



## **United Nations Environment Programme Regional Office for Asia and the Pacific**

First Forum of Ministers and Environment Authorities of Asia Pacific  
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Discussion Document for Session 4  
**Environment and Health Linkages in Asia Pacific**

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**Discussion Document -- Not for quotation or citation.** The purpose of this document is to facilitate discussions during the First Forum of Ministers and Environment Authorities of Asia Pacific, 19-20 May 2015, Bangkok. Comments are welcome and should be sent to [uneproap@un.org](mailto:uneproap@un.org). The document will be revised to reflect all verbal and written comments received no later than 31 May 2015.

## I. Introduction

1. Human health and well-being and the environment are inextricably linked with environmental conditions being major determinants of morbidity and mortality. Environmental deterioration such as air pollution, climate change, contamination with hazardous chemicals, uncontrolled waste generation and disposal, and ecosystem disruption have effects on human health which are direct and immediate as well as indirect effects that occur over the medium to long term. Estimates by the World Health Organization (WHO) show that 24 per cent of the total burden of disease in Asia Pacific is attributable to environmental risk factors.<sup>i</sup>

2. The issue of environment and health was also a cross cutting theme in the inaugural meeting of the United Nations Environment Assembly (UNEA-1) in 2014 appearing as a priority area for action in four UNEA resolutions<sup>1</sup>. Environment and health related targets also appear in the draft Sustainable Development Goals under SDG 3, “Ensure healthy lives and promote well-being for all at all ages,” and SDG 12, “Ensure sustainable consumption and production patterns.” At the regional level, the issue of environment and health is being addressed in a number of inter-governmental and expert fora including the Regional Ministerial Forum on Environment and Health in Southeast and East Asian Countries and the Asia Pacific Clean Air Partnership Joint Forum.

3. The first Forum of Ministers and Environment Authorities of Asia Pacific provides a platform for Ministers to address pressing health and environment challenges and to discuss potential policy solutions. The Forum will also guide UNEP on regional implementation of the resolutions and decisions of UNEA-1 and will help to identify the region’s inputs to the next UNEA as well as UNEP’s medium term strategy for 2018-2021. The present paper provides background information and policy options to guide those discussions.

## II. Environment and Health and the Impact on Sustainable Development

### A. Air Pollution and Health

4. Air pollution is a major threat to human health and the well-being of people in Asia Pacific. Recent estimates by the WHO placed air pollution as the world’s largest single environmental health risk with nearly seven million deaths per year<sup>ii</sup>. Seventy per cent of these deaths occur in Asia Pacific.

5. Exposure to air pollution has become an inescapable part of urban life in many countries of the region due to motor vehicle and industrial emissions and fuel combustion in households. The Asia Pacific region contains some of the world’s most polluted cities. Available data indicate that more than 200 cities in the region exceeded the WHO guideline value (10µg/m<sup>3</sup>) for annual average PM<sub>2.5</sub> concentration. High concentrations of sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), tropospheric ozone (O<sub>3</sub>), and volatile organic compounds (VOCs) are also being reported in Asian cities and sub-urban areas. Outdoor air pollution is estimated to be the cause of at least 2.5 million premature deaths each year in the region.

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<sup>1</sup> UNEA Resolutions on: Ecosystems Based Adaptation; Chemicals and Waste; Marine Plastics Debris and Micro-plastics; and Strengthening the Role of UNEP in Promoting Air Quality.

6. Many air pollution problems are attributable to energy use. The combustion of fossil fuels is the principal source of air pollution in the urban and industrial areas. Emissions of air pollutants including particulate matter are expected to continue to grow with the global rise of energy demand which is projected to grow by 37 per cent by 2040. Sixty per cent of this growth will take place in Asia<sup>iii</sup>. Countries in the region are recognizing the need to address air pollution issues through strengthening capacity and coordination at the national and regional level.

7. The burning of coal and biomass, such as firewood, agricultural wastes and animal wastes, is the principal source of air pollution in rural communities and some urban areas. Burning solid fuels in traditional cook stoves and open fires in poorly ventilated indoor space, the primary means of cooking and heating for 2.8 billion people in developing countries, results in exposure to dangerous levels of various toxic air pollutants. For instance, one study<sup>iv</sup> reported that levels of 24-hour mean PM<sub>2.5</sub> (particulate matter up to 2.5 micrometer in diameter) and CO (carbon monoxide) in rural households range from 173 to 1,436 microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and 3.6 – 29 parts per million (ppm), respectively while cooking with traditional cook stoves [note: WHO guideline for 24-hour average PM<sub>2.5</sub> and CO are 75  $\mu\text{g}/\text{m}^3$  and 6 ppm respectively]. Indoor smoke contributes to a range of chronic illnesses and acute health impacts such as early childhood pneumonia, emphysema, lung cancer, bronchitis, cardiovascular disease and low birth weight. According to WHO estimates as many as 4.3 million deaths per year results from breathing indoor air pollutants.

8. Besides its health impacts, air pollution also poses a threat to the region's food security, water security and climate system, thereby challenging poverty alleviation and sustainable development in the region. Air pollutants such as ozone and sulfur oxides cause crop and ecosystem damage and pose a major concern for food security. Black carbon (BC), a component of particulate matter, has been identified as a major contributing factor in the accelerated melting of snowpack and glaciers. In addition, studies<sup>v</sup> found that particulate matter disturb rainfall patterns including the Asian Monsoons and are a major concern for water security and natural disasters in the region. A group of air pollutants (black carbon, ozone, methane, and hydrofluorocarbons), referred to as Short-Lived Climate Pollutants (SLCPs) due to their short lifetime in the atmosphere, also impacts our climate system. A UNEP study identified a set of 16 SLCP control measures that could curb climate change by around half a degree Celsius and cut global crop losses by 30 million tons a year<sup>vi</sup>. The largest avoided crop loss stemming from this action would be achieved in Asia.

