MEETING OF THE THEMATIC WORKING GROUP (TWG) ON CLIMATE CHANGE AND HEALTH OF THE REGIONAL FORUM ON ENVIRONMENT AND HEALTH

JAKARTA, REPUBLIC OF INDONESIA, 9-12 DECEMBER 2013
MEETING REPORT

MEETING OF THE THEMATIC WORKING GROUP (TWG) ON CLIMATE CHANGE AND HEALTH OF THE REGIONAL FORUM ON ENVIRONMENT AND HEALTH

Convened by:
THEMATIC WORKING GROUP (TWG) ON CLIMATE CHANGE, OZON DEPLETION AND ECOSYSTEM CHANGES

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1. INTRODUCTION

The meeting of the Thematic Working Group (TWG) on Climate Change and Health of the regional forum was held from 9 to 12 December 2013. There were 29 participants (the list of participants is in Annex 1 and the meeting agenda is in Annex 2), including members of Thematic Working Group (TWG-CC) from twenty countries in the region, secretariats from the World Health Organization (WHO), United Nations Environment Programme (UNEP) and resource persons.

The TWG-CC was previously named as the Thematic Working Group on Climate Change, Ozone Depletion and Ecosystem Changes and was one of seven working groups that were established following the First Ministerial Regional Forum on Environment and Health in Southeast and East Asian Countries, held from 8 to 9 August 2007 in Bangkok, Thailand.

The objectives of the TWG-CC are to enhance regional knowledge management and technical support for emerging and re-emerging infectious diseases associated with climate change and eco-system change through information sharing and regional cooperation; and to promote research and development in understanding the complex inter-relationship between climate change, ecosystem change and human health particularly infectious diseases.

The TWG, chaired by the Ministry of Environment, Republic of Indonesia, now operates under the Framework for Cooperation that was approved by the Third Ministerial Meeting of the Regional Forum on Environment and Health, held on 10 September 2013 in Kuala Lumpur, Malaysia.

1.1 Objectives

The objectives of the meeting are the following:

(1) To present the latest draft of WHO reports on climate change and health;
(2) To report and discuss the outcomes of COP19 Warsaw Climate Change Conference emphasizing on the relevance of addressing the linkages between Climate Change and Health;
(3) To renew the work plan of the TWG-CC and formulate a roadmap for the strengthening of regional collaboration in the development of regional and national action plans addressing Climate Change and Health;
(4) To explore financing opportunities for the implementation of roadmaps, raising awareness and training members of the TWG-CC on project financing processes;
(5) To involve potential new members of the Regional Forum and include them in the TWG-CC knowledge sharing in order to strengthen their planning for National Health Adaptation to Climate Change.
1.2 Opening Session

Mr. Arief Yuwono, Deputy Minister for Environmental Degradation Control and Climate Change welcomed the participants. He highlighted some important climate observations reported by the IPCC, in which some of the climate change impacts already occurred in Asia as well as Pacific region. All countries were encouraged to develop technology based early warning system in advance for addressing a health impact of climate change in relation with the diseases epidemic. The early warning system is important tool to reduce victims of the epidemic and health impact of natural disaster.

He also pointed out that mitigation efforts shall be rapidly accelerated and adaptive capacity in developing countries needs to be enhanced to respond climate change. The evidence shows that ignoring climate change will eventually hinder economic growth. The south-south cooperation need to be enhanced, either bilateral or multilateral action for combating climate change, including the health sectors. Recent technology development, including the local wisdom, which supported by the regulation and program will offer solutions for the implementation of adaptation actions, which will take sustained investment in terms of networking, capacity building, community empowering and also fundamental research. The meeting provided opportunity for the working group member and the partners to discuss and share experiences in identifying problems and define its solutions, as well as strengthen the future collaboration.

On behalf of WHO, Ms Payden, Regional Advisor, Water, Sanitation and Health, WHO/SEARO welcomed all the participants and thanked the Government of Indonesia particularly the Ministry of Environment for organizing this important meeting jointly with WHO and UNEP. She informed that in addition the Climate Change TWG members of the Regional Forum on Environment and Health, health and environment officials from several other countries were able to attend this meeting. The meeting is indeed an opportunity to share country experiences and to explore the expansion of funding mechanisms for adaptation and mitigation in the health sector through the National Adaptation Plans of Actions in collaboration with the Environment Focal points.

She concluded by summarizing three key points: first, climate change is a fundamental threat to human health. Second, strengthening control of diseases of poverty is essential to protect the most vulnerable populations. It is a safe investment for adaptation resources for climate change. Third, cutting greenhouse gas emissions can represent a mutually reinforcing opportunity to reduce climate change and to improve public health. Health protection should therefore be one of the criteria by which mitigation measures are judged.

Mr. Jonathan Gilman, Regional coordinator, Inter-Agency and Country Level Coordination, UNEP ROAP also welcomed the participants. He pointed out two important points. There are two important events at the Warsaw meeting specifically related to Climate Change and Health; firstly the 2nd Climate Change and Health summit and secondly the Climate and Clean Air Coalition. He said that momentum is building around an ambitious and integrated post-2015 development agenda that will include sustainable development goals in the area of climate change and health.
As a representative of UNEP, he addressed that UNEP would like to highlight the new Scientific Panel and a Knowledge Network of the Regional Forum on Environment and Health as these mechanisms could play a role in supporting climate change action for improved human health. Finally he noted that the Kuala Lumpur (KL) Declaration also requested UNEP and WHO to continue to provide support through the joint Forum Secretariat.

Ms. Tantri from Ministry of Environment Republic of Indonesia introduced the objectives of TWG-CC meeting as follows: 1) to report and to discuss about climate change and health issues 2) to renew TWG work plan 3) to explore financing 4) to review agendas including countries’ presentations. She also noted that the theme of the event is "Strengthening of Regional Collaboration in the Development of Climate Change and Health Action Plans".

2. PROCEEDINGS

2.1 Day 1: Climate Change Science and Impacts

2.1.1 Presentation on “Climate Change and Health: from Science to policy”

Prof Hae-Kwan Cheong, Sungkyunkwan University, Republic of Korea (ROK) noted that when looking at the temperature variation these days, around 0.85°C has increased over the last 133 years (1880-2012). This trend is closely linked to historical trend of atmospheric CO₂ level. He emphasized that due to variations in temperature, several countries are suffering from climatic health problems that result in asthma, dengue fever and malaria. In case of Mongolia, extreme winter events resulted in huge losses of cattle, severe hunger and other related impacts including urban migration and air pollution. This pathway of Mongolia leads to other related disease such as malnutrition, Post-Traumatic Stress Disorder (PTSD), Waterborne Diseases (WBDs), Food Borne Diseases (FBDs), Cardiovascular Diseases (CVDs), diarrhoea, and respiratory disease. Regarding this, he highlighted that WHO regional framework, WPRO/SEARO have three main objectives;

(1) Awareness–raising;
(2) Capacity building;
(3) Adaptation through influencing on other sectors.

2.1.2 Presentation on “Status of climate change and health: update from the UNFCCC COP 19”

Mr. Diarmid Campbell-Lendrum, Team Leader, Climate Change and Health, WHO Headquarters mentioned that burden of climate-sensitive diseases (CSDs) remains high. To support his address, he added some evidence that under-nutrition induced by climate change kills 3.5 million each year, due to temperature rise caused by climate change diarrhoea kills 2.2 million,
malaria kills 900,000 and extreme water events also kill 60,000. He further noted that WHO estimates that the climate change has occurred since the 1970s and already killed over 14,000 per year. Moreover he highlighted that decisions on energy and pollution reduction will severely influence on huge impacts of health. India is one of the countries where indoor air pollution is very serious. He added that outdoor air pollution gives effects on 3.3 million people’s death per year and indoor air pollution kills 3.5 million each year. These are mostly attributed by inefficient biomass and coal cook stoves. He further noted that in this situation, the opportunities that they can have are UNFCCC negotiations. With regard to UNFCCC negotiations and mechanisms, they have continued to raise the importance of adaptation and the need for international support of around US $100 billion per year. He finally noted that regarding outcomes from Warsaw COP19, health is now widely recognized as one of the key objectives of adaptation, and of reducing black carbon.

2.1.3 Presentations on regional climate change and health programmes

Each WHO WPRO/SAERO representative presented on the regional climate change and health programmes.

Presentation on “A synthesis of climate change & health in the Western Pacific region”

Mr. Jung-Sub Yeom, Technical Officer, Environmental Health (ENH), WHO Regional Office for the Western Pacific asked a question to participants why we do need a synthesis report now. And he answered that based on Regional Frame Work of Climate Change on the Regional Forum, many activities and reports were done. It is time to synthesize for the next step, both regional and sub-regional level. He also addressed that due to projection of climate change global temperature has increased around 1.5°C since 20th Century. It has impacted on infectious diseases, malnutrition, air quality-related effects as well as extreme weather events. Lastly he remarked that in terms of governance, developed and developing countries should identify the body of the national governance on Climate Change and Health (CC&H) and establish a multisectoral committee to deal with the climate change. When it comes to planning, he also said that strategies and actions on adaptation, strengthening public health and health services are crucially needed. In addition he further noted that reducing greenhouse gas emissions is also an important framework activity in terms of mitigation.

Presentation on “Climate change and health in the pacific island countries”

Dr. Rok-Ho Kim, Environmental Health Specialist, WHO Division of Pacific Technical Support, WHOWPRO shared general background of climate change which has affected Pacific Island States (PICs) susceptible to sea level rise. He added that all PICs would require substantial support from WHO in further developing and implementing National Climate Change and Health Action Plans (NCCHAPs) and protecting the public health from the impacts of climate change. Moreover, he added that because of seriousness of climate change, climatic health related issues
have been more significant to be solved. For example, many countries are experiencing exceptional variations in heat wave, dengue fever, seasonality of malaria and asthma.

