

## The Millennium Project: the positive health implications of improved environmental sustainability

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Ensuring environmental sustainability is essential to achieving all the Millennium Development Goals. Long-term solutions to problems of drinking-water shortages, hunger, poverty, gender inequality, emerging and re-emerging infectious diseases, maternal and childhood health, extreme local weather and global climate changes, and conflicts over natural resources need systematic strategies to achieve environmental sustainability. For this reason, the UN Millennium Project Task Force on Environmental Sustainability has concluded that protection of the environment is an essential prerequisite and component of human health and wellbeing.<sup>1</sup> Economic development and good health are not at odds with environmental sustainability: they depend on it.

One important dimension of environmental sustainability is the need to maintain ecosystem services critical to the human population. These services include providing food, shelter, and construction materials; regulating the quantity and quality of fresh water; limiting soil erosion and regenerating nutrients; controlling pests and alien invasive species; providing pollination; buffering human, wild plant, and animal populations from interspecific transfer and spread of diseases; and stabilising local weather conditions and sequestering greenhouse gases to contain climate change. A second and equally important dimension of environmental sustainability is the need to control water pollution and air pollution, including the emission of greenhouse gases that drive climate change. These so-called brown issues can have a severe effect on human health and ecosystem function.

Natural systems worldwide are being degraded at unprecedented rates. Standing forests, particularly in the tropics and subtropics, are disappearing at a rate of over 10–15 million hectares per year. If current trends persist, southeast Asia, for example, will probably lose up to 75% of its original forest and 42% of its original wildlife species by 2100.<sup>2</sup> The highly fragmented forests that remain will be greatly diminished in their ability to provide the goods and services outlined above. Deforestation can further increase the risk of natural disasters, as evidenced by the deadly landslides in the Philippines in November, 2004, after steep slopes above several towns were denuded.

Degradation of the marine environment is also extreme. Coral reefs are severely damaged by dynamite and cyanide fishing, together with soil and untreated chemical runoff from agriculture, industry, and domestic households. Moreover, rising ocean temperatures resulting from climate change are projected to further increase coral bleaching.<sup>3</sup> More than 58% of the

world's coral reefs are now damaged or destroyed.<sup>4</sup> Deep-sea ecosystems are raked daily by drag nets that cause great damage to the sea floor. As human beings derive ever more food from the sea yet persist in destroying the nurseries that supply that harvest, local and global fisheries have begun to collapse.<sup>5</sup> Since two-thirds of the world's population depends on fish as their main source of protein,<sup>6</sup> continued destruction of marine ecosystems will probably have a severe effect on human health worldwide.

One focus of the task force was the health consequences of environmental degradation, which is a contributing factor to the emergence, re-emergence, and accelerated dispersal of zoonotic and vector-borne diseases. In particular, the zoonotic transfer of a disease from another avian or mammalian species to human beings has become increasingly common, accounting for 75% of the emerging and re-emerging infectious diseases recorded in the past decade.<sup>7</sup> Prominent examples of zoonotic diseases are severe acute respiratory syndrome (SARS) and Lyme disease, which have affected thousands of people and resulted in economic losses of tens of billions of US dollars.<sup>8,9</sup> Other pathogens, such as West Nile, Ebola, and Nipah viruses, may have a growing, harmful effect on human health. Notwithstanding their impact and the attention they garner, the ecology of many zoonotic diseases remains understudied and poorly understood. For example, whereas civet cats found in markets in China have been identified as harbouring SARS, the species that serves as the reservoir for the SARS virus has not yet been determined. However, scientists have linked the

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reduction of mammalian biodiversity with increased likelihood of human cases of Lyme disease,<sup>10</sup> but responses to the disease are still focused on individual treatment rather than better land use and wildlife-management policies that might stem the spread of Lyme and possibly other new pathogens.