## **B. Climate change and health**

9. A recent assessment by WHO found that globally, climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050 and that the burden of disease attributable to climate change will fall mainly on children in developing countries<sup>vii</sup>. Asia Pacific hosts the greatest number of people at risk of adverse impacts of climate change. Historically, more people in Asia Pacific have been affected by floods, droughts and storms than in any other region of the world: more than 80 per cent of all people affected by droughts, floods, and by storms over the period 1960–2007 resided in East Asia, the Pacific, and South Asia.<sup>viii</sup> In 2014 alone, natural disasters in Asian and Pacific nations cost almost 60 billion US dollars and killed 6,000 people. The impacts of climate change on human health occur directly through extreme weather events such as flooding, drought and heat waves and indirectly by contributing to the expansion of

the vector borne diseases, malnutrition, and diarrheal disease and by negatively impacting infrastructure and economic development.

10. More frequent and intense heat waves in Asia will increase mortality and morbidity in vulnerable groups. Increases in heavy rain and temperature will increase the risk of diarrheal diseases, dengue fever, and malaria. The transmission of infectious disease, such as cholera epidemics in coastal Bangladesh, and schistosomiasis in inland lakes in China, and diarrheal outbreaks in rural children will be affected as a result of warmer air and water temperatures and altered rain patterns and water flows. Outbreaks of vaccine-preventable Japanese encephalitis in the Himalayan region and malaria in India and Nepal have been linked to rainfall.

11. The estimated impact on mortality across the region is shown in Table 1. In addition to these mortality rates, there are far greater numbers of people whose health and livelihoods are negatively affected and undermined by climate change. With climate change it is estimated that there will be 4.9-5.3 million malnourished children by 2050 in East Asia (compared to 2.3 million in the case of no change in the climate) and 58.2 million malnourished children in South Asia (compared to 52.3 million with no change in climate)<sup>ix</sup>. In terms of vector borne diseases, three quarters of the people exposed to dengue are in the Asia Pacific region and bear the greatest burden of the 390 million dengue infections worldwide<sup>x</sup>. Single extreme weather events also have a devastating and widespread impact on human health and livelihoods. In 2008 Cyclone Nargis caused at least 135,000 fatalities while Cyclone SIDR in 2007 affected more than 8.5 million people and killed 3,000 in Bangladesh.

**Table 1: Additional annual deaths attributable to climate change<sup>2</sup> in 2030 and total flood related mortality rates in 2030.<sup>xi</sup>**

| Region/Health Impact     | Undernutrition <sup>3</sup> | Malaria | Dengue | Diarrhoeal disease <sup>4</sup> | Heat <sup>5</sup> | Flood related mortality rate <sup>6</sup> |
|--------------------------|-----------------------------|---------|--------|---------------------------------|-------------------|---|
| Asia-Pacific High Income | -                           | 0       | 0      | 1                               | 93                | 30-100                                    |
| East Asia                | 1155                        | 0       | 39     | 216                             | 8010              | 10,000-30,000                             |
| South Asia               | 20,692                      | 1875    | 197    | 14,870                          | 9176              | 30,000-100,000                            |
| Southeast Asia           | 3348                        | 550     | 0      | 765                             | 2408              | 30,000-100,000                            |
| Pacific                  | -                           | 44      | 0      | 22                              | 13                | 300-1,000                                 |
| Australasia              | -                           | 0       | 0      | 0                               | 93                | 10-30                                     |

12. In addition to the human cost, it is likely that increases in disease burden attributable to climate change would lead to lower labor productivity and economic growth as well as increased healthcare costs. It is estimated that the cost of adaptation in the health sector for the prevention and treatment of diarrhea and malaria alone over the period 2010–2050 could reach USD 700 million per year in East Asia, the Pacific and South Asia (above and beyond the prevention and treatment of these diseases in a scenario without climate change)<sup>xii</sup>. In Asia Pacific, the economic cost of flooding alone was estimated to be 26.8 billion dollars in 2014<sup>xiii</sup>. It is also estimated that in Southeast Asia, in

<sup>2</sup> The figures are the mean, based on five global climate model runs.

<sup>3</sup> Undernutrition estimates are for children aged under 5 years;

<sup>4</sup> Diarrhoeal disease estimates are for children aged under 15 years

<sup>5</sup> Heat estimates are for people aged over 65 years

<sup>6</sup> Estimates based on a future with no adaptation

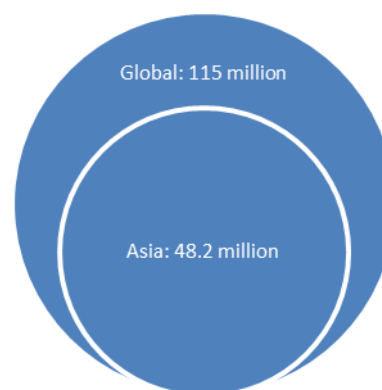
2050, more than half the afternoon work hours will be lost due to the need for rest breaks due to heat exhaustion, which would imply a significant drop in economic productivity.<sup>xiv</sup>

13. The burden of these negative health impacts falls primarily on the poorest and most vulnerable populations including coastal populations of the Pacific Islands, high population megadelta regions and cities such as Bangkok Ho Chi Minh City, Kolkata and Manila. The populations in mountainous regions of Bhutan and Nepal are also increasingly at risk from the economic and health impacts from more than 200 potentially dangerous glacial lake outburst floods.

### C. Chemicals, waste and health

14. Chemicals have become integral to everyday life. Large quantities of chemicals are used to produce products to meet increasing needs of growing populations. For example, 3 kg of chemical substances are required to produce 1 kg of cotton t-shirts<sup>xv</sup>. Many chemicals play vital roles in enhancing human well-being and achieving sustainable development. Chemicals are used by almost all industries and play an important role in boosting agricultural production, treating drinking water, treating disease, enhancing trade and economic growth, and providing employment opportunities. However, chemicals are also a threat to human health and environment if not managed properly.

