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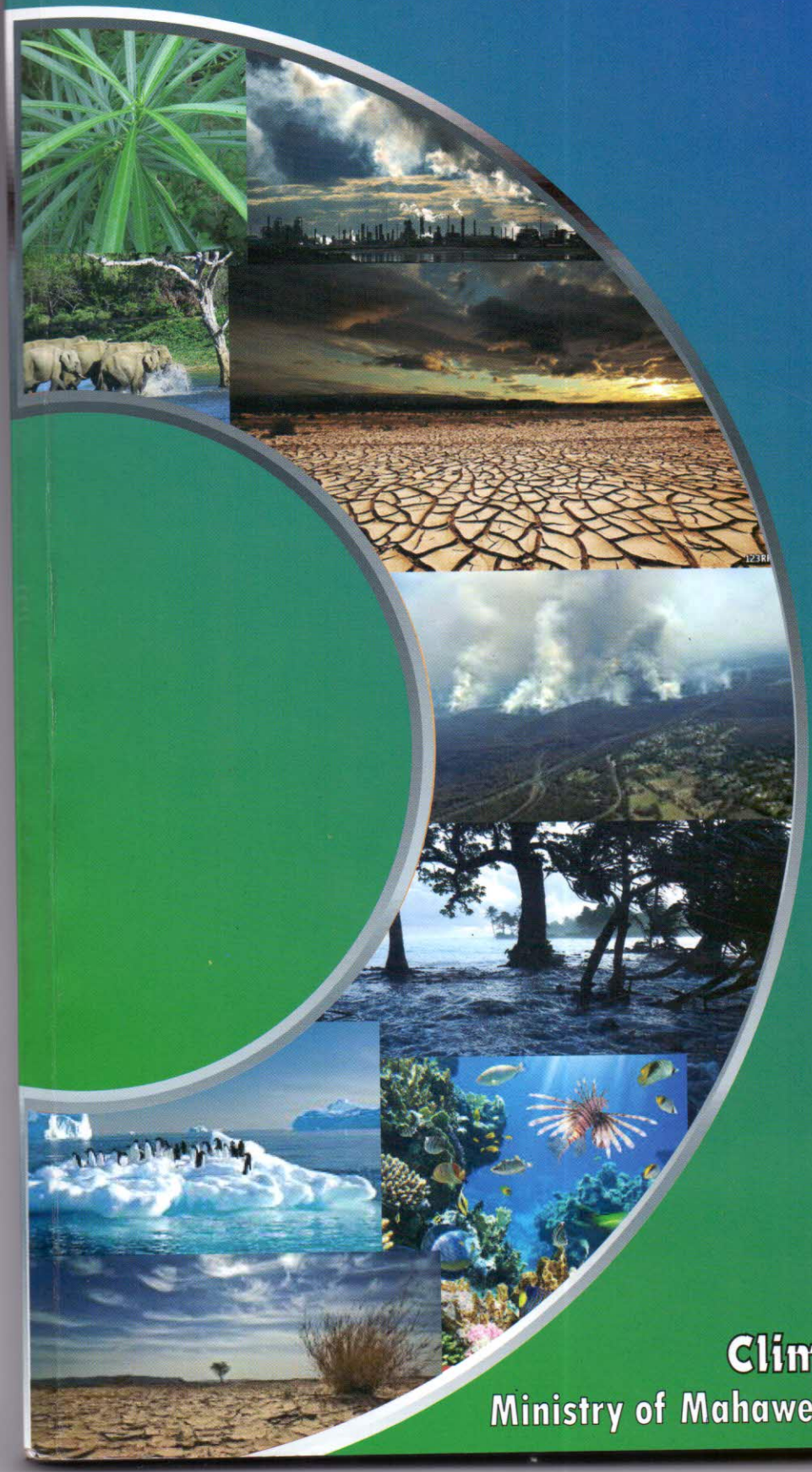

Climate Change Secretariat

Ministry of Mahaweli Development and Environment

Climate change and infectious diseases

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Introduction

United Nations Framework Convention on Climate Change (UNFCCC) defines that climate change is the change that can be attributed "directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". This is a crucial threat to the world environment, caused by the human activities and their mishandling of resources. Mankind always alters and renews the natural resources in terms of development, without considering its environment. Continuous process in this nature will widely affect the entire eco-system of the globe and consequently meteorological conditions (wind, rain, snow, sunshine, temperature, *etc.*). This will adversely affect the socio-economic condition of a nation, generating multifarious infectious diseases.

