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**Work Plan – Thematic Working Group (TWG) on
Climate Change, Ozone Depletion and Ecosystem Changes**

By: Thematic Working Group members on
Climate Change, Ozone Depletion and Ecosystem Changes

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Work Plan-Thematic Working Group on Climate Change, Ozone Depletion and Ecosystem Changes

1. Background

Environment can be broadly define as the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of flora and fauna and the social factors of aesthetics. Within this environment, living things (plant, animal and micro-organism) exist in a complex dynamic interaction; one is invariably dependent on the others. The interaction between environmental components can be in many forms which include competition, predatory, parasitic, facilitator (such as dispersal of seed) and supportive (such as provision of shelter). These fundamental linkages among organisms and their physical and biological environment constitute an interacting and ever changing system that is known as eco-system. Human beings are a component of these eco-systems and in many ways, micro-organisms that cause infections are also parts and parcels of the eco-systems.

The human activities in the past few years have modified the eco-system, especially during the last 50 years, through the increasing use of natural resources, emissions of pollutants, and the use of hazardous/toxic chemicals. Experts have already observed warning signs negative impact to the human health which affected many countries in the region. One of the problem is climate change which likely to have wide-ranging and potentially serious health consequences. Some health impacts are resulted from direct-acting effects such as heat wave-related deaths, weather disasters, and others from disturbances to complex ecological processes like changes in patterns of infectious disease, freshwater supplies, and food production.

The atmosphere changes had been also threatened the human health. In the normal condition, the natural ozone levels in the atmosphere protecting the human life by absorbing most harmful solar radiation of the UV-B before it can reach the Earth's surface. However, due to extensive use and release of different type of the ozone depletion substance to the atmosphere, the destruction of stratospheric ozone layer in some area during the past two decade became critical increasing level of UV-B radiation. Any changes in the amount of radiation that penetrates to the Earth's surface as a result of the thinning of the ozone layer can have potentially serious implications for human health and ecological systems, and also for global climate. Excessive UV-B radiation is reported link to various types of skin cancer, cataracts and damage to the human immune system; UV-B is also known to be harmful to some crops and some forms of marine life.

In some diseases, human, the agent and their environment co-exist in a stable state of equilibrium such that the transmission of the infections is maintained at a low level of endemicity. Similarly such equilibrium and endemicity is maintained for diseases confined to the animals. Each of this occurs in a well-defined ecosystem. Any changes to the eco-system may offset this equilibrium which may trigger the occurrence of infectious disease outbreak. Similarly, encroachment or displacement of one species into another ecosystem with or without broken defined boundaries may introduce a novel pathogen which may lead to a fatal disease outbreak.

Countries in Asia-Pacific and South-Asia regions are very prone to infectious diseases, very often occurring in epidemic proportion. In recent years, apart from the usual outbreak of the endemic diseases such as malaria, dengue and cholera, the regions are experiencing outbreaks of newly emerging, novel infectious diseases such as the Nipah virus, Severe Acute Respiratory Syndrome (SARS) and avian influenza H5N1.

Many factors favour the emergence of these infectious diseases and environmental degradation, either natural or man-made, is a significant contributory factor. These changes cause a cascade of factors that exacerbate infectious disease emergence, such as forest fragmentation, pathogen introduction, pollution, poverty and animal and human migration. These are important and complex issues that are understood only for a few diseases (Patz AJ, 2004). Zoonotic diseases are the important source of infection and the most significant cause of emerging and novel infectious diseases in human. Out of about 1,400 known pathogenic species of infectious organisms to human, 61% are zoonotic (Patz et al, 2004). Wildlife and domestic animals are the key players that provided the zoonotic pool from which previously unknown organism may emerge in human (Darszak et al, 2001). Cross-species transmission of infectious agents is among the most important public-health threats facing humanity.

The emergence of the novel paramyxovirus, the Nipah virus (Lam & Chua, 2002), in 1998 came as a surprise and caught Malaysian as a whole unprepared. The virus caused an outbreak of severe febrile encephalitis in human with high fatalities, whereas in the pigs, the disease had a relatively low mortality. Between September 1998 to December 1999, a total of 283 cases of viral encephalitis with 105 fatalities were reported (Chua, 2003). In retrospect, available data and evidence suggest that a complex interplay of multiple factors led to the spillage of the virus from its natural reservoir host into the domestic pig population with subsequent spread to humans (Chua et al, 2002a). The emergence of Nipah virus is **an example of the complexness of the link between climatic change (El-Nino), eco-system destruction (natural and man-made forest fire) and human health (Nipah encephalitis)** which are often indirect, displaced in space and time, and dependent on a number of modifying factors. It was postulated that deforestation has substantially reduced the forest habitat of fruit-bats and flying foxes. Subsequent mass open burning or natural fire facilitated by the el-nino phenomena at that time, led to the unprecedented encroachment of cultivated fruit orchards by the flying foxes in the initial outbreak. The virus was isolated from the flying-foxes (Chua et al, 2002b). These anthropogenic events, coupled with the location of piggeries in orchards and the design of pigsties in the index farms allowed the transmission of a novel virus from its reservoir host to the domestic pig and ultimately to the human population (Chua et al, 2002a). Flying fox are known to travel over considerable distance. Radio-tagged grey-headed flying fox in eastern Australia have been shown to undertake regular long distance movement covering up to 600km (Field et al, 2001). Since 1999, the infection has emerged in Bangladesh in four outbreaks in 2001, 2003 and 2004 (Harcourt et al, 2005). More recently the virus has been implicated in an outbreak of febrile illness with altered sensorium in Siligari, India (Chadha et al, 2006). Similar Nipah-like outbreak may occur again, in different place at different time.