15. The Asia Pacific region is facing rapidly growing challenges in chemicals and waste management, fuelled by population growth, economic growth, urbanization, industrialization, and intensive agriculture. Volumes of waste are growing and waste streams are becoming increasingly complex and containing ever large amounts of hazardous substances. In addition, there is a shift in production and use of chemicals from developed countries to developing countries. Chemical production in the region is expected to grow by 46 per cent from 2012 to 2020.<sup>xvixvii</sup>



Number of children in hazardous work  
(Data source: ILO (2010))

16. Chemicals used in the production of electronics, textiles, flame retardants, and cement are key concerns in the region. For example, nearly 77 per cent of the chemicals used for production of integrated circuits and printed circuit boards globally are being used in this region. Increasing use of agrochemicals due to intensive agriculture is another serious concern as are metals such as lead, mercury and cadmium which are highly toxic in small quantities and used in battery manufacturing and artisanal and small-scale gold mining (ASGM). About 50 per cent of the global anthropogenic mercury emissions are from Asia Pacific<sup>xviii</sup>.

17. Exposure to chemicals causes various impacts on health including mortality by affecting body systems including respiratory system, reproductive system, cardiovascular system, endocrine system, and immune system. Chemicals also contribute to chronic diseases such as cancer, diabetes, asthma, and birth defects. Some chemicals can affect health even at very low levels of exposure. For example, there is no safe level of exposure to lead. Exposure to lead even at very low levels can cause permanent brain

and nervous system damage, problems with kidney function, and blood and reproductive damage. The economic burden of childhood lead poisoning in Asia has been estimated to be nearly USD 700 billion due to intelligence quotient points lost.<sup>xix</sup>

18. Depleting of the stratospheric ozone layer by release of Ozone-depleting substances (ODS) such as CFCs, halons, and HCFCs would lead to overexposure of Earth's lower atmosphere to ultra-violet solar radiation (UV-B) and causing health effects among its inhabitants, including skin cancers (contributing to an increase in melanoma), eye damage (including cataracts) and immune system suppression. Two ODS, i.e. Methyl bromide (once used extensively as a pesticide) and carbon tetrachloride (once used extensively as a solvent), are both highly toxic.

#### **D. Ecosystems disruption and health**

19. There is growing recognition of the importance of biodiversity, ecosystems and the services they provide as a foundation for sustainable development, human health and well-being. Scientific reports have also highlighted these critical linkages.<sup>xxxi</sup> Due to these linkages, biodiversity loss and undermined ecosystem functions affect human health, both directly and indirectly, causing outbreaks of infectious disease, undermining development progress and nutrition security.<sup>xxii</sup> Loss of biodiversity and ecosystem disruption caused by the human-induced factors such as habitat destruction, over exploitation, pollution and invasive alien species affect the sustainability of production systems and lead to direct and indirect negative effects on human health. The key ecosystem and health linkages in the region are summarized below.

20. **Ecosystem, food security and nutrition.** Although there have been significant short-term increases in food production through the introduction of high yielding crops, expansion of agricultural land and the promotion of mono cropping, agricultural productivity is being undermined by the loss of biodiversity in production systems, including pollinators such as bees. It has been reported that the contribution of insect pollinators to agricultural and food supply can be valued at around USD 190 billion per year.<sup>xxiii</sup> Declines in the diversity and numbers of pollinator species have significant implications on food security and nutrition. The degradation of the marine environment has a negative impact on nutrition. Fish provide between 50 and 60 per cent of total dietary protein in countries such as Bangladesh, Cambodia, Indonesia and Sri Lanka, and as much as 90 per cent in some small island developing states<sup>xxiv</sup>. Overfishing and the degradation of coastal ecosystems therefore undermine food security across the Asia Pacific region. The ecological services which intact coral reefs provide can reach a value of USD 375 billion per year, including the provisioning of food and materials, climate regulation, and shoreline stabilization.<sup>xxv</sup> In 2002, financial damage from the overfishing of more than 21,000 km<sup>2</sup> of reefs in the Philippines was estimated at USD 1.2 billion over 20 years<sup>xxvi</sup>. Invasive alien species (IAS) also affect health and national economies, mainly through their impacts to agriculture production as well as the functioning of ecosystems such as wetlands, reefs, and forests. In Asia, despite an increase in the use of pesticides over the past 40 years, about 30-40 per cent of crops such as rice, maize, soybean and potato are lost due to pests, including invasive plants and insects<sup>xxvii</sup>. The total annual economic costs of IAS pests to crops, pastures and forests in Australia and India amount to USD 6.24 billion and USD 91.02 billion, respectively<sup>xxviii</sup>. IAS can increase flooding and have effect on well-known human disease pandemics and epidemics, such as through the vectors causing dengue and malaria. Additionally IAS can be poisonous to humans or give severe allergic reactions. As an example Parthenium – a small invasive herb from South America - is now extensively found in India where 10 – 20 per cent of the rural population

will develop severe allergenic reactions such as skin dermatitis or bronchitis and asthma<sup>xxix</sup>.

21. **Harmful Algal Blooms and health.** Anthropogenic changes such as agriculture and infrastructure development have caused major changes in the nutrient loading in freshwater and marine ecosystems worldwide. These nutrient inputs cause an increasing trend in harmful algal blooms (HABs), leading to serious health effects, such as skin irritation, respiratory ailments and neurotoxic and carcinogenic effects<sup>xxx</sup>. Algal blooms producing toxins as well as those producing high biomass pose significant threats to human health, the former in the form of shellfish poisoning, the latter through fish mortalities and reductions in aquaculture yields. Asia produces as much as 90 per cent of the world's aquaculture fish and shellfish, making it particularly vulnerable to impacts from HABs. There has been a 60 per cent increase in the annual incidence of ciguatera (one form of HAB) since the late seventies, and as many as a quarter of the human population of Pacific islands will suffer ciguatera poisoning at some stage of their lives<sup>xxxi</sup>.