In terms of ways forward for PICs, he emphasized seven points;

1. Mainstream Climate Change and Health (CC&H) into existing public health system;
2. Align CC&H with Disaster Risk Management (DRM) and Water Supply Sanitation and Hygiene (WASH) activities in PICs;
3. Investigate link between climate change and Non Communicable Diseases (NCDs);
4. Explore climate change impacts on mental health;
5. Develop and improve climate-based early warning systems for infectious disease epidemics;
6. Support Least Developed Countries (LDCs) for establishing sustainable climate health program;
7. Develop and implement the Health component of the National Adaption Plan processes (HNAPs).

Ms. Payden, Regional Adviser, Water Sanitation and Health, WHO Regional Office for South East Asia introduced that there were three important parts to be shared;

1. Importance and extent of climate change related human health impacts;
2. Health vulnerability of the poor;
3. WHO strategy to protect human health from climate change.

Regarding this, she also mentioned commitments to minimize health impacts of climate change;

1. New Delhi Declaration on Climate Change and Health with South-East Asia (SEA) Health Ministers;
2. WHO South-East Asia Regional Committee Resolution;
3. SEA Parliamentarian’s call for action for protecting human health from climate change in South-East Asia.

She further highlighted two key focus areas which are; 1) identify strategies and actions 2) support health systems to enhance capacity for assessing and monitoring health vulnerability, risk and impacts. She noted that SEARO is taking actions on climate change and health. In general the actions that SEARO has taken are South-East Asia Regional Parliamentarian’s Conference on protecting human health from climate change in 2010, South-East Regional High Level Preparatory Meeting for COP16, retrospective study protocol to assess the linkage between
climate change and VBDs, FBDs and WBDs. In the countries’ level, several vulnerability and adaptation assessments have been conducted, small studies on the impact of climate change on climate sensitive diseases have been carried out and health adaptation project is running in Bhutan, one new project on low emission climate resilient development in Maldives and two new projects in Bangladesh and Nepal on “Protecting health by strengthening resilience of drinking water and sanitation services from climate change”.

2.1.4 Presentation on “Short-Lived Climate Pollutants (SLCPs); special focus on Atmospheric Brown Clouds (ABCs): Monitoring, Assessment and Mitigation”

Dr. Ram Lal Verma, AIT-UNEP Regional Resource Centre for Asia and the Pacific, Thailand introduced how to define the climate change. According to him, accumulation of energy in earth-atmosphere resulted in an increase in temperature, sea level, glacier melting and so on. Moreover, he explained Short-Lived Climate Pollutants (SLCPs), such as Black Carbon (BC), CH$_4$, HFCs, and Trop-O$_3$ which need special attention to control the rate of climate change in the future. He also introduced the concept of Atmospheric Brown Clouds (ABCs) which are widespread layers of brownish haze of regional scale plumes of air pollutants consisting of mainly aerosol particles (such as BC and non-BC) and precursor gases (such as CH$_4$, CO, NMVOCs, NOx), which produce aerosols and ozone. These ABCs and their interaction with build-up of Green House Gases (GHGs) significantly affect the regional climate, hydrological cycle, glacial melting, agriculture production, and human health. Another issue that he highlighted was approaches for promoting SLCPs mitigation. The overall goals that he emphasized were;

1) Building upon existing legal instruments;
2) Promoting further efforts by international organizations and cooperative mechanisms including partnerships and networks;
3) Putting enabling mechanisms in place at the global scale to facilitate the implementation of black carbon and methane mitigation measures;
4) Strengthening technical assistance, technology transfer and capacity building and financing.

2.1.5 Presentation on “Flooding and diarrhoeas: methodological challenges for scientific evidence”

Prof Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University, Japan introduced background of floods in recent years. He addressed that floods are the most frequent natural disasters affecting over 2.5 billion people during the last thirty years. Recently floods have tended to intensify, and this trend could increase with climate change. Diarrhoeal disease is one of the leading causes of morbidity and mortality, especially among children in low-income countries. He further added that in high-income countries, the risk of diarrhoeas caused by floods is considered to be low, although a study in the UK reported an increase in risk of gastroenteritis
of individuals exposed to floods. According to a study in the United States found that flooding house or yard was associated with increased risk of gastrointestinal illness. Self-reported diarrhoeas were used as an outcome measure in these studies. In low-income countries, where water supply, sanitation system and causative agents of diarrhoea are likely to be different from those in high-income countries, increase of post-flood in cholera, rotavirus diarrhoea, cryptosporidiosis and non-specific diarrhoea has been reported. He said that there was a report that in the area outside, the flood-control embankment had an 18% higher mortality rate compared to the rate of inside the embankment suggesting adverse effect of flooding on diarrhoeal mortality. However, he noted that most of these studies had methodological problems such as lack of pre-flood data, lack of comparison groups and potential bias. He added some limitations;

(1) Exposure to the 2004 flood was indirectly ascertained with regard to the results of an interview with the representative of each country in 2008. Although there was no major flood or heavy rainfall after the 2004 summer flood, until the date of the interview, the long-time interval could cause recall bias;

(2) There was also imprecision in definition of the flood period.

Redefining the flood period with more precise data on its duration in this region might show slightly different patterns of rates, but it is unlikely to have a material effect on the overall results during the 3-year post flood observation period. To sum up his presentation, he concluded that this study provided detailed quantitative evidence on the flood-related risk of diarrhoea following the severe monsoon flood of 2004.

2.1.6 Countries’ presentations on “Current status of Climate Change and Health”

Each member country presented on current status of climate change and health.

<Brunei Darussalam>

Dr. Hjh Anie Haryani Bte Abd Rahman, Director of Environmental Health Service, Department of Health Services, Ministry of Health and Mr. Shaharuddin Khairul ANUAR, Acting Deputy Director, Department of Environment, Parks and Recreation, Ministry of Development presented the current state of climate change and health in Brunei Darussalam and its health system. Regarding temperature, Dr. Abd Rahman noted that it remained similar comparing to past 30 years’ and past 5 years’ temperature. And he further noted that climate change mostly has influenced on VBDs such as dengue, chikungunya and Japanese encephalitis (JE). To take an action against climate change and health issue, Mr. ANUAR said that Brunei Darussalam has established the Brunei Darussalam Council in 2010 and various sectors have developed relevant adaptation and mitigation policies. All these efforts were estimated to have positive impacts on health. According to him, Brunei Darussalam has monitored water quality, especially during extreme weather conditions and Government of Brunei Darussalam enhanced multi-agency cooperation and community participation to cope with climate change. Moreover to
enhance surveillance and early warning on various diseases, he emphasized that joint prevention and control activities with relevant agencies and authorities have been done.

**<Cambodia>**

Ms. Vichet Ratha Khlok, Chief Officer, Climate Change Department, Ministry of Environment and Dr. Prak Piseth Raingsey, Director, Preventive Medicine Department, Ministry of Health shared Cambodia’s current activities and policies to cope with climate change related threats. The average temperature in 1960 was 25.2°C and is currently 28.3°C in Cambodia. So Cambodia is expecting that the future temperature will rise up to 31.2°C in 2050. In addition they noted that VBDs and water and food borne infectious diseases were main risks in the past. However currently important issues are psychological distress, greater frequency of infectious diseases, increased risk of death and serious illness principally in older age group. Thus Ms. Khlok said that Cambodia has created three crucial strategies to resolve current threats caused by climate change; 1) increase resilience capacity of the population in combating VBDs and water and food borne infectious diseases 2) reduce impacts of extreme weathers and disasters through better emergency preparedness and response plans 3) build knowledge of the population and health personnel to cope with climate change impacts.

**<China>**

Mr. Guo Shu, Senior Engineer, South China Institution of Environmental Sciences, Ministry of Environmental Protection said that temperature variation from average 0.31°C to 9.4°C for forty years has heavily affected on health. The major risks are increasing morbidity or mortality of infectious diseases, cardiovascular diseases, respiratory diseases, injury and so on. He also mentioned that currently observed health related issues are increasing in morbidity and mortality of chronic diseases due to extreme weather. Government of China has taken actions to cope with climate change related health problems for recent years. He highlighted four actions that Chinese government has taken:

1. The government of China issued national health emergency plan of natural disasters, developed health emergency plan for heatstroke from high temperature and National Environment and Health Action Plan (2007-2015) and developed research on climate change, air pollution, water pollution and human health;
2. National Mortality Surveillance and Network Reporting System have been established by China Centres for Disease Control (CDC);
3. Global pilot adaptive project of ‘Climate Change Adaptation to protect Human Health’ was supported by GEF, UNDP and WHO;
4. ‘Climate Change and Health Impacts and Adaptation Mechanism’ is funded by national basic research program.

**<Lao PDR>**

Dr. Taypasavanh Fengthong, Chief, Environmental and Occupational Health Management Division, Department of Hygiene and Health Promotion, Ministry of Health and Mr.
Amphayvanh Oudomdeth, Officer, Ministry of Natural Resources and Environment described the current status of climate change and health in Lao PDR. The main points that they stressed were 1) average temperature of Lao has not changed dramatically 2) main risks of climate change are dengue, diarrhoea, dysentry, typhoid fever, food poisoning, hepatitis, malnutrition in the past and currently are mental health and leptospirosis. He further noted that Lao PDR has done 1) National Adaptation Programme to cope with climate change 2) Climate Change strategy for Lao PDR 3) Climate Change Action Plan 2013-2020.