Land-use change, along with global warming, has further led to rises in insect-borne diseases, such as malaria, dengue, and filariasis in many parts of the world.<sup>11-13</sup> When trees are cut down and rutted logging roads are left behind, puddles and sunshine create new habitats for malaria-transmitting mosquitoes. Indeed, the increase in malarial mosquitoes in Peru is closely correlated with forest clearance.<sup>14</sup> The rise in global temperatures has in many places affected the life histories of mosquitoes and other disease vectors, resulting in more outbreaks occurring in more places at more times during the year.<sup>15,16</sup> Apart from deforestation and rising temperatures, other human actions affecting disease emergence include poorly managed urbanisation, conflict-related events, inappropriate use of antimicrobials and insecticides, and many water-related issues, including dam construction, irrigation, and waste-water mismanagement.<sup>17</sup>

If these difficulties were not enough, lack of infrastructure to control chemical and organic pollutants of air and water have rendered indoor and outdoor environments extremely dangerous to long-term human health. Polluted sources of drinking and bathing water cause widespread and severe health problems, and are especially lethal to children. Acute respiratory infections linked to indoor air pollution kill 1.6 million people per year, mostly children and women.<sup>18</sup> This figure represents an enormous loss of human and economic potential in developing countries. Furthermore, urban air pollution causes the premature death of an additional estimated 0.5-1.0 million people in developing countries per year.<sup>19</sup>

How then can the degradation of the environment be contained and environmental sustainability be achieved? A first challenge to overcome is the fact that, although scientifically sound, the concept of environmental sustainability does not translate immediately into operational objectives. To this end, the task force recommends that as part of their national-level processes for the Millennium Development Goals, countries should set their own long-term objectives, such as maintaining a specific share of natural forests, lowering acid deposition below a certain threshold, or achieving a target level of nutrient load in critical freshwater ecosystems.

Since virtually all human activities have an effect on the environment, strategies to achieve these objectives and reverse the loss of environmental resources need to be broad-based and include every sector of society. Doing so requires major structural changes nationally, regionally, and globally that must be coupled with specific investments in improved environmental management.

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The task force has identified practical interventions to improve the management of environmental resources in at least six key areas: soils and land-based production systems, forests, marine ecosystems and global fisheries, freshwater ecosystems, climate change, and pollution. These tested interventions can be delivered at scale provided that countries have access to substantially strengthened human resources and increased financial resources. Least-developed countries and many other poor countries will be likely to require additional external finance to improve environmental management

However, technical interventions, no matter how good, will not be sufficient unless they are accompanied by structural changes to effectively integrate the environment into all development plans and sector policies. First, among these changes is the need to strengthen public institutions responsible for environmental policymaking and to build up environmental expertise in other government groups, such as ministries for health or infrastructure, to better appraise environmental consequences of all sector strategies. Second, countries need to correct market failures and remove distortions that exacerbate environmental degradation. Thus, wherever possible, countries should phase out damaging subsidies that overcapitalise industries such as farming, fishing, and forestry, and that promote inefficiencies, overextraction, and environmental damage. Third, we underscore the importance of improving our knowledge

about the environment—including the crucially under-researched environment–health links—and to make this information effectively available to senior decision-makers through science-advice mechanisms. Moreover, environmental education and training must be integrated into the curricula of primary and secondary schools worldwide to improve the public's understanding of the environment.<sup>20</sup> Finally, efficiency gains through advanced science and technologies directed at environmental challenges can slow the rise in demand for certain ecosystem services. Several proven approaches exist to promote science and technology that can be harnessed for the environment.

The knowledge and tools exist to guide us toward an environmentally sustainable future. However, the lack of success in stemming environmental degradation over the past decades has shown that the challenge lies in applying them. Successful implementation is key and will hinge on the active participation of the private and public sectors, as well as an informed and engaged citizenry. The Millennium Development Goals provide an important operational framework for addressing environmental sustainability in concert with other development priorities. During 2005, the international community should honour its commitment to support all countries in scaling-up direct investments in environmental management and implementing the structural changes that underpin them. This represents the only rational way forward.

#### Conflict of interest statement

We declare that we have no conflict of interest.

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