22. **Water, sanitation and health.** As seen in Tables 2 and 3, the Asia Pacific region as a whole has made good progress and is projected to meet the water supply MDG target of 97 per cent access. Only 76 per cent of the population of the region is projected to have improved water piped on premises, implying risks for contamination of water at the household level for 24 per cent of the population that lack this level of service. Again the situation is more dire in the Pacific where the projected 2015 level of access, 53 per cent, falls far short of the 73 per cent MDG target and the population having water piped on premises has fallen to only 19 per cent. Moreover, the sustainability of the water sources on which water supplies depend on is at risk due to ecosystem disruption caused by untreated wastewater discharges, unsustainable land use practices in watersheds, and other factors. Despite considerable progress towards the MDG sanitation target within the Asia Pacific region as a whole, raising access to improved sanitation from only 32 per cent in 1990 to 62 per cent in 2015, the region is projected to fall several percentage points short of the target of 66 per cent. The situation is critical in the Pacific sub-region where access to improved sanitation has barely risen from 29 per cent in 1990 to 31 per cent in 2015 and falls far short of the 2015 target of 65 per cent with some 15 per cent of the population still practicing open defecation.

23. **Flooding and infectious diseases.** Flood events are increasing in the Asia Pacific region. The higher incidence of floods is reported to have led to increased risks of infectious disease transmission and its impacts to human health. Waterborne diseases together account for 150,000 deaths per year in East Asia and these vector-borne diseases, such as malaria and dengue fever, are on the increase and enabled by floods. During the 2011 floods in Thailand, approximately five million people were affected of which 630 died from water-borne diseases<sup>xxxii</sup>.

**Table 2: Access to improved water supply and sanitation in Asia-Pacific region<sup>7</sup>**

| Year             | Population (x1000) | Water supply              |                              | Sanitation                |                             |                            |
|------------------|--------------------|---------------------------|------------------------------|---------------------------|-----------------------------|----------------------------|
|                  |                    | Total improved (per cent) | Piped on premises (per cent) | Total improved (per cent) | Sharing improved (per cent) | Open defecation (per cent) |
| 1990             | 301,4777           | 94                        | 70                           | 32                        | 6                           | 33                         |
| 2012             | 3,955,816          | 97                        | 75                           | 58                        | 13                          | 19                         |
| 2015 (Projected) |                    | 97                        | 76                           | 62                        |                             |                            |
| 2015 MDG target  |                    | 97                        |                              | 66                        |                             |                            |

**Table 3: Access to improved water supply and sanitation in the Pacific sub-region<sup>8</sup>**

| Year             | Population (x1000) | Water supply              |                              | Sanitation                |                             |                            |
|------------------|--------------------|---------------------------|------------------------------|---------------------------|-----------------------------|----------------------------|
|                  |                    | Total improved (per cent) | Piped on premises (per cent) | Total improved (per cent) | Sharing improved (per cent) | Open defecation (per cent) |
| 1990             | 5,871              | 46                        | 22                           | 29                        | 4                           | 14                         |
| 2012             | 9,454              | 52                        | 19                           | 30                        | 4                           | 15                         |
| 2015 (Projected) |                    | 53                        |                              | 31                        |                             |                            |
| 2015 MDG target  |                    | 73                        |                              | 65                        |                             |                            |

24. **Air pollution due to land-use change.** Air pollution, including the one caused by ecosystem disruption (e.g. smoke, soot, dust from land use change and clearing of forests), has significant environmental health risks. In Southeast Asia, up to 90 per cent of the smoke which creates the regular transboundary smoke haze in the region comes from peat land fires, causing significant impacts on human health. Altogether, more than 20 million of Indonesia's inhabitants were affected by the smoke such as asthma, bronchitis, pneumonia, skin complaints and eye irritations, from the 1997 forest fires<sup>xxxiii</sup>

25. **Ecosystems and traditional medicine:** Biodiversity has been an essential resource for the development of pharmaceuticals and in addressing challenging health problems. It has also been estimated that up to 90 per cent of the population in developing countries rely on the use of medicinal plants to help meet their primary health care needs<sup>xxxiv</sup>. Furthermore, it is estimated that 25-50 per cent of the USD 640 billion pharmaceutical market is derived from genetic resources<sup>xxxv</sup>. Furthermore, millions of people rely on traditional medicine dependent on biological resources and well-functioning ecosystems. However, today, many species are threatened by extinction, and biological resources and ecosystems are in decline, leading to the loss of bio-prospecting opportunities.

26. **Ecosystems and human wellbeing.** Ecosystems provide nonmaterial benefits to people through spiritual enrichment, recreation, and aesthetic experiences. Exposure to nature and more bio-diverse environments can provide mental and physical health

<sup>7</sup> Forty two countries covered by UNEP's Regional Office for Asia-Pacific (ROAP). Figures calculated from 2014 WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation estimates.

<sup>8</sup> Fourteen Pacific islands covered by UNEP's Regional Office for Asia-Pacific (ROAP). Figures calculated from 2014 WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation estimates.



benefits. Declines in ecosystems and ecosystem services can therefore lead to reduced health benefits to people.

### **III. Outlook for Policy Making**

27. Efforts to integrate environment and health in policy making have faced challenges in many countries around the world and in the region. Development objectives have often been addressed in vertical programs targeted on specific sector-wise development objectives, oft times missing opportunities for mutually beneficial synergies between sectors. Intersectoral coordination has often been hampered by lack of awareness on cross cutting issues and the potential for win-win outcomes. The need for management and control of environmental health risks to be exercised in productive sectors such as energy, industry, agriculture, transport and others has also brought challenges to achieve coordination and collaboration among an increasing number of partners and not merely between environment and health authorities alone. Integrated policy making is therefore a prerequisite for effectively addressing regional and national environment and health challenges.

