159] Indirect effects have substantial and often neglected spin-offs, such as mental stress from loss of home or job after a disaster.

Table 14-1: Health Effects of Climate Change and Ozone Depletion

Possible Main Direct Health Effects	Possible Main Indirect Health Effects
Ozone Depletion	
UV radiation: skin cancer and cataracts (perhaps depression of immune system)	*Impairment of photosynthesis:* compromised food production (may exacerbate illnesses in groups with already weakened immune systems)
Climate Change	
Extreme temperature variations: death, illness, and injury from thermal stress*	*Extreme cold:* transport-related injuries and death
Storms: drowning and injury	*Storms:* loss of housing, mental and physical stress of displaced persons, and increase in water-related infectious diseases
Floods: drowning and injury	*Floods:* (same as storms)
Brush and forest fires: injury and death	*Brush and forest fires:* (same as indirect effects of storms, but to a lesser extent)
	Habitat alteration: infectious diseases, plus epidemics
	Food production: malnutrition
	Water quantity and quality: diarrheal diseases
	Aggravation of air pollution: aggravation of existing illnesses

* Thermal stress refers to the body's inability to respond to rapid changes of extremes in heat or cold, such as heat waves or cold spells. Cold spells are relevant, because global warming, that is, increase in the average temperature of the earth's atmosphere, entails greater climate variability and a wide range of weather extremes.

Possible Main Direct Health Effects	Possible Main Indirect Health Effects
	Desertification and droughts: malnutrition, plus mental and physical stress of displaced persons
	Rising sea level: water pollution, saltwater intrusion, susceptibility to storms, vector diseases, and malnutrition
	Social and demographic dislocations: mental and physical stress in displaced persons and loss of infrastructure

Source: Adapted from figure 1-1 in McMichael and others (1996), p. 12.

An example of how climate change may influence disease is cholera. This disease was once regarded as one of deficient sanitation and poverty, passed on by drinking water and poor hygiene. It is now clear that cholera bacteria live in small crustaceans (copepods), are transported farther, and live longer than formerly assumed. Global warming plays a role in the growth and distribution of algal blooms that harbor these copepods, which are spread over larger areas, indeed, as far north as Norway![160]

A number of key linkages with global issues demand more detailed discussion. They include new and re-emerging diseases, food production, and vector-related diseases.

"New" and Re-Emerging Diseases

Besides a resurgence of old scourges, such as TB and malaria, twenty-nine *new* infectious diseases were discovered in the past 20 years. New and re-emerging diseases are not confined to remote areas, as *Ebola* is in the forests of former Zaire. AIDS, for example, has gone well beyond African forests to become a modern pandemic, although its impacts are still severest in Africa (see section on AIDS in chapters 1 and 8.) In 1990, in Milwaukee, Wisconsin (United States, pop. 850,000), *Cryptosporidium* in drinking water caused 100 deaths and 400,000 cases of sickness, 4,000 of which required hospitalization. The disease, previously associated with poverty and poor sanitation, was linked to farm runoff and agroindustrial pollution that had contaminated Milwaukee's drinking water supply. *Cryptosporidium* is not killed by most disinfectants and was once filtered out naturally by wetlands, many of which have now been developed. In other words, the same economic growth that contributes to improving the standard of living of the world's poor may also play a role in new and re-emerging diseases.

Continued economic growth (in developing countries, much of it urban) is outstripping the capabilities of governments and the private sector to provide reliable infrastructure services—the same infrastructure that was responsible a century ago for reducing a wide range of respiratory and diarrheal diseases that took a high toll.

Box 14-1: Key, Confusing, and Misused Terms on Climate and Ozone Depletion

Climate change. Refers to a complex set of disturbances to intricate ecological systems, not to a single event. Heat waves and storms, for example, are both manifestations of increased climatic *variation*, a related but different aspect of climate, as are the frequency of extreme variations in climate.

Global warming. Refers to increases in mean global temperature, which may entail not only the extreme case of heat waves, but also subtle increases in temperature that occur during cooler seasons.*Source:* Authors' data.

Food Production

The actual effects of climate change and ozone depletion on the productivity of animal, fish, and agricultural food sources are still uncertain. But many positive and negative factors are postulated. For example, a 2°–3°C warming in mean global temperature could affect crop production with enormous economic consequences. Changes in temperature and rainfall would directly impact productivity in animals and food crops, as well as growth rates of their pests, predators, and diseases. Lower yields would presumably involve major areas in the middle-to-lower latitudes, which include global breadbaskets, for example, the U.S. Great Plains, parts of southern Europe, the Ukraine, parts of south and southeast Asia, and western Australia, plus arid areas, such as the Sahel. In comparison, higher yields would be expected at higher, temperate latitudes, such as Canada, Siberia, and Patagonia. At present, models indicate that the world would still be able to produce enough food to feed future populations.[161]

The main direct health consequences of climate change entail nutrition, particularly in areas, such as the Sahel, where malnutrition is already common; more than 800 million in the world are now chronically malnourished. The consequences of malnutrition, however, go well beyond issues of food adequacy, that is, providing enough energy to perform bodily functions; they also include, for example, maintaining resistance to infection. It is well known that malnutrition predisposes the body to infectious diseases,[162] but new evidence is helping to clarify the relationship between malnutrition and the immune system. The most worrisome aspect of the re-establishment of infectious diseases is that malnutrition might facilitate transformation of otherwise benign viruses into pathogens.[163] Moreover, application of fertilizers and pesticides to address decreases in food production, possibly compromised by climate change, as well as attain normal growth in agricultural output would increase exposures to pesticide residues; this might bring some of the most worrisome *indirect* health consequences, including the potential for hormone disruption and reproductive disorders (see chapter 8's section on "Use of Pesticides and Fertilizers").