**Malaysia**

Dr. Daud bin Abdul Rahim, Head of Occupational and Environmental Health, Disease Control Division, Ministry of Health noted with analytical evidence that the range of annual mean surface temperature for the country as a whole is about 26°C to 28°C. And annual maximum rainfall intensity for 1 hour and 3 hours durations (2000-2007) has increased by 17 percent (112 mm/hour) and by 29 percent (133mm/hour) respectively compared to the 1970s values. To enhance early warning, he mentioned that continuous data surveillance for selected communicable diseases is needed.

### 2.2 Day 2: Health National Adaptation plans

#### 2.2.1 Presentation on “Overview on the objectives of National Adaptation Plans: Why it is important for the health sector to be involved in the NAP process?”

Mr. Diarmid Campbell-Lendrum, Team Leader, Climate Change and Health, WHO Headquarters pointed out that health sector was absent from National Adaptation Programme of Action (NAPA) process. He also added that according to WHO report 2002, over 95% of LDCs identified health as a priority sector for climate change and 73% included health interventions within adaptation needs and proposed actions. Less than 30% had adequate health vulnerability assessments and health adaptation plans. Thus, now the health sector is ready to be part of National Adaptation Plan (NAP) process and it is moving fast in developing it. The followings are the actions that have been taken to embrace health sector in NAP; 1) WHO guidance to protect health from climate change through health planning 2) regional workshops to develop HNAPs 3) Operational framework to build health systems resilience to climate change.

How can WHO support this process? Regarding the question, he answered that WHO should support LDCs to finalize Health component of the National Adaptation Plan process (H-NAPs) at national level, facilitate and promote funding opportunities and support health sector in its normative and monitoring roles in relation to other health-determining sectors (e.g. indoor and outdoor air pollution and WASH). He further noted that health adaptation planning implies two points; 1) building health systems resilience through climate-smart health programmes 2) working with other health-determining sectors (e.g. food and nutrition, water, housing and energy).
2.2.2 Presentation on “WHO guidance to protect health from climate change through health adaptation planning”

Dr. Kristie L. Ebi, Consulting Professor, Department of Medicine, Stanford University, Independent Consultant Climate Change Impacts and Adaptation emphasized the hazard of climate change by addressing ‘vulnerability’ which is the degree that a person or a group is susceptible to or unable to cope with the adverse effects of climate change including climate variability and extremes. Also she mentioned three goals of HNAP; 1) to engage in the overall NAP process at the national level 2) to identify national strategic goals for building health resilience to climate change 3) to develop a national plan with prioritized activities to achieve these goals within a specific time period and given available resources. She also highlighted the indicators of information categories on casual pathway from climate change to health outcomes.

2.2.3 Presentation on “National Adaptation Plan Global Support Programme (NAP-GSP)”

Mr. Conrado Heruela, Task Manager, GEF Climate Change Projects, Division of Technology, Industry and Economics, Regional Office for Asia and the Pacific said that the NAP-GSP involves GEF, WHO, FAO, UNEP, IFAD, UNDP, Global Water Partnership by strengthening capacities. He presented five goals of NAP-GSP as follows:

1. UNDP-GEF, UNEP, The GEF Secretariat, UNFCCC, WHO, Global Water Partnership, FAO, IFAD and UNITAR have launched the National Adaptation Plan Global Support Programme (NAP-GSP) to assist LDCs with NAPs;

2. NAP-GSP is responding to requests for support from LDCs to achieve medium- to long-term planning for adaptation that is fully integrated into relevant policy and planning processes;

3. NAP-GSP provides technical assistance and targeted training, and it promotes dialogue, partnership building, and knowledge exchange among national stakeholders in LDCs and other North and South countries;

4. NAP-GSP is supporting the identification, financing and implementation of adaptation measures by LDCs at national, sub-national and local levels to ensure sustainability of institutional country-driven efforts;

5. NAP-GSP is drawing on the best available science, experiences and good practices to achieve the integration of adaptation into existing development plans and budgets.

In relation to this, Mozaharul Alam, the Regional Climate Change Coordinator UNEP, said that strengthening capacities is not like providing magic pills. There are several steps that need to be undertaken to support this effort. They are 1) multi-stakeholder framework 2) use of national experts 3) institutional capacity-building needs 4) diversified learning and 5) encouragement of
gender inclusion. However NAP-GSP is not a panacea for every county. He expressed that the total amount of fund leaded to developing countries is only US $ 2 million.

**Discussion:**

Ms. Elena Villalobos Prats, Technical Officer, WHO Headquarters asked a question to Mr. Heruela about details of specific sectors under GSP. He answered that there is no sector focus to be more specific but he emphasized that NAP-GSP would be improved by further research and case studies.

Mr. Adao Soares Barbosa, UNFCCC Focal Point, Ministry of Commerce, Industry and Environment in Timor Leste also asked a question regarding GEF’s assistance for planning and implementing plans. For this question, Mr. Heruela answered that there are limitations of funding. He added that Green Climate Fund (GCF) would be another proper supporter on the issue.

Mr. Gabor Vereczi, Technical Advisor for the Pacific Region, Climate Resilient Development, United Nations Development Programme commented that water and food security nexus with health is very important. So he addressed that countries do not overlook the funding links with water where funds are forthcoming. Moreover in terms of funding sources, the ceiling for the health issues is US $20 million. In addition he raised a question about tools for selecting proposals. And for this, Mr. Heruela answered that selecting proposals depends on the relevant UN county officers’ decision.

Dr. Rok-Ho Kim mentioned what co-benefits on the health and energy sector are. Mr. Heruela remarked that in the past GEF mostly focused on large energy emission (GHG reduction) with limited direct connection with health issues. However, under six strategies GEF has directly concentrated on the health issues recently.

### 2.2.4 Session on Group Work on Health National Adaptation Plans

Participants were divided into several groups and they were as follows;

1. PICs;
2. Indonesia, Myanmar, Thailand and Timor Leste;
3. Bangladesh, Bhutan and Nepal;
4. Cambodia, Lao DPR and Vietnam;
5. China, Korea and Mongolia;
6. Brunei Darussalam, Malaysia and Philippines.

Mr. Diarmid Campbell-Lendrum, Ms. Elena Villalobos Prats, and Dr. Mohd Nasir Hassan gave guidelines on group work including specific instructions. They are as follows;
(1) Build on areas that are already available at country level (e.g. National Adaptation Programme of Actions (NAPAs), national strategies, health plans and/or Health component of the National Adaptation Plan processes (H-NAPs)) ;

(2) Based on operational framework, analyse and discuss current planning documents that can be improved (i.e. comprehensive and medium-long-term planning) to define the health component of the National Adaptation Plans (NAPs) ;

(3) Identify if further support is required to finalize the H-NAP and tentative date to do so.

Moreover they addressed that presentations of participant countries might share their challenges and they should be done in 10 minutes each. The details are as follows;

(1) Priority areas should include the H-NAP (e.g. VBDs, WBDs nutrition, air pollution, occupational health);

(2) When focusing on current NAPAs, strategies or plans, areas should be identified for further development of plans;

(3) Show process for finalization of H-NAP at the county level;

(4) Specify key stakeholders to be involved;

(5) Develop dissemination plan of H-NAP.

2.2.5 Countries’ presentations on “Current Status of Climate Change and Health”

Cambodia, Lao DPR and Vietnam introduced countries’ overview and shared challenges. According to the representative of Cambodia, Cambodian government is working an action plan for climate change and health including VBDs and water and food borne infectious diseases. He further noted that Cambodia needs other Ministry of Health (MoH) departments to connect with climate change and health strategies and action plans.

In case of Lao PDR, Mr. Amphayvanh Oudomdeth, Officer, Ministry of Natural Resources and Environment briefly explained that national-leveled climate change committee was established and under the committee TWGs, seven ministries were included.

<Bangladesh>

Mr. Mohammed Abdul Hannan, Additional Secretary, Ministry of Environment and Forests noted that the main risks and priorities on health effects of climate change are skin diseases, eye diseases, vision loss, asthma, allergy, WBDs, VBDs, and fever. And the occurrence of the aforementioned diseases has increased significantly over the last five years. He highlighted that Bangladesh has taken an action to resolve climate change related health problems. During the consecutive four fiscal years the government has allocated US $ 350 million from its own revenue budget in favour of Bangladesh Climate Change Trust fund. So far a total of 158
government projects and 63 NGO projects have been funded through this programme. In addition Bangladesh Climate Change Resilience Fund (US $ 189.5 million) is funded by the donors. So far as many as 9 projects have been taken.

<Bhutan>

Ms. Sonam Lhaden Khandu, Senior Environment Officer, National Environment Commission, Ms. Rada Dukpa, Programme Manager, Climate Change and Health, Ministry of Health and Mr. Rinchen Wangdi, Chief, Public Health Engineering Division, Ministry of Health introduced technical information on climate change and health in Bhutan. They addressed that current average lowest precipitation is 700mm in Gasa and current average of highest precipitation is 3500mm in Tsirang. In accordance with research data malaria is still epidemic and dengue and chickungunya is on rise. According to Vulnerability and Adaptation report 2012 (V&A report 2012) diarrhoeal diseases are expected to rise and VBDs transmission is expected to happen in new areas. To solve these threats, according to them, Bhutan has invested on 1) disaster risk management 2) climate change related projects 3) NAPA Projects: Glacial Lake Outburst Flood (GLOF) early warning system installation 4) community based disaster risk management 5) lowering level of Thorthormi Lake 6) involvement of planning officials in NAP awareness workshop.