28. The benefits of integrated policy making are important to consider. Integrated environment and health policies, by their very nature, will be “win-win” policies that support the objectives of both sectors and enjoy the support of both sectors in terms of advocacy and enforcement. Integrated policies are most effective when they derive from higher level national policy objectives that transcend and unite individual sectors. Integrated policy making ensures consistency in governments’ policies and may result in synergies that are greater than the sum of the parts. Integrated policy making also provides environment and health authorities with a structured framework to jointly identify, assess and manage tradeoffs that result from new or reformed policies. Collaboration between environment and health authorities may result in cost savings through economies of scale and, importantly, by reducing health care costs both for individuals and for governments. Some practices that can help promote progress through each stage of the hierarchy include the following: Interdepartmental and ministerial committees, commission and working groups; human resource policies (e.g. job rotation, joint trainee programs); joint cross ministries training; joint budgeting arrangements (allocating budgets for goals, not departments). Public participation in the monitoring and assessment of government policies may be an effective tool for promoting integrated approaches in some countries having a history of civil society participation in governance.

29. In recent years, governments have strived to shift away from single purpose, vertical units of government towards a more integrated approach to public policy and service delivery that is sometimes termed as “joined up government” or “whole of government” approach. WHO promotes this approach in the health sector under the term, “Health in All Policy” (HiAP). In Asia Pacific, Thailand provides a good example. For more than a decade, Thailand has strengthened inter-sectoral collaboration by making HIA’s mandatory at all levels of government<sup>xxxvi</sup>. HIA’s are seen in Thailand as effective tools to address health issues associated with air pollution, pesticide contamination and other environmental hazards<sup>xxxvii</sup>.

#### **A. Policy options to address air pollution and health**

30. At the national level, countries have taken several initiatives to address the issue of air pollution. The policies, strategies and actions for air quality management have been a mix of regulatory measures, economic instruments and technological options. Most of the countries in the region have formulated ambient air quality standards and source-specific emission standards. Regulatory authorities for implementation of these standards have also been set up. Countries like Japan and Singapore have been able to enforce stringent standards based on achievements of earlier initiatives. Other countries, like China, India, Indonesia, the Republic of Korea and Thailand, have taken policy initiatives and progressively tightened standards, particularly with regard to industrial and vehicular emissions. Financial incentives/disincentives in the form of tax concessions and subsidies have been a common practice in some countries. For instance, in Thailand higher tax was levied on leaded gasoline to encourage the use of unleaded gasoline. The technological options such as energy efficient devices, emission control systems, cleaner fuels and clean technologies are among other initiatives required for air control. In India, for example, introduction of improved stoves for rural families had three immediate benefits: (1) reduced black carbon emissions which significantly improved the kitchen air quality below the WHO guideline; (2) less time spent by women collecting biomass fuel because the improved stoves require less fuel than traditional stoves; and (3) reduced cooking time because the stoves are more energy efficient. Building on the established frameworks at the national level, stringent enforcement of regulatory measures and upscaling of technical and economic measures are urgently required to control the current air pollution problem.

31. Recognizing the need for regional cooperation for addressing air pollution, countries have established networks to promote cooperation on air pollution related issues. There are several regional and sub-regional initiatives and networks to promote collaboration and action on air pollution issues in the Asia Pacific region. For example, countries in East and Southeast Asia have initiated scientific cooperation under the Acid Deposition Monitoring Network in East Asia (EANET); South Asian countries have agreed to cooperate under the framework of the Malé Declaration on the Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia (Malé Declaration); countries of Southeast Asia have agreed on a formal treaty on the control of transboundary haze pollution from forest fires/clearance. Other key initiatives include the Asia Pacific Clean Air Partnership (APCAP), Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC), Clean Air Asia (CAA) and the Asian Co-benefits Partnership (ACP).

32. While a wealth of knowledge has been developed through such regional and sub-regional initiatives, the incidences of air pollution have not generally decreased across the region and continue to have severe consequences on human health, agricultural productivity, local and global climate change. There is an opportunity to address the fragmentation of processes and initiatives in the region by developing a mechanism to help them share experiences and identify opportunities for effective collaboration. Such coordination mechanism would help with better use of investments by avoiding duplication of efforts such as assessments and meetings and ultimately speed up air pollution control in the region.

## **B. Policy options to address climate change and health**

33. In order to make the case and secure adequate resources it will be important for policies to highlight and integrate the co-benefits to health and climate change mitigation and adaptation. For example, considering the high concentrations of population in Asian cities, growing greenhouse gas emission as well as its vulnerability due to its location, development of resilient and low carbon cities in Asia with fewer fossil fuel-driven vehicles and with more trees and greenery will bring a number of co-benefits, including improved public health.

34. Regarding mitigation, the emphasis is therefore on identifying policies that have co-benefits for mitigation and human health. Many mitigation measures that reduce emissions of those climate-altering pollutants (CAPs) that warm the planet have important direct health benefits in addition to reducing the risk of climate change. For example, increasing combustion efficiency in households cooking with biomass or coal could have climate benefits by reducing CAPs and at the same time bring major health benefits among poor populations. Energy efficiency and reducing reliance on coal for electricity generation not only reduces emissions of greenhouse gases, but also reduces emissions of fine particles that cause many premature deaths worldwide as well as reducing other health impacts from the coal fuel cycle. Programs that encourage “active transport” (walking and cycling) in place of travel by motor vehicle reduce both CAP emissions and offer direct health benefits. A major share of greenhouse gas emissions from the food and agriculture sector arises from cows, goats, and sheep—ruminants that create the greenhouse gas methane as part of their digestive process. Reducing consumption of meat and dairy products from these animals may reduce ischemic heart disease (assuming replacement with plant-based polyunsaturates) and some types of cancer. Programs to provide access to reproductive health services for all women will not only lead to slower population growth and its associated energy demands, but also will reduce the numbers of child and maternal deaths.