Each of the last 3 decades has been continuously warmer than any preceding decade since 1850. Over the last five decades, human activities, particularly burning of fossil fuels and clearing of forest, have released more carbon dioxide and other greenhouse gases to the atmosphere, which trap additional heat in the lower atmosphere and affect the global climate adversely (UNFCCC, 2010). Increases in average global air and ocean temperatures, widespread melting of snow and ice, rising average global sea levels and changing of precipitation patterns are a few major adverse effects caused by the climate change. Moreover, this situation generates eligibility for emerging infectious diseases to new places and new hosts. Researchers have found that there is a close link between local climate and the occurrence or severity of diseases and other human health related threats.

Correlation between climate change and infectious diseases

Climate change accelerates the spread of diseases, primarily because warmer global temperatures enlarge the geographic range in which disease carrying animals, insects and microorganisms as well as the germs and viruses can survive. In addition, changing weather patterns and climatic conditions affect the diseases shift *via* vectors such as mosquitoes (vector-borne disease) or through rodents (rodent-borne disease). The malaria and dengue fever are transmitted by mosquitoes, which cannot survive if temperatures are too low. Further, climate restricts infections, limiting the distribution of other species that are required for disease transmission. More predictable as climate change unfolds is the spread of so-called waterborne infections.

These infections most often cause diarrheal illness and flourish in the wake of heavy rainfalls as runoff from land enters into and may contaminate water supplies. Many pathogens that cause diarrheal disease reproduce more quickly in warmer conditions as well.

World Health Organization (2012) states that the average atmospheric temperature rose by about one degree Fahrenheit in the last quarter of the 20th century. This increase was responsible for the

annual loss of about 160,000 lives and the loss of 5.5 million years of healthy life of nature. Further, it estimates that the climate change contributes to 150,000 deaths and 5 million illnesses each year, due to the contamination of air, water, soil and food. Climate-sensitive diseases are among the largest global killers. Diarrhea, malaria and protein-energy malnutrition alone caused more than 3.3 million deaths globally in 2002, with 29% of these deaths occurring in the region of Africa. Deadly diseases often associated with hot weather, like the West Nile virus, Cholera and Lyme disease, are spreading rapidly throughout North America and Europe because increased temperatures in these areas allow disease carriers like mosquitoes, ticks, and mice to thrive ((UNFCCC, 2010). Further, it records approximately 2.4% of worldwide diarrhea and 6% of malaria in some middle-income countries (WHO, 2010).

Types of infectious disease

The Inter-governmental Panel on Climate Change noted in its 2007 report that climate change may contribute to expanding risk areas for infectious diseases. Types of such diseases are elaborated below.

Water-borne diseases

A warmer climate could cause water-borne diseases to become more frequent, including cholera and diarrhoeal diseases; such as giardiasis, salmonellosis and cryptosporidiosis. Diarrhoeal diseases are already a major cause of morbidity and mortality in South Asia, particularly among children. It is estimated that one-quarter of childhood deaths in South Asia are due to diarrhoeal diseases. As rising ambient temperatures increase bacterial survival time and proliferation, the incidence of diarrhoeal diseases might further increase (WHO, 2012).

Cholera is a well-known water-borne disease that has afflicted humankind since ancient times. Outbreaks of cholera have occurred in India, Bangladesh, and more recently, Latin America and Africa. Molecular techniques have shown that bacteria are now recognized as naturally occurring in aquatic environments, with bacterial population peaks in spring and fall in association with plankton blooms. The discovery of *Vibrio cholerae* in the natural environment, with a dormant state between epidemics, changed the understanding that this disease had only a human reservoir. A relationship has been observed between increase in sea-surface temperature and the onset of cholera epidemics, with the cholera outbreaks following the seasonal rise and fall in sea-surface height and temperature (UN, 2008).

Vector-borne diseases

The incidence of mosquito-borne diseases, including malaria, dengue, and viral encephalitides, are among those diseases most sensitive to climate. Climate change would directly affect disease transmission by shifting the vector's geographic range and increasing reproductive and biting rates and by shortening the pathogen incubation period. Climate-related increases in sea surface temperature and sea level can lead to higher incidence of water-borne infectious and toxin-related illnesses, such as cholera and shellfish poisoning. Human migration and damage to health infrastructures from the projected increase in climate variability could indirectly contribute to disease transmission. Human

annual loss of about 160,000 lives and the loss of 5.5 million years of healthy life of nature. Further, it estimates that the climate change contributes to 150,000 deaths and 5 million illnesses each year, due to the contamination of air, water, soil and food. Climate-sensitive diseases are among the largest global killers. Diarrhea, malaria and protein-energy malnutrition alone caused more than 3.3 million deaths globally in 2002, with 29% of these deaths occurring in the region of Africa. Deadly diseases often associated with hot weather, like the West Nile virus, Cholera and Lyme disease, are spreading rapidly throughout North America and Europe because increased temperatures in these areas allow disease carriers like mosquitoes, ticks, and mice to thrive ((UNFCCC, 2010). Further, it records approximately 2.4% of worldwide diarrhea and 6% of malaria in some middle-income countries (WHO, 2010).

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