Crops. Increased ultraviolet light (UV-B) on photosynthesis on land- and water-based flora could also reduce food production. The International Panel on Climate Change has estimated that the overall effects of climate change on crop production would be negative, but on a modest scale and the negative aspects would be concentrated in the tropical regions. These are precisely the areas where malnutrition is common, that is, parts of Sub-Saharan Africa, south and east Asia, southeast Asia, and some Pacific Islands. Most of these studies, however, do not account for changes in distribution of weeds and plant diseases.[164] Possible resulting changes in fertilizer and pesticide use have some of the most troublesome health repercussions. These include the potential for hormone disruption and reproductive disorders.

Drought. Drought is also a determinant of food production, but is discussed in chapter 8 on the agriculture sector in box 8-3 and related text.

Table 14-2: Main Environmental Health Linkages with Global Issues

Sector	Main Linkages
Agriculture and rural development	Agricultural expansion, including slash-and-burn agriculture, and commercial logging can contribute to deforestation (depletion of carbon sinks) and land erosion and, consequently, increase global warming and frequency of extreme weather events; drought and desertification, hence, flooding (causing drowning, migration, and mental stress); water pollution and food contamination (causing diarrhea and intestinal disease, among others); and changes in vector habitats (causing vector-related diseases). It can also cause loss of biodiversity (loss of environmental life support systems and potential curative medicinal plants).
Infrastructure and urban development	Air shed pollution from vehicular transportation (which could exacerbate watershed and land pollution) contributes to ozone depletion (causing skin cancer and cataracts), global warming and frequency of extreme weather events, drought and desertification, hence, causing the same health effects as listed under agriculture. Deforestation (depletion of carbon

Sector	Main Linkages
	sinks) caused by human settlements and extension of roads and railways can increase global warming (can cause same health effects as listed under agriculture).
Energy	Deforestation (depletion of carbon sinks) due to increased use of biofuels and oil and gas exploration and exploitation; fuels used in vehicular transportation and industry, home heating, and so on and pollutant emissions; and hydroelectric schemes (e.g., organic matter washed into reservoir and plant growth on reservoir can increase greenhouse gases) all contribute to ozone depletion (causing skin cancer and cataracts), global warming and frequency of extreme weather events, drought and desertification, hence, causing the same health effects as listed under agriculture.
Industry	Deforestation (depletion of carbon sinks) from wood meant for industrial purposes (land erosion) and pollutant emissions contribute to ozone depletion (causing skin cancer and cataracts) and global warming and frequency of extreme weather events, drought and desertification, hence, causing the same health effects as listed under agriculture.
Health	Need to increase provision of health services for indirect and direct effects, especially in remote areas.
Environment and natural resources	Deforestation (depletion of carbon sink) can cause loss of biodiversity (loss of environmental life support systems and potential curative medicinal plants) and can contribute to global warming and frequency of extreme weather events, drought, and desertification, hence, causing the same health effects as listed under agriculture.

Source: Authors' data.

Intestinal worms. The literature deals little with changes in soil moisture that affect the habitats of ground worms (nematodes), which cause intestinal worms, still a major problem in developing countries. A 2°C increase in mean soil temperature would probably cause nematodes to increase.[165] Intestinal worms do not kill, but result in high costs in lost labor. In 1990 intestinal worms accounted for 17,059,000 years lived with disability globally, roughly triple those of malaria.[166]

Vector-Related Diseases

Climate change may have specific impacts in spreading vector-related diseases.

In SSA, Rift Valley fever is spread by mosquitoes, but mainly affects livestock. It can be spread to humans, if they eat meat from infected animals or handle sick livestock. An epidemic in 1997–98 in Tanzania, Kenya, Somalia, and Ethiopia was attributed to the unusually moist climate associated with El Niño.[167]

Spread of schistosomiasis and malaria could increase in some parts of the world, if greenhouse gas reduction measures increase energy prices. This is because higher energy costs might spur dam construction that is now considered technically, but not economically feasible. Twenty-nine of the dams under consideration are located in developing countries where these two diseases exist.

Table 14-3: World Hydro Power: Potential Number of Dams for Development

Region	Technically Feasible	Economically Feasible	Difference
Africa	39	20	19
Asia	33	26	7
Austral-Asia and Oceania	4	4	–
Europe	36	32	4
North and Central America	15	9	6

Region	Technically Feasible	Economically Feasible	Difference
South America	12	9	3
Total	139	100	39
Gigawatt hours/year	14,000,000	8,905,000	–

Source: The International Journal on Hydropower and Dams: World Atlas and Industry Guide (1997).