35. In terms of interventions to support adaptation to climate change to minimize health impacts, there are a number of entry points including the National Adaptation Programs of Action (NAPA's) which are conducted by least developed countries and small island states to identify priority actions to respond to their urgent and immediate adaptation needs; the National Adaptation Process (NAP) process which is intended to provide support for medium- and long-term adaptation planning needs in the Least Developed Countries and other developing countries; National Health Strategies; and National Biodiversity Strategies and Action Plans (NBSAPs)'. There is a corresponding need to ensure that these interventions are coordinated and synergistic as far as possible. For example, the Cambodia NAPA includes projects on the production of bio-pesticides, the provision of safe water in high risk Malaria regions and a Malaria education and mosquito habitat clearance campaign while the National Health Strategy also aims to reduce the number of malaria cases and number of deaths caused by malaria.

36. In contrast to Cambodia's experience, the health sector has been largely absent from the NAPA process in most LDC's and SID's worldwide and specifically in the Asia Pacific region. In 2010, WHO assessed the inclusion of health within NAPA's. The assessment concluded that 39 out of 41 (95 per cent) NAPA's identified health as a priority sector negatively impacted by climate change. 30/41 (73 per cent) of the NAPA's identified health interventions within their list of adaptation needs and proposed actions. While 11 per cent (50 out of 459) of the priority projects focused on health, only approximately 4 per cent of the portfolio of the Least-developed Countries Fund (LDCF) funds supporting the NAPA process targeted health adaptation<sup>xxxviii</sup>. One explanation for this lack of support for health sector adaptation includes the limited technical guidance

that was made available to countries to support the development of proposals on health adaptation.

37. As global climate adaptation processes move now beyond NAPA's focus on urgent and immediate needs and forward to NAP's focus on medium- and long-term adaptation planning. UNEP's National Adaptation Plans Global Support Programme has determined that health is a key issue during national consultation processes. It is of critical importance that the health sector be actively engaged in the national adaptation process (NAP). Actively engaging the health sector in adaptation planning ensures that critical actions to protect population health are identified and implemented, and helps avoid policies and programmes in the environment and other sectors that may inadvertently cause or contribute to adverse health impacts. Furthering participation of the health sector will facilitate access by the health sector to national adaptation funds made available through the Least Developed Countries Fund (LDCF), Adaptation Fund (AF), Green Climate Fund (GCF), and other funds. Coordination will also ensure that the health sector maximizes synergies and promotes health and environment co-benefits as well as co-benefits in sectors impinging on both health and environment, such as energy, agriculture, housing and water. Towards this end, the WHO has developed technical guidance to assist countries in the development of the health national adaptation process (HNAP). The health national adaptation process (HNAP) should be the health component of the National Adaptation Plan (NAP), including as an output a detailed health adaptation plan designed to achieve the national health adaptation goals within a specific period of time and given available resources.

38. Another tool that can support an integrated approach to policy making is the Climate Public Expenditure and Institutional Review (CPEIR). A CPEIR reviews the financial management systems as well as the institutional arrangements and policy directives for allocating and spending climate change-related finance. They can therefore be used to assess current climate and health related expenditures and institutional arrangements. Mainstreaming emissions reduction and adaptation considerations into national budgeting processes can also help to identify and potentially reallocate spending that result in co-benefits to addressing climate change and health.

### **C. Policy options to address chemicals, waste and health**

39. Many countries are recognizing the need to strengthen their capacity for chemical risk assessment and management. Under guidance from the chemicals and waste cluster of Multilateral Environmental Agreements (MEAs) and Strategic Approach to International Chemicals Management (SAICM) of the UNEP, many countries have established national chemical safety implementation plans and intersectoral coordinating mechanisms. Consistent with SAICM's global health sector strategy, many national health authorities have begun to collaborate with environment-led initiatives by sharing information and research results, advocating for safe chemical management regulations and practices, and assessing the impact of chemicals management policies through monitoring and evaluation, including biomonitoring and health surveillance<sup>xxxix</sup>.

40. In view of increasing threat of chemicals and waste, response measures have been initiated at international and national level. Major MEAs negotiated at the international level include: the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; The Stockholm Convention on Persistent Organic Pollutants; the

Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone layer; and the Minamata convention on Mercury. Scientific evidence of environment and human health linkages was the exact drive behind the establishment of all these MEAs. Many Asia Pacific countries are parties to these MEAs on chemicals and wastes and responded to the need by developing national strategies and plans. However, many developing countries lack the required capacity, institutional and policy measures for the implementation at the national level. In addition, inadequate capacity for addressing emerging issues is such as dioxin emissions from open burning, lead in pain, cadmium containing products such as nickel-cadmium batteries, and increasing threats of endocrine disturbing substances is also a concern. Existing MEAs provide an opportunity to enhance capacity building, knowledge transfer, and awareness at the national and local levels. The successful implementation of the Montreal Protocol, for example, will be preventing about two million skin cancers world-wide every year by 2030<sup>xl</sup>.

41. The Global Alliance to Eliminate Lead Paint (GAELP) presents another important opportunity for environment and health integration. The initiative draws on the experience of the global community's earlier campaign to gradually phase out leaded gasoline worldwide which accrued USD 2.4 trillion annual benefits, 1.2 million fewer premature deaths, higher overall intelligence and 58 million fewer crimes<sup>xli</sup>. UNEP and WHO jointly established GAELP to catalyze efforts to prevent children's exposure and to minimize occupational exposures to lead paint. Collaboration between environment and health authorities in countries such as Australia, Nepal, Philippines and Sri Lanka has led to the establishment of national standards for lead in paint that are consistent with international best practices. GAELP continues to gain momentum worldwide but much more needs to be done for the elimination of lead in paint to match the success brought about earlier by the global community's determination to eliminate this harmful chemical from gasoline.

42. The availability of integrated approaches and waste-to-resource technologies provide opportunities to implement sound management of wastes at the national and local level. Wastes management has become a significant planning challenge faced by the countries at national and local level. Waste is often handled in a fragmented manner seeking end of pipe solutions rather than using integrated approaches and preventive measures. This has also resulted in use of unsafe practices for waste management. The management of infectious health care waste, for example, is a critical issue as unsafe practices pose serious risks to the environment and public health alike. Contaminated needles and syringes may be recovered by scavengers in dumpsites and landfills to be recycled, repackaged and reused.<sup>9</sup> An assessment by WHO in 22 developing countries showed that in 2002 the proportion of health care facilities that did not use safe waste management practices ranged from 18 per cent to 64 per cent<sup>xlii</sup>.

43. Sound management of wastes can bring social, economic and environmental benefits and support green economic growth through creation of new job opportunities and business. Sound management requires integrated approach based on 3R (reduce, reuse and recycle) principle. Technologies for supporting such approach are available. A wide range of technologies are available and have been demonstrated for converting wastes into resources<sup>xliii</sup>.

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<sup>9</sup> WHO estimated that, in 2000, the use of contaminated syringes caused 21 million hepatitis B (HBV) infections; two million hepatitis C (HCV) infections, and at least 260,000 HIV infections.

44. Engaging the stakeholders, particularly the health sector is crucial in the development and implementation of integrated approach for sound management of chemicals and wastes. One factor driving the health sector's interest has been the requirement of the International Health Regulations (2005) for all countries to maintain adequate core capacity to deal with chemical events of public health significance. Presently, member states of the WHO South-East Asia Region and member states of the WHO Western Pacific Region have assessed the level of attainment of their core capacities to manage chemical events of public health significance to be only 50 per cent and 57 per cent respectively<sup>xliv</sup>. This presents an opportunity for national health and environment authorities to build the capacity needed to comply with IHR requirements through partnerships that strengthen national capacity to detect and assess chemical incidents that may be of concern to public health.

#### **D. Policy options to address ecosystems disruption and health**

45. Many policy options are available to address ecosystems disruption and its impact on human health.

46. **The reduction of eutrophication** that leads to harmful algal blooms and loss of agro-biodiversity, calls for interventions such as reduction in the runoff of fertilizers and soil into waterways from large scale agriculture, the promotion of greenbelts along riverbanks, agricultural fields and coastlines, enforcement of regulations that protect critical habitats, and the adoption of commodity certification schemes for plantations.

47. **Flood prevention efforts** may be enhanced by undertaking national mapping, monitoring and analysis of health and economic impacts of floods, and investment in Integrated Water Resources Management (IWRM) practices.

48. **Control of invasive alien species** should be accelerated by mapping the national economic impact of IAS, promoting Integrated Pest Management (IPM) practices, and implementing National Invasive Species Strategies and Action Plans (NISSAP's).

49. **Harmful effects of pesticides** may be reduced by promoting IPM, reducing agricultural pests, reducing runoff, and stimulating markets and fiscal support for multiple cropping systems and agroforestry, including robust certification systems.

50. **Marine resources** may be supported by supporting marine production bases (reefs, seagrass meadows and mangroves) and reducing overfishing, protecting critical habitat through cross-sectoral marine and coastal spatial planning, including continued strengthening of marine protected areas, and establishment of fisheries refugia as a means towards ensuring an ecosystem approach to fisheries sector management.

51. **Forest and peat fires** may be controlled by enforcing strategies such as the ASEAN Peatland Management Strategy, setting and attaining national targets on the reduction of forest fires, developing and implementing sustainable forest management strategies such as the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanisms, and investing in forests as a transition towards a green economy.

52. In order to implement such policy options effectively, a number of support mechanisms are available.

- **National outreach programmes** on the linkages between healthy ecosystems and human health, to support the implementation of the strategies addressing ecosystems-health nexus;
- **Stronger statistical data** on ecosystem degradation and its health impacts (nutrition, diseases, natural hazards, etc.).
- **Making the economic case** for investing in ecosystems-health nexus, such as through the assessments of the economic costs of ecosystems degradation and its impacts on human health, and benefits of policies and programmes that address ecosystems-health nexus;
- **Monitoring progress** on ecosystems-health nexus through expanding existing monitoring systems and indicators, such as Green GDP index system, Inclusive Wealth Index, etc. and communicating them in government communications to all relevant sectors.

53. The interrelationships between biodiversity, ecosystems and human health are complex. In some cases, an increase in biodiversity has a positive effect on human health, while in other cases, it has a negative effect. In relation to human health, anthropogenic environmental changes in some cases bring about positive impacts, for example increased agricultural productivity leading to enhanced nutrition, but it may also bring about negative changes, such as nutrient runoff from agricultural fields leading to negative health effects. Therefore, better understanding and awareness of these complex inter—linkages is essential in designing appropriate policies on biodiversity, ecosystems and human health. Furthermore, understanding the trade-offs between competing uses of biodiversity and ecosystem services and highlighting synergistic situations in which the conservation of biodiversity actually promotes human health and well-being would be effective. In particular, economic analysis of such trade-offs and synergies provide a good basis for supporting decisions on resource allocations and developing alternative approaches and that take into account the interrelationships between biodiversity, ecosystems and human health and well-being. The policies and approaches that we require should aim for simultaneously improve human health while maintaining biodiversity and ecosystems<sup>xlv</sup>.