The only way to combat such an overwhelm challenge of nature is through regional and global cooperation. The issues are not confined within the arbitrary borders of individual countries, but span the borders of many nations. Therefore, it is necessary to create a framework for strategic cooperation by which to cope with regional problems. It is important for countries in the region to develop and increase its' capacity to adapt to this potential threat through information sharing and building up technical expertise through cooperation and collaboration. We need to understand better the complex interaction between climate change, ozone depletion, eco-system and infection and because of the trans-boundary risk as experienced in previous outbreaks, it is important that the research is multi-disciplinary and collaborative in approach.

2. Objectives

The objectives of this activity are:

- To enhance regional knowledge management and technical support for emerging and re-emerging infectious diseases associated with climate change, ozone depletion and eco-system change through information sharing and regional cooperation
- To promote research and development in understanding the complex inter-relationship between climate change, ozone depletion, ecosystem change and human health particularly infectious diseases
- To promote effective management of the environment for the benefit of human health at the region
- To establish a regional information centre from which the member countries may access available sources of data related to human health effects of the climate change, ozone depletion and environmental changes

3. Activities

Objectives	Activities	Time-line
Enhance knowledge management & technical support	Regional inventory of experts	First list: 2 nd Quarter 2008, on-going
	Regional inventory of laboratory facilities (human and animals)	First list: 2 nd Quarter 2008, on-going
	Regional inventory of Good Practice Guidelines*	First list: 2 nd Quarter 2008, on-going
	Regional inventory impact of climate, ozone and ecosystem change to health	2007-2010
	Training for young scientist	2008-2009
	Monitoring the source information of Asian dust sand storms	2008-2010
	Development and training on risk assessment methodology for infectious and non-infectious disease	4 th Quarter 2008
Promote research & development	Regional inventory of research institutions and facilities	First list: 2 nd Quarter 2008, on-gong
	Compilation of research abstracts on subject matters	First list: 3 rd Quarter 2008, on-going
	Regional conference on climate change, ozone depletion, ecosystem changes & health	2 nd Quarter 2009
	Regional collaborative research to study the agreed priority issue directed problem (e.g. zoonotic trans-boundary migration and movement, data relevant to the UV radiation and human health issue)	3 rd Quarter 2009
	Prioritizing communicable and non communicable diseases	2008~2010

Effective management of the environment for benefit of human health	Establishment of regional committee as a "think tanks" for developing regional cooperation related to the topics area	2 nd Quarter 2008
	Regional meeting to identify priority issues for the region and make suggestion to overcome the problem	3 rd Quarter 2008
Regional Information Centre	Inventory of information sources in participating country member	1 st Quarter 2008
	Define mechanism for sharing information	4 th Quarter 2008

* e.g. Good Agricultural Practice Guideline, Syndromic Surveillance Program,

4. Outputs

Expected outputs:

- Publication of regional resource inventory containing
 - i. list of expertise
 - ii. list of laboratory facilities,
 - iii. Inventory of Good Practices Guidelines
 - iv. list of research institutions
- Publication of compendium of research abstracts (or as supplementary issue of journal)
- Organisation Regional scientific conference health impact of climate change, ozone depletion and eco-system changes
- Publication on Asian dust sand storms
- Research protocol for collaborative research of agreed research topic(s)
- Regional committee
- Centre for facilitating information exchange among the member countries

5. Monitoring and reporting

Output	Indicator
Regional Resource Inventory	<ul style="list-style-type: none"> • Appointment of coordinator • Publication of Inventory
Compendium of research abstract	<ul style="list-style-type: none"> • Appointment of coordinator • Publication of abstract
Regional scientific conference	<ul style="list-style-type: none"> • Appointment of organiser • Distribution of 1st announcement • Distribution of final announcement • Post-conference report
Training	<ul style="list-style-type: none"> • Number of training participants
Collaborative research	<ul style="list-style-type: none"> • Identification of research topic

	<ul style="list-style-type: none"> • Identification of research team • Availability of research funding • Implementation and research progress report
Regional Committee	<ul style="list-style-type: none"> • Appointment of committee member • Priority issue for the region defined
Information Centre	<ul style="list-style-type: none"> • Appointment of coordinator • List of information sources in each country available • Information exchange mechanism agreed

6. Resources

Activity	Resource required	Resource availability
Regional inventory	Secretariat services in communicating, compiling and publishing inventory	<ul style="list-style-type: none"> • TWG Focal Point may be appointed to serve as the secretariat • May need to mobilise fund for publication
Compendium of research abstract	Secretariat services in communicating, compiling and publishing inventory	<ul style="list-style-type: none"> • TWG Focal Point may be appointed to serve as the secretariat • May use existing journal/ annual publication
Regional scientific conference	Organising committee	<ul style="list-style-type: none"> • TWG Focal Point may be appointed to serve as the main Organising Committee • WHO/ENEP as co-organiser and sponsor
Collaborative research	Research collaborators both within and outside the region	<ul style="list-style-type: none"> • Regional conference may identify research questions & projects • Mobilise research fundings
Information Centre	Secretariat services in communicating, compiling and publishing inventory	<ul style="list-style-type: none"> • Secretariat to facilitate the information exchange