<Kiribati>

Mr. Choi Yeeting, Coordinator of Climate Change Adaptation, Office of the President and Mr. Tebikau Tibwe, Ag Chief Health Inspector, Environmental Health Services, Division of Public Health, Ministry of Health and Medical Services said that Kiribati is composed of dispersed atolls. Thus regarding climate change and health, financial support and knowledge sharing should be provided to all island groups. As one of the countries that are influenced by sea level rise, much effort has been made by the government to cope with hazard of climate change. Its efforts are as follows;

(1) NAPA 2007: Environment Programme;
(2) National Climate Change and Health Action Plan, 2011 leading to design of Health Project for Environmental Health Unit (VBDs and WBDs surveillance and monitoring);
(3) KJIP – Kiribati Joint Implementation Plan (cross sector implementation plan);
(4) Disaster early warnings: Disaster Risk Management Unit (Office of Te Beretitenti) put in place a Disaster Warning Plan.

<Nepal>

Dr. Yubak Dhoj G. C, Director General, Department of Environment, Ministry of Science, Technology and Environment and Dr. Badri Pokharel, Ministry of Health and Population,
Government of Nepal presented that main risks and priorities are WBDs, VDBs, FBDs and infectious diseases and currently are respiratory diseases, dengue fever and injuries. They introduced their efforts to cope with climate change in their country, Nepal. The government established NAPA in 2010 with three components;

1) Preparation and dissemination of NAPA document;
2) Development and maintenance of Nepal Climate Change Knowledge Management Centre (NCCKMC);
3) Development of Multi-Stakeholder Climate Change Initiative Coordination Committee (MCCICC).

To sum up they noted that their priorities to strengthen health system are;
1) Community-based adaptation through integrated management of agriculture, water, forest and biodiversity sector;
2) Building and enhancing adaptive capacity of vulnerable communities through improved system and access to services related to agriculture development;
3) Community-based disaster management for facilitating climate adaptation.

**Samoa**

Ms. Victoria Faasili, Climate Change and Health Focal Point, Ministry of Health and Ms. Ualesi Silva, Assistant Chief Executive Officer, Health Prevention and Enforcement Division, Ministry of Health began their presentation by explaining that like other countries’ diarrhoeal diseases, typhoid and dengue fever, influenza and injuries are significant risks in Samoa and currently these diseases have become major climate change related health threats. To cope with this, Ms. Faasili said that Samoa created ‘Strategy for Development of Samoa 2012-2016’, ‘Health sector Plan 2008-2018’ and ‘National Health Disaster and Emergency Plan’. Furthermore with regard to VBDs, Samoan government integrated vector control into community and social development programme (Healthy Home Healthy Village). In addition they further noted that extreme events preparation has been done for flooding, droughts and fires.

**Solomon Islands**

Mr. Jimmy Hilly, Chief Environment Management and Control Officer, Ministry of Health and Medical Services and Mr. Malachi Maesubua Bate, Climate Change Officer, Ministry of Environment, Climate Change, Disaster Management and Meteorology addressed that for recent years there were no significant changes in temperature and rainfall but expected that there would be more intense bursts of rain and longer wet periods. They further noted that VBDs (malaria and dengue), mental related illness, WBDs and Non Communicable Diseases (NCDs) are significant risks now. For this reason the government of Solomon Islands tried to strengthen their health systems with these efforts; 1) NAPA 2) National Communication 3) draft second national
communication 4) Solomon Islands National Climate Change Policy 5) national Climate Change and Health Adaptation Plan 6) WASH policy.

<Timor-Leste>

Mr. Adao Soares Barbosa, UNFCCC Focal Point, Ministry of Commerce, Industry and Environment noted that with regard to the recent research on climate change in Timor-Leste, average surface temperature has increased by 1.5°C and expected that the average annual rainfall will rise up to 20% by 2070. He pointed out that National Adaptation Programme of Action (NAPA) priorities cover food security, agriculture, water resource management, human health, natural disasters. The government of Timor-Leste has been creating plans and establishing national climate change centre which has built a capacity against climate change.

<Vanuatu>

Mr. Erickson Sammy, Water Resources Manager, Department of Geology, Mines and Rural Water Resources and Mr. Pakoa Rarua, Environment and Health Officer, Ministry of Health noted that rainfall and temperature are seen to be increasing in the past 5 years and in the future the temperature will increase more by 1.8°C. Thus the government has concentrated its efforts on avoiding health problems caused by climate change. He emphasized that health related strategies adapted to climate change recently and they are in progress now.

2.2.6 Session on summary and presentations on group work and technical discussion on Health National Adaptation Plans

Dr. Hassan remarked that presentations made by participant countries were very informative so that WHO is able to collect and re-finalize them as one valuable country report. Moreover he notified that participant countries, here, are still available to contribute a chapter to the WHO report and if the chapter is needed to be edited, there is still enough time to do. So he said that Malaysia, Japan or others might wish to submit a chapter and added that there was a process for a WHO publication that WHO country offices should communicate with Ministry of Environment as well as Ministry of Health.

2.3 Day 3: Planning and Financing

2.3.1 Session on management of Health Adaptation Projects

In this session, participants summarized and presented on Group Work and discussed on Health National Adaptation Plans.

For the first session of the day, Mr. Hilly, Ministry of Health and Medical Services in Solomon Islands of PICs pointed out that the using of names in Samoa varies from H-NAP to Climate Change Adaptation Strategy for Health (CASH). He further noted that Samoa’s priority
areas include; 1) completion of H-NAPs 2) implementing special projects 3) developing new proposals 4) capacity building. During his presentation, relocation of hospitals and funding for infrastructure was noted to be proposed as a separate component.

The representative presenter of the group of Thailand, Myanmar, Timor Leste and Indonesia noted that the common priority areas include VBDs, WBDs, FBDs and extreme weather events. The main challenges that they are facing were 1) limited human and financial capacity 2) access to climate related data and information 3) lack of individual research on climate change and health and coordination among ministries and national experts. However by explaining several achievements that the four countries have made, he emphasized that even though there are still many challenges to overcome to cope with climate change related health threats they were still underway to finalize NAPs. To conclude the presentation, he addressed its common needs;

(1) Risk mapping on climate change and health;
(2) Capacity development;
(3) Access to technical and financial support.

The third group of Bangladesh, Bhutan and Nepal presented their current common challenges and needs to be improved. The presenter of the group mentioned that all three countries agreed with some points that these three countries need more extensive V&A assessments, supportive policies and good governance, integrated monitoring and early warning systems. In accordance with his statement, the current status of three countries is that all has NAPAs, health plans and climate strategies. However incorporation of climate change into health is still needed to improve. Also he explained that specific areas needed to be added are injuries, deaths from disasters and awareness and advocacy with support to implement H-NAP in Bangladesh. Regarding this, Bhutan and Bangladesh wanted to complete their H-NAP by 2015.

For the fourth group of Lao DPR, Vietnam and Cambodia, Dr. Taypasavanh Fengthong from Lao DPR, Dr. Nguyen Huy Nga from Vietnam, Ms. Vichet Ratha Khlok from Cambodia made a presentation respectively. Dr. Fengthong noted that Lao PDR is facing high communicable diseases morbidity and increasing under-five mortality rate and women mortality. He pointed out with specific evidence that even remote communities are suffering from indoor air pollution and chemical like pesticides. In addition he explained that the country level progress was outlined in terms of plans and strategies noting where improvements are needed with further support.

After the presentation of Dr. Taypasavanh Fengthong, Dr. Nguyen Huy Nga from Vietnam noted that Vietnam’s strategies and the framework are completed in recent years and they are listed too. He briefly added that with four current Vietnam’s plans, framework and guideline documents that need to be improved with those requiring technical and financial support also are listed including the H-NAP and staff training.
Finally, the last presenter of the group, Ms. Vichet Ratha Khlok from Cambodia mentioned that VBDs and water and food borne infectious diseases and impacts from extreme events are priority agenda to be listed. And she added that the process including nine steps for communication, consultation and awareness among formal endorsements is still underway. She lastly mentioned the challenges that Cambodia is facing are lack of human and financial resources and technical support.

As a fourth group, Republic of Korea (ROK), Mongolia and China explained overall their actions on climate change and health issues. The representative of the group stressed about reducing vulnerability through priority actions against the nine areas including; 1) cross-sectorial collaboration on capacity development 2) V&A assessment 3) integrated monitoring 4) early warning 5) research 6) communication 7) community mobilization 8) emergency preparedness 9) management.

The final group consists of Brunei Darussalam, Malaysia and Philippines showed a table in their presentation and a table for Brunei spelled out eight priority areas for working with three key ministries with other areas for development including multi-sectoral consultation especially environment and health, integrated V&A assessment and connectivity among sectors. The presenter showed another table of Malaysia and it listed four key ministries and seven priority areas for work and five additional areas for development. He also mentioned that Philippines listed four main institutions and six priority areas for development. Also five main areas for additional development were listed. The presenter shared common process to follow for completion of N-HAPs and where both internal and external technical support and trained experts should be provided.

To wrap up the group presentation session Dr. Simon Hales thanked groups for explaining the usefulness for both the secretariat and the countries that were seeing the way forward hopefully. Lastly Dr. Hassan added his welcome and made a request to three countries not currently in the WHO WPRO synthesis report to consider contributing to it.

Discussion:

Dr. Hassan of WHO WPRO recommended that this kind of content should go into the PICs synthesis report and specific pictures of PICs are needed to be included. Also the important factor that the highest point of the regions is only 3 meters should be added.

Regarding Ms. Vichet Ratha Khlok’s presentation, Dr. Simon Hales asked about ‘zero’ reporting. Dr. Prak Piseth Raingsey replied that ‘zero’ reporting is required when no ‘case’ is found but investigated. Dr. Hassan also added on the presentation that it is required to include such information in the synthesis report and remarked on the serious level of dengue.
Mr. Terrence Thompson, Sr. Water & Environmental Health Adviser, WHO Office in Nepal introduced some policy initiatives to reduce the impact of climate change in Nepal. Most representative initiatives are four; 1) National Climate Change Policy 2) National Adaptation Plan for Action (NAPA) 3) Local Adaptation Plans of Action (LAPA’s) 3) Health sector vulnerability and adaptation assessment (ongoing) 4) Health National Adaptation Plan (2014). According to him, NAPA Priority activities include disease outbreaks and early warning but not include WASH. With regard to water resources and energy, they have been weak on WASH as the national water authority was absent from NAPA process. The priority activities focusing on now are water resources, hydro-power, groundwater monitoring and water mills.

He noted that another important action is the Ministry of Health and Population (MoHP) Technical Working Group on Climate Change and Health (2013-2014). Currently it is expected to be with its in-house working group to develop a national climate change and health plan based on V&A assessment. So WASH is now included as a crucial part of their plan for the future. With clear links to WASH sector including natural disaster, VBDs and WBDs, he mentioned that non WASH areas such as extreme variation of temperature are emerging as focus areas. He expected that building adaptation to climate change in health in LDCs through climate resilient WASH which is four- year project from 2013 to 2016 will bring outcomes such as improved health adaptation policy and practice supported by robust evidence from field testing with reduced vulnerability in poor populations.

He further noted that a project coordination committee in Nepal included eleven members (similar to the TWG on WASH). And project outputs and activities at a country level are as follows; 1) climate resilient and health-promoting WASH policies are defined and implemented 2) climate resilient Water Safety plan (WSP) is designed and implemented. Moreover with the objective of reducing WBDs, evidence of effectiveness of household and community level WASH interventions to improve climate resilience focuses on household and community-level resilience. At the end of his presentation he addressed that conclusions include the fact that the NAPA is strong on water resources but weak on WASH. So, Nepalese government has taken actions for strengthening health-WASH linkages.

Discussion:

Mr. Badri Pokhrel, Joint Secretary, Ministry of Health and Population added remarks on the process. And Mr. Pakoa Rarua, Environment and Health Officer, Ministry of Health commented on Vanuatu’s strong link within the WASH ‘cluster’ mechanism. Dr. Simon Hales asked what other specific explanations on WBDs which are WASH related diseases including VBDs and waste management. For the question Mr. Terrence Thompson explained that due to temperature changes dengue has expanded into many regions and water containers as breeding sites are important with waste management which is greatly neglected especially in the capital such as famous tourist spots, Popora. Dr. Hassan commented that LDCs in TWG of the Regional
Forum need to synergize with TWG on WASH, environmental emergencies, climate change and health. He also noted that cooperation among countries should be encouraged.

### 2.3.3 Presentation on “GEF-funded health adaptation in Bhutan”

Ms. Rada Dukpa, Programme Manager, Climate Change and Health, Ministry of Health showed an overview map that weather conditions vary greatly with three North to South regions. She said that CSDs and health outcomes include especially WBDs, VBDs, natural disasters (flood, landslides and windstorms), nutrition and respiratory diseases. Malaria is endemic in 16 or 24 districts with the highest prevalence in low southern districts. Dengue and Chickungunya also were shown as concerns. In addition Acute Respiratory Infections (ARI) linked to pollen season changes and to indoor air pollution. The Piloting Climate Change Adaptations to Protect Human Health (PCCAPHH) project is proposed to start from 2004-2010 and is expected to be implemented into seven countries from 2010 to 2015. She mentioned that the total budget is US $ 549,000 and Bhutan strengthens the national capacities to identify and prevent adverse climate change related health. The followings are project objectives and outcomes;

1. Risk assessment and integrated surveillance to enhance effective management of climate sensitive health risks;

2. Improve capacity of community and health sector institutions to respond to climate-sensitive health risks;

3. Emergency preparedness and disease prevention measures.

She further explained that piloting “Integrated Surveillance” for CSDs is underway. In addition the piloting integrated surveillance focuses on monitoring the risk factors (climate factors) along with the routine epidemiological surveillance of CSDs. Further efforts were shared including 1) increased awareness 2) spatial V&A analysis 3) developing an Early Warning System 4) a Response Plan 5) mainstreaming climate change and health into stronger multi-sectoral collaboration.

**Discussion:**

Ms. Ualesi Silva from Samoa asked about GEF funds taking from 2004 to 2006 to evolve and about WHO’s contributions and roles to the outcome indicators. Ms. Rada Dukpa from Bhutan answered the question that even though Nepal was challenging during preparation phase due to lack of technical capacity, WHO has assisted Nepal in a proper way. Ms. Elena Villalobos Prats from WHO also noted that there were 6 years requirement to be funded the project. She added that until to be confirmed it has taken 6 years from 2005 to 2010, especially in case of Fiji PCCAPHH. One of the participants of the meeting asked another question about WHO support. Ms. Rada Dukpa replied that the strengthening of Bhutan’s capacity was the key initial step. And Dr. Simon Hales added that he supported this process and Bhutan actually had good data but needed further help. The important outcome is to show that impacts can be related in future to predict health impacts based on past relationships. Mr. Badri Pokhrel raised another question that
regarding data, how many years of data really is needed in countries like Nepal and Bhutan and what quality is required. Dr. Simon Hales answered that both Nepal and Bhutan had limited but sufficient data though it is not collected for over 40 or 50 years. Furthermore, supporting countries by seeking proper experts who can spend their time on assisting many regions is very important points.

2.3.4 Session on Plenary discussion and next steps to finalize the health component of the National Adaptation Plans

Dr. Nasir Hassan added comments on cooperation of regional and countries offices regarding building the expert pool for LDCs. He further noted that sabbatical in WHO WPRO to work on climate change and health will be a great opportunity not only for counties suffering from lack of experts but also for experts such as professors. He highlighted that the crucial connection of air quality with climate change should be kept in mind. Dr. Rok-Ho Kim commented on the GEF PCCAPHH project in Fiji which has demonstrated four CSDs that improved detection, early warning outcomes and community awareness materials. So participants were encouraged to start by learning Fiji’s achievements and by doing so. Lastly he insisted that “Don’t wait for the perfect project”.

Ms. Victoria Faasili from Samoa asked how WHO could support the process. She said that PICs appreciated being invited to this TWG meeting but she felt left behind. So she made for a humble request for continued efforts to incorporate PICs into TWGs. Dr. Nasir Hassan remarked on her request that he truly supported and understood that pacific logistics to allocate meetings should be needed.

Mr. Mohammed Abdul Hannan from Bangladesh requested to come forward with proposals about integrated health and coping with climate change threats for Bangladesh. Ms. Payden from WHO noted that WHO support is being provided and they know that more assistance is needed from WHO. On her remark, Dr. Hassan mentioned that he welcomed more consultation and inter-ministerial collaboration to be shown to others for fund raising.

2.3.5 Presentation on “Increasing resiliency of health sector to climate change impact through development of seasonal based early warning system”

Prof. Dr. Rizaldi Boer, Centre for Climate Risk and Opportunity Management in Southeast Asia Pacific, Indonesia started his presentation by introducing general background of climate change and health. He mentioned that the outbreak of many infectious diseases such as malaria, dengue fever, diarrhoea and other water and FBDs are related to climate variability. Regarding developing and establishing Modified Early Warning Score (MEWS), he said that an example of an integrated framework for managing the risk associated with climate variability is recommended by WHO for the development of Malaria Early Warning Systems. According to him, this integrated approach uses information from various sources to develop cumulative
Evidence of changes in epidemic risk. It is based on four monitoring components which are used to inform planning and preparedness for timely epidemic prevention and control. The four elements are; 1) vulnerability monitoring and mapping 2) seasonal climate forecasting 3) environmental and weather monitoring 4) sentinel case surveillance. The implementation of this integrated approach strengthens health systems through the use of timely information from other sectors and may also serve control planning for other diseases besides malaria. He also added that this approach is the beginning to be implemented in a number of sub-Saharan African countries. The most developed application is in Botswana and Southern Africa where a recent Regional Epidemic Malaria Outlook Forum was convened by WHO, World Meteorological Organization the Southern African Development Community (WMO SADC) and International Research Institute (IRI) to assess epidemic risk over the coming season. The forum was attended by participants from National Malaria Control Programmes, National Weather, Monitoring and Food Security Services, as well as the media. He concluded that development of system for updating diseases risk mapping based on seasonal climate forecast as well as the institutionalization of its use for improving management of the risk would be good basis to strengthen capacity to manage the increasing risk of human health in the future.

Discussion on raising funds for anticipating natural disasters to prevent fragile and climate change-affected countries from environmental catastrophes

Dr. Simon Hales who presented on main dengue vector aedes aegypti explained the parameters used as specific tools to particulate geographical areas. And Dr. Nasir Hassan noted that tools and data vary in developing models.

2.3.6 Presentation on “Third E&H ministerial meeting and the framework for cooperation on environment and health”

Mr. Jonathan Gilman, Regional Coordinator, Inter-agency and Country Level Coordination noted that he was presenting for the WHO/UNEP Joint Secretariat work in Kuala Lumpur in September 2013. Over three hundred participants attended the Prime Minister (PM)’s opening who notably included trans-boundary pollution in his opening remarks. Regarding the forum in Kuala Lumpur (KL), he mentioned that outcomes included the adoption of the KL Declaration on Environment and Health (E&H) and the renamed Framework for Cooperation. Also he reported on governance, Impact, partnerships and sustainable financing mechanisms that were specified in the forum. He further noted that prioritization criteria for health and environment issues were also laid out in KL, and a new structure for the E&H Forum was agreed upon including functions of the Ministers, National Focal Points, the Secretariat and the role of a knowledge network. The Framework also highlights global policy drivers, flexibility and responsiveness that expand membership to interested non-member states. The work plan for 2013-2016 includes strengthening NEHAPS, national capacities, occupational health and children’s environmental health. He notified that the next event would be a high-level officials’ meeting on April 2014, in Bangkok. The 8th High-Level officials’ meeting will be held in mid-2015 and the 4th Ministerial
Meeting will be held in 2016 in the Philippines. A series of working level activities are anticipated to be held during the same period.

Discussion:

Mr. Adao Soares Barbosa from Timor Leste expressed his concern that there were no clear answers or responses through presentations. Moreover membership requirements were not clear nor were financial mechanism included in the part of this environment and health forum. Also he raised a question how this forum works with other forums like Rio+10 or Secretariat of the Pacific Regional Environment Programme (SPREP) in the Pacific regions. Mr. Jonathan Gilman noted that they have discussed mostly on UNEP and WHO but the important point is that they need to connect to other international organizations and programmes such as Green Climate Fund (GCF), Global Environment Facility (GEF), and SPREP. Dr. Hassan added that regarding being a member country of the forum is open to all participants and it is pleased to eagerly join with it. He further noted that Jakarta is the first TWG meeting after the health and environment forum was held in last September.

Regarding funds, he said that funding is voluntary for participants. So, future activities are uncertain and risky to be proceeded to the next step. Ms. Rada Dukpa from Bhutan added that support for the future individual government could be possible. Then Mr. Adao Soares Barbosa requested for a single paper to give more detailed information to each government. Mr. Manoj Roy also asked a question with regard to being a member country of the forum and the process and way of choosing a host country. Mr. Jonathan Gilman of UNEP explained that there is lack of clarity as the high level officials meeting will not address it until next year. He also mentioned that documents would be added to the website. Dr. Hassan noted that the individual country environmental health (E&H) profiles have been done since 2006, but still trained experts and resources are needed.

2.3.7 Presentation on “GIZ programme on adaptation to climate change in the health sector”

Ms. Ute Jugert, Head of global programme - Adaptation to climate change in the health sector, Health Section, Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) introduced the overall background of GIZ. She explained that GIZ was established on 1 January 2011, and it brings together under one roof the long-standing expertise of the Deutscher Entwicklungsdienst (DED), the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and InWent. GIZ’s purpose is to promote international cooperation for sustainable development and international education work. She added that as a 100% federally owned, public-benefit enterprise, it supports the German Government in achieving its development policy goals. The German Federal Ministry for Economic Cooperation and Development (BMZ) has commissioned GIZ to implement the global program ‘Adaptation to Climate Change in the Health Sector’. According to her, main themes of German Development Cooperation in Health were;

(1) Promoting Health System Strengthening;
(2) Promoting Sexual and Reproductive Health and Rights (SRHR) and Population Dynamics;

(3) Responding to HIV/AIDS.

Regarding global program ‘Adaptation to Climate Change in the Health Sector’, she mentioned that compared with the extent of (perceived) damage, adaptation measures to target the health impacts of climate change have not figured prominently enough in international debate on a situation that goes hand in hand with inadequate prioritization at national level. She, finally, noted that if the nexus between climate change and health is not to be considered in a more prominent way, weak health care systems will be exposed to additional stresses and strains. At the same time achieved progress regarding the strengthening of health care systems would be destroyed.

Discussion:

Mr. Jonathan Gilman suggested that they invite GIZ to next TWG to share findings and UNEP be included among other UN agencies. Mr. Adao Soares Barbosa asked to the presenter that how they get support from GIZ and Ms. Ute Jugert explained that unfortunately Timor Leste is not included in the GIZ’s health priority counties by showing the map of her presentation.

2.3.8 Presentation on “Project financing opportunities and processes (GEF)”

Referring to the earlier discussion, Mr. Conrado Heruela, Task Manager, Global Environment Facility (GEF) Climate Change Projects, Division of Technology, Industry & Economics, Regional Office for Asia and the Pacific noted that the GEF cycles are like Bhutan and Fiji’s. He started his presentation by introducing general background of GEF. According to his explanation, GEF’s focal areas are climate change, biodiversity, land degradation, international waters, ozone depletion, and persistent organic pollutants. And 7 GEF agencies are 1) United Nations Development Programme (UNDP) 2) United Nations Environment Programme (UNEP) 3) World Bank (WB) 4) Regional Development Banks 5) Food and Agriculture Organization of the United Nations (FAO) 6) International Fund for Agricultural Development (IFAD) 7) United Nations Industrial Development Organization (UNIDO). He further noted that there are 178 member countries. In accordance with project reviewed by GEF, there are several factors to be reviewed. The details are as follows;

1. Country eligibility;
2. Endorsement by the national GEF Operational Focal Point;
3. Consistency with GEF strategic objectives;
4. Resource availability;
5. Comparative advantage of the GEF agency;
6. Delivery of global environmental benefits;
7. Soundness of project design;
(8) Consistency with national priorities and policies;
(9) Cost-effectiveness of the project;
(10) Value-added of GEF involvement (incremental reasoning);
(11) Project cost and co-financing.

As mentioned earlier that GEF is the largest multilateral public sector and it is meant to cover only ‘incremental cost’. Thus co-financing is required even at 10:1 ratio to ensure funds. The GEF V (GEF-5) cycle climate change programme includes five strategic objectives on energy and carbon reduction towards climate change mitigation. The bulk of funds under GEF V go to Asia, US $ 150 million to China alone, followed by India and Indonesia, Cambodia, Bhutan and others. And the cycle is expected to take only 18 months or 12 months for a medium size project.

2.3.9 Presentation on “GEF 6 opportunities”

Mr. Conrado Heruela introduced GEF 6 programme strategies. According to him the goal and objectives of the GEF-6 Climate Change Mitigation program is to support developing countries and economies in transition to make transformational shifts towards a low-carbon development path. The GEF support also aims to enable recipient countries to prepare for the new climate regime under the UNFCCC with universal emission reduction commitments. He said that the GEF-6 Climate Mitigation Strategy has three objectives: 1) promote innovation, technology transfer and supportive policies and strategies 2) demonstrate systemic impacts of mitigation options 3) foster enabling conditions to mainstream mitigation concerns. In addition he further noted that project under this program will develop and demonstrate innovative mechanisms that are sustainable beyond the project implementation period. Mr. Conrado Heruela concluded his presentation by emphasizing outcomes of GEF 6 Climate Change Mitigation (CCM) Programme strategies which are;

(1) Innovative technologies and management practices successfully demonstrated, deployed, transferred and financed;

(2) Enabling policy, legal and regulatory frameworks and mechanisms created and put into place to foster innovation and accelerate low-carbon technology transfer.

2.3.10 Presentation on “Funding opportunities and linkages for climate change in health sector”

In the beginning of his presentation, Gabor Vereczi showed a diagram ‘climate finance in the Pacific’ that comprises of SPREP, Secretariat of the Pacific Community (SPC), The Pacific Islands Forum Secretariat (PIFS), Japan International Cooperation Agency (JICA), the UN agencies, USAID, EU, ADB, WB and so on. And he mentioned that GEF 6 is a set of ‘refreshed strategies’ and includes the Small Grants Program (SGM). International Waters has a nexus with health deals with trans-boundary waters, fisheries, coastal habitats, groundwater management, and
Land degradation. GEF ‘Adaptation Funds’ are different from GEF ‘Trust Funds’. Regarding Climate Early Warning Systems, he said that they are keys to current GEF funded work underway in the Pacific. An example of Samoa showed meteorological early warning systems’ connection to relevant agencies. He further noted that a solar water purifier was used in Marshalls after being introduced in Nauru to reduce contamination. The main point that he emphasized was that cooperation with ministries of Environment, Met Services, Public Works, Water Authorities, Education and institutions and NGOs were encouraged along with participation in the National Coordinating Mechanisms. And at the end of the presentation, Mr. Gabor Verczi closed his presentation with a short video clip, “Tuvalu: Vital Waters” which was about the 2011 drought and Integrated Water Resources Management (IWRM) project across 14 PICs, and it shows composting toilets, rainwater harvesting and other solutions being introduced for water and sanitation resilience.

Discussion:

One of the participants who represented the Republic of Indonesia asked about GEF’s health sector support and Mr. Conrado Heruela replied that mitigation funds are only for mitigation, but health related support is provided by GEF funds. Mr. Gabor Verczi added on Mr. Heruela’s mention that GEF has a 4-year cycle and it has different mechanisms. Moreover, it is more easily to be adopted by low income countries. Ms. Elena Villalobos Prats, Technical Officer, WHO Headquarters commented on the guidelines from UNFCCC and the GEF process related to the health sector. Mr. Adao Soares Barbosa pointed out that there was no mention at all about NAP in the both presentations. Also he added that GEF 5 and 6 should provide financial support for NAP.

2.4 Day 4: Way Forward

2.4.1 Session on summary of previous days of the meeting

Ms. Sri Tantri Arundhati from Ministry of Environment Republic of Indonesia was acting as the madam chair during the closing plenary session. She closed the TWG by inviting all country participants to work in partnership across the countries to strengthen the health sector in each country to respond to the implications of climate change. She added that to achieve this, an effective collaboration between the sector of environment and health in each country is fully required. And she summarized previous days of meeting that on Day 1, proceedings and overview of presentations were made by Mr. Jonathan, Mr. Diarmid and Mr. Yeom on behalf of Dr. Nasir Hasan. Messages included a clear need for more V&A assessment and simple tools. On Day 2, Country Group Work was featured and on Day 3, group findings were shared by participant countries’ presentations and partnership with GIZ and GEF were also shared. On Day 4, preparation for TWG-CC statement and output document were done and the draft Work Plan of the TWG-CC 2014-2016 was revised.
**Draft work plan activities:**

The chair, Ms. Sri Tantri Arundhati requested to participants that they make comments on the draft Work Plan Activities starting from Brunei Darussalam who requested a quick read through. Then the chair read through the Draft Activities Work Plan. According to Dr. Hassan, the activities in the work plan are not just for the host country to implement but for all countries to offer support and assistance towards the TWG work plan. He added that UNEP and WHO will continue to support as much as possible. Mr. Sharad Adhikary, Environmental Health Adviser, WHO Office in Indonesia commented about knowledge management and good cases of partnerships including Thailand’s experience on Health Impact Assessment (HIA). Dr. Tayphasavanh Fengthong of Lao PDR made a suggestion that the activities should be included to increase effective communication on CC&H at the country level and Mr. Jonathan Gilman agreed with the chair to add them to the table. Dr. Daud bin Abdul Rahim, Head of Occupational and Environmental Health, Disease Control Division, Ministry of Health asked about the function of the TWG at the regional level, especially about capacity building support and the function or opportunity of financing and support.

**2.4.2 Session on round table discussion for the identification of priorities, activities, objectives and prospects for linking climate change strategies and health impacts**

The chair led the session and a representative from Philippines commented that they have no objections to the activities but he prefers to discuss about it more before the next meeting. As it is not easy for them to implement the climate change strategies due to lack of financial resources, they need more funding and legislation in some cases. Also noted that research can be done in some cases and regular updates from TWG will be very helpful. A second speaker of Philippines noted that the network may be helpful.

**2.4.3 Session on preparation and approval of CC TWG statement/output document**

Dr. Hassan remarked that Brunei agreed that it would host a regional workshop on H-NAP under the work plan draft and WHO WPRO would clearly edit it. Regarding recommendations, it was read by the rapporteur during the session. The several points of recommendations to the Regional Forum on Environment and Health for Southeast and East Asian Countries and to the governments are as follows (for more details, refer to chapter 5):

1. Promoting and strengthening the integration of environment and health considerations within current climate change policies and programmes;

2. Providing the necessary support to ensure the implementation of the Work Plan of the TWG –CC and H-NAPs;

3. Strengthening public health engagement into current climate change processes at national, regional and international (including trans-boundary) levels by among others.
Moreover TWG requested for WHO, UNEP, SPREP and all development partners to (for more details, refer to Chapter 5);

1. Assist Regional Forum on Environment and Health (RFEH) member countries and other countries in Asia and the Pacific to share experiences, develop capacity, and establish a mechanism for monitoring progress towards the fulfillment of the commitments made at this meeting;

2. Support the implementation of the document and to increase their efforts in advocacy, in resource mobilization and in obtaining new and additional investments in order to strengthen the strategic alliance between health and environment;

3. Provide technical support to countries for the finalization of the health component of the national adaptation plans, so that these are comprehensive and look for medium- and long-term priorities for adaptation.

2.4.4 Session on revision of the draft work plan of the TWG-CC 2014-2016

For the revision of the draft work plan, the representative of Bangladesh noted that the word ‘official’ was edited and ‘Declaration’ was also revised as ‘document’. After his mention, the representative of Indonesia addressed that the name of TWG was too long to use in the documents formally and Dr. Hassan replied to him that in the new charter, only TWG was mentioned and Indonesia had discussed on the length of the name. So Mr. Marco Silvestri, Programme Officer, Regional Resource Centre for Asia and the Pacific said that if there was no objection, then all would agree with it and keep the name shorter. Lastly the representative of Nepal suggested that as climate change is cross-cutting and multi-sectoral issue, all sectors should be involved in a document as a bullet point.
3. SUMMARY

- Participants of the meeting discussed the outcomes of COP19 Warsaw Climate Change Conference highlighting on the relevance between Climate Change and Health (CC&H)
- Because of variations in temperature, many countries are suffering from climatic health problems that result in diseases such as asthma, dengue fever, malaria and etc.
- Financial support and providing trained experts are needed to implement a road map, raise awareness and build own National Adaptation Plans (NAPs)
- Raising funds for anticipating natural disasters to prevent fragile and climate change affected countries from environmental catastrophe is crucial to be discussed
- It is necessary to involve potential new members of the Regional Forum and include them in the TWG-CC knowledge sharing in order to strengthen their planning for National Health Adaptation (NHA) to Climate Change
- Developing or updating national, sub-regional and regional operational frameworks are advised to build health systems resilience to climate change

4. CONCLUSIONS

(1) In general, the participant countries of the meeting have made good progress in coping with climate change related health threats
(2) The participants agreed to finalize the draft of TWG Work Plan (Annex 3) and Jakarta recommendations (Chapter 5) of the Thematic Working Group by member countries and to implement it
(3) The participants gained an understanding of the H-NAP, NAP, and seriousness of climate change related health problems in developing countries
(4) It is needed to synthesize and analyse the current situation of participant countries on climate change and health for developing the next stage of regional/national policies to move forward
(5) TWG-CC should promote research and develop understanding of the complex inter-relationship between climate change, ecosystem change and infectious diseases
5. JAKARTA RECOMMENDATIONS ON CLIMATE CHANGE AND HEALTH

Recommendations of the Thematic Working Group on Climate Change and Health meeting

9-12 December 2013 Jakarta, Republic of Indonesia

We, Environment and Health officials from Brunei Darussalam, Cambodia, China, Indonesia, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Thailand and Viet Nam, members of the Regional Forum on Environment and Health for Southeast and East Asian Countries (RFEH), together with the Environment and Health officials of Bangladesh, Bhutan, Kiribati, Nepal, Samoa, Solomon Islands, Timor Leste, and Vanuatu, convened in the Thematic Working Group on Climate Change and Health (TWG-CC&H) meeting held in Jakarta, Indonesia, on 9-12 December 2013;

Recommend to the Regional Forum on Environment and Health for Southeast and East Asian Countries (RFEH) and to the governments of our respective countries to strengthen their attention to climate change and health issues by:

1. Seeking the involvement of sectors and ministerial agencies other than environment and health, thus recognizing that climate change is a cross-cutting concern with impacts on several sectors, all of which need to be involved in addressing the issues deriving from a changing climate.

2. Promoting and strengthening the integration of environment and health considerations within current climate change policies and programmes in both the health and environment sectors and integrating these links in policies, strategies, regulations and national development plans;

3. Providing the necessary support to ensure the implementation of the Work Plan of the TWG-CC&H and of the health component of National Adaptation Plans (H-NAPs);

4. Strengthening public health engagement into current climate change processes at national, regional and international (including transboundary) levels by, among others:
a. developing the health component of National Adaptation Plans in a comprehensive way and responding to medium- and long-term priorities for adaptation;

b. promoting health considerations and reporting on co-benefits of mitigation policies and actions undertaken at national level in national communications to the United Nations Framework Convention on Climate Change (UNFCCC);

c. requesting the UNFCCC the consideration of these recommendations and their inclusion in the next report to the Parties to the UNFCCC in response to the request made by Parties in the 19 Conference of the Parties (CoP19) for additional input on health under the Nairobi Work Programme on adaptation;

d. requesting the representation of health expertise within the technical support mechanisms for the UNFCCC, including the Least Developed Countries Expert Group (LEG) and Adaptation Committee, to consider engaging an expert on public health within its members;

e. requesting the Green Climate Fund to consider opening a specific funding stream for health adaptation within its adaptation window;

f. requesting the GEF political and operational focal points of our respective countries to recommend that GEF ensure that health issues are adequately addressed in national communications and support is granted in the formulation and design of climate change mitigation and adaptation projects that support the work of the TWGCC&H and of the RFEH;

5. Promoting and raising awareness on the results of the WHO Synthesis Report on Climate Change and Health in the West-Pacific Region and other relevant reports and research studies in Asia and the Pacific within the RFEH members;

6. Pursuing the RFEH’s goal towards the strengthening of institutional arrangements and collaboration between Ministry of Environment and Ministry of Health at national level, the establishment or strengthening of health and environment institutions, the promotion of exchange of experiences and lessons learned among countries, with the inclusion of the promotion of Health and Environment Impact Assessment as a tool to consider health impacts of all adaptation and mitigation policies and programmes;

7. Establishing or strengthening systems for health and environment surveillance to allow measurement of interlinked health and environment impacts and to identify emerging risks, in order to manage them better;
8. Evaluating the health benefits of mitigation policies, including particularly the health co-benefits that could be achieved through reduction of air pollution at the same time as reducing greenhouse gas emissions;

9. Alongside improving the delivery of health services effectively and equitably, to also strengthen their health resilience, and contribute to the greening of health services and facilities inter alia by improving renewable energy access and energy efficiency, water and sanitation and waste management in the health sector;

10. Developing or updating our national, sub-regional and regional operational frameworks to build health systems resilience to climate change by taking into consideration the use of traditional knowledge and community participation in order to address more effectively the health impacts of climate variability and change and to ensure that health systems are capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, so as to bring sustained improvements in population health, despite an unstable climate;

11. Supporting knowledge acquisition and management in the area of health and climate change adaptation and mitigation, particularly through the promotion of applied research at local, subregional and regional levels, while ensuring coordination of scientific and technical publications so as to identify knowledge gaps and research priorities and to support education and training at all levels;

12. Requesting the ASEAN Working Group on Climate Change to consider the health impacts of climate change and convene thematic meetings on this topic, including representatives of all health-determining sectors (e.g. food and agriculture, water, energy, housing and -urban- planning);

13. Considering the establishment of a Thematic Working Group on Climate Change and health for the Pacific, to address the specific issues and pressing needs of its island countries.

We also call upon the World Health Organization (WHO), the United Nations Environment Programme (UNEP), SPREP and all development partners to:

- Assist RFEH member countries and other countries in Asia and the Pacific to share experiences, develop capacity, and establish a mechanism for monitoring progress towards the fulfillment of the commitments made at this meeting, including through peer review, so as
to feed into the UNFCCC and the post-2015 new climate agreements and development agenda;

• Support the implementation of this document, and to increase their efforts in advocacy, in resource mobilization and in obtaining new and additional investments in order to strengthen the strategic alliance between health and environment;

• Provide technical support to countries for the finalization of the health component of their National Adaptation Plans, so that these are comprehensive and look for medium- and long-term priorities for adaptation, through the application of the operational framework for building climate resilient health systems, the organization of regional workshops, and the provision of additional funding support so that countries can finalize their H-NAPs involving all relevant stakeholders at country level;

• Facilitate access to funds that might be made available for the implementation of the health component of National Adaptation Plans through, among others, the establishment of an online repository of H-NAPs and relevant technical documents at national level (e.g. NAPAs, synthesis report on Climate Change and Health in the West-Pacific, and relevant studies in the South East Asia Regions)

We thank the government of the Republic of Indonesia for hosting the 2013 meeting of the Thematic Working Group on Climate Change and Health, and the international agencies participating in the meeting, particularly UNEP and WHO for their support. We also thank the representatives from South Asia and the Pacific for their interest in the TWG-CC&H and in the Regional Forum on Environment and Health, and agree to meet again to discuss on Climate Change and Health issues and the progressing of the work plan before the end of 2015 in a second meeting of the to be hosted by a volunteering member.

Jakarta, 12 December 2013
### ANNEX 1: LIST OF PARTICIPANTS

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<td>16. Solomon Islands</td>
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SECRETARIAT

United Nations Environment Programme (UNEP)

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Mr. Jonathan Gilman</td>
<td>Regional Coordinator</td>
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<td></td>
<td>Inter-agency and Country Level Coordination</td>
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<td></td>
<td>Regional Office for Asia and the Pacific</td>
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<tr>
<td>Email: <a href="mailto:jonathan.gilman@unep.org">jonathan.gilman@unep.org</a></td>
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</tr>
<tr>
<td>Name</td>
<td>Position/Responsibilities</td>
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</tr>
<tr>
<td>Mr. Conrado Heruela</td>
<td>Task Manager, GEF Climate Change Projects, Division of Technology, Industry &amp; Economics</td>
</tr>
<tr>
<td>Mr. Marco Silvestri</td>
<td>Programme Officer, Regional Resource Centre for Asia and the Pacific</td>
</tr>
<tr>
<td>Dr. Payden</td>
<td>Regional Adviser, Water Sanitation and Health, WHO Regional Office for South East Asia</td>
</tr>
<tr>
<td>Dr. Mohd Nasir Hassan</td>
<td>Team Leader, Environmental Health, WHO Regional Office for the Western Pacific</td>
</tr>
<tr>
<td>Mr. Diarmid Campbell-Lendrum</td>
<td>Team Leader, Climate Change and Health, WHO Headquarters</td>
</tr>
<tr>
<td>Mr. Jungsub Yeom</td>
<td>Technical Officer, Environmental Health, WHO Regional Office for the Western Pacific</td>
</tr>
<tr>
<td>Dr. Rokho Kim</td>
<td>Environmental Health Specialist, WHO Division of Pacific Technical Support</td>
</tr>
<tr>
<td>Ms. Elena Villalobos Prats</td>
<td>Technical Officer, WHO Headquarters</td>
</tr>
<tr>
<td>Mr. Sharad Adhikary</td>
<td>Environmental Health Adviser, WHO Office in Indonesia</td>
</tr>
</tbody>
</table>
Mr. Terrence Thompson  
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Dr. Ram Lal Verma  
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Email : ramlal.verma@rrcap.unep.org

Dr. Kristie L. Ebi

Dr. Simon Hales

Prof. Dr. Rizaldi Boer  
Centre for Climate Risk and Opportunity Management in Southeast Asia Pacific, Indonesia  
rizaldiboer@gmail.com
## International Organizations and Bilateral Cooperation

### Ms. Ute Jugert
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### Mr. Gabor Vereczi
Technical Advisor for the Pacific Region  
Climate Resilient Development  
United Nations Development Programme  
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## Observers

### Mr. Febi Dwirahmadi
Centre For Environment And Population Health  
Griffith University  
Email: f.dwirahmadi@griffith.edu.au
ANNEX 2: MEETING AGENDA

Meeting of the Climate Change and Health Thematic Working Group of the Regional Forum on Environment and Health, 9-12 December 2013, Jakarta, Republic of Indonesia

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter/ moderator</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td>Climate Change Science and Impacts</td>
<td></td>
</tr>
<tr>
<td>Mon 09 Dec</td>
<td>08:30-09:00 Registration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>09:00-09:30 Welcome and Opening Remarks</td>
<td>Arief Yuwono, Deputy Minister for Environmental Degradation Control and Climate Change</td>
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<td></td>
<td></td>
<td>Payden, Regional Adviser, Water Sanitation and Health, SEARO</td>
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<td></td>
<td></td>
<td>Jonathan Gilman, Regional Coordinator, Inter-Agency and Country Level Coordination, ROAP</td>
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<tr>
<td></td>
<td>09:30-09:50 Group photo and coffee break</td>
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<tr>
<td></td>
<td>09:50-10:00 Meeting objectives and adoption of the agenda</td>
<td>TWG Chair</td>
</tr>
<tr>
<td></td>
<td>10:00-10:30 Climate Change &amp; Health: from Science to Practice</td>
<td>Dr. Hae-Kwan Cheong, (Sungkyunkwan University, ROK)</td>
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<tr>
<td></td>
<td>10:30-11:10 Climate Change Talks:</td>
<td>Diarmid Campbell-Lendrum (WHO-HQ)</td>
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<tr>
<td></td>
<td>Past, Present and Future Agendas on Climate Change and Health</td>
<td></td>
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<tr>
<td></td>
<td>11:10-12:00 Regional Climate Change and Health Programmes</td>
<td>Facilitator : Diarmid Campbell-Lendrum (WHO-HQ)</td>
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<tr>
<td></td>
<td>(WPRO and SEARO)</td>
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<tr>
<td></td>
<td>- Jungsub Yeom (WPRO),</td>
<td></td>
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<tr>
<td></td>
<td>- Rokho Kim (WPRO-Pacific Island Countries),</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Payden(SEARO)</td>
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<tr>
<td></td>
<td>12:00-13:30 Lunch</td>
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<tr>
<td></td>
<td>13:30-14:00 Short Lived Climate Pollutants: Monitoring and</td>
<td>Ram Lal Verma (AIT-UNEP RRCAP)</td>
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<tr>
<td></td>
<td>Assessment</td>
<td></td>
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<tr>
<td></td>
<td>14:00-14:30 Flooding and diarrhoea: methodological challenges</td>
<td>Masahiro Hashizume (Nagasaki University, Japan)</td>
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<tr>
<td></td>
<td>for scientific evidence</td>
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<tr>
<td></td>
<td>14:30-15:00 Health Impact of Climate Change: a science</td>
<td>Dr. Anwar Musadad (Centre for Community Health Intervention Technology)</td>
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<tr>
<td></td>
<td>perspective</td>
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<td></td>
<td>15:00-15:45 Countries’ Presentations (5 minutes per agency)</td>
<td>Moderated by Indonesia MOE</td>
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<td></td>
<td>15:45-16:00 Coffee break</td>
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<tr>
<td></td>
<td>16:00-17:00 Countries’ Presentations (continued)</td>
<td>Moderated by Indonesia MOE</td>
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<tr>
<td>Time</td>
<td>Activity</td>
<td>Presenter/ moderator</td>
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<tr>
<td>19:00-</td>
<td>Welcome dinner</td>
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<tr>
<td><strong>DAY 2</strong></td>
<td><strong>Health National Adaptation Plans</strong></td>
<td></td>
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<tr>
<td><strong>Tue 10 Dec</strong></td>
<td><strong>Overview on the objectives of National Adaptation Plans:</strong> Why it is important for the health sector to be involved in the NAP process?</td>
<td>Diarmid Campbell-Lendrum (WHO-HQ)</td>
</tr>
<tr>
<td>09:00-09:15</td>
<td>WHO guidance to protect health from climate change through health adaptation planning</td>
<td>Kris Ebi</td>
</tr>
<tr>
<td>09:15-09:45</td>
<td>WHO proposals for interventions to be included into the health component of National Adaptation Plans</td>
<td>Nasir Hassan (WPRO)</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>National Adaptation Plan Global Support Programme (NAP GSP)</td>
<td>Conrado Heruela (UNEP)</td>
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<tr>
<td>10:30-10:45</td>
<td>Coffee break</td>
<td></td>
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<tr>
<td>10:45-12:00</td>
<td>Group work on Health National Adaptation Plans</td>
<td>WHO-HQ, RO focal points</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
<td></td>
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<tr>
<td>13:30-15:30</td>
<td>Group work on Health National Adaptation Plans</td>
<td>WHO-HQ, RO focal points</td>
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<tr>
<td>15:30-15:40</td>
<td>Coffee break</td>
<td></td>
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<tr>
<td>15:45-12:00</td>
<td>Group work on Health National Adaptation Plans</td>
<td>WHO-HQ, RO focal points</td>
</tr>
<tr>
<td><strong>DAY 3</strong></td>
<td><strong>Planning and Financing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Wed 11 Dec</strong></td>
<td><strong>Summary and Presentations on Group work and Technical Discussion on Health National Adaptation Plans</strong></td>
<td>Elena Villalobos Prats (WHO-HQ) and Simon Hales</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>Management of Health Adaptation Projects</td>
<td>Terrence Thompson (WHO Nepal)</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>GEF-funded health adaptation in Bhutan</td>
<td>MOH Bhutan</td>
</tr>
<tr>
<td>10:30-10:45</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>11:15-12:00</td>
<td>Plenary discussion and next steps to finalize the health component of the national adaptation plans