54. In order to realize integrated approaches, it is important to ensure that the linkages between health and ecosystems are widely recognized, valued and reflected in national public health, national accounts and budgeting, as well as in land management sectors and their policies (planning, agriculture, fisheries, tourism, etc.). These strategies should focus on the promotion of health benefits provided by healthy ecosystems in terms of food security and nutrition, pharmaceuticals and traditional medicines, mental health and physical and cultural well-being; and the management of ecosystems to reduce the risks of infectious diseases by avoiding ecosystem degradation, preventing invasive alien species, and improving water resources management<sup>xlvj</sup>.

55. In the efforts to adopt an integrated approach as mentioned above, the application of ecosystem-based management (EBM) should also be promoted, which emphasizes the health of the whole land or seascape, including production sectors, and the protection and restoration of ecosystem structure, function and key processes. EBM is concerned with sustaining the services that healthy ecosystems produce to the benefit of the local economy and its people.<sup>xlvixlviii</sup> Under the EBM, strong emphasis is placed in promoting cross-sectoral approaches and integrated policies, and therefore could be an effective approach in addressing the ecosystems-health nexus. EBM can be supported through development and application of indicators and methodologies that make the

economic case for investing in the ecosystems-health nexus and measure progress in addressing ecosystem disruption and its impact on human health, as well as its contribution to human welfare and green growth by using indicators such as Green GDP index system and Inclusive Wealth Index.

#### **IV. Healthy Environment, Healthy People: Options for Action**

56. In Asia Pacific, integrating policy making on environment and health issues could bring benefits to both sectors, improving environmental quality and public health through intersectoral collaboration. Integrated policy making should focus on priority environment and health issues, including those endorsed by resolutions of the first UN Environment Assembly, such as air quality and health, chemicals and waste, and ecosystems disruption. Climate change and its impact on environment and health is also a priority issue. Based on the analysis of environment and health issues and existing initiatives, the following options are proposed for action.

##### **A. Develop or revise and implement National Environment and Health Action Plans**

57. National Environment and Health Action Plans (NEHAP's) represent a comprehensive, holistic and intersectoral way of planning and implementing environmental health action at the national level. In many cases, NEHAP's have evolved from plans to national processes for environmental health. In the Asia Pacific, some countries have developed NEHAP's. Countries' experiences with the development of NEHAP's in Asia Pacific have been uneven and preliminary recommendations for improving NEHAP's in the region can be drawn from the present review. It is recommended to conduct more rigorous review of NEHAP's at the national level, including a review of their impacts. Based on the review existing NEHAP's should be revised. New NEHAP's are suggested to be developed for those countries without existing NEHAP's.

##### **B. Plan the development of environment and health information systems**

58. The development of guidance and support for capacity building on environment and health issues should also enable countries to plan and implement integrated health and environment information systems. It will be particularly strategic to include within national environment and health information systems, mechanisms for monitoring and reporting environmental quality indicators related to public health and the related health indicators. Information systems that monitor countries' compliance with related Multilateral Agreement (MEA) targets and with countries' own environment and health sector policies and plans, such as NEHAP's, will also support reporting to progress with SDG implementation.

##### **C. Promote synergy among existing air pollution related initiatives at the regional level**

59. As noted above, many ongoing regional processes and initiatives have built a wealth of knowledge on air quality and health issues in the Asia Pacific region and a strategic priority is to strengthen coordination among them in order to optimize the sharing of information and knowledge, policy making, and efforts towards capacity building at national and local level. The Consultation Meeting for the Joint Forum on



Clean Air in Asia (Colombo, 17-18 November 2014) considered this matter and recommended establishment of a Joint Forum on Clean Air in Asia and the Pacific.

60. The meeting discussed a wide range of roles where the Joint Forum could support countries, processes and initiatives including provision of a platform for dialogue, information sharing, and joint action; linking science with policy by bringing together information in an accessible and policy relevant form, including through regional synthesis reports; supporting communications by compiling information into simple form, including campaigns, for wider dissemination for non-technical audience such as parliamentarians and general public; building regional expertise and enhancing management capacities through regional trainings and knowledge transfer and sharing; facilitating action for reducing air pollution; developing inputs to global fora such as the United Nations Environment Assembly and the World Health Assembly, regional and sub-regional fora such as the Regional Forum of Environment and Health, ASEAN, SACEP, Pacific Islands Forum, etc.

#### **D. Expand the geographical scope of the Regional Forum on Environment and Health in Southeast and East Asian Countries to Asia Pacific**

61. The Regional Forum on Environment and Health in Southeast and East Asian Countries (Regional Forum) is an initiative of fourteen countries established in 2007 to strengthen the cooperation of environment and health authorities within and among the countries by providing a platform for sharing knowledge and experiences, improving policy and regulatory frameworks at the national and regional level, and promoting the implementation of integrated environmental health strategies. UNEP and WHO jointly provide the Secretariat for this Regional Forum. Through the Forum various activities have been implemented including inter-country working group meetings and scientific conferences which have resulted in the exchange of information among member countries.

62. It is recommended to expand the geographical scope of the Regional Forum from Southeast and East Asia to Asia Pacific. It may be noted that the Regional Forum's third ministerial meeting (Kuala Lumpur, 2013) resolved inter alia to invite other countries in the region to join the Regional Forum for the common benefit of all and for the sake of learning from and assisting each other in creating a better environment to promote health for all...<sup>xlix</sup>

63. While considering the feasibility of expanding the Regional Forum, however, careful consideration should again be paid to financing needs and mechanisms. The Regional Forum's third ministerial meeting urged member countries to consider various funding options and, in consultation with the Secretariat, "to decide on the most effective combination of voluntary financing options to support the Regional Forum and its activities".<sup>1</sup> The effectiveness and efficiency of other regional or sub-regional approaches for promoting integrated environment and health strategies and their financial implications should also be weighed, as alternatives to expansion of the Regional Forum's membership. One option may be to promote intersectoral policy fora within the context of well-established sub-regional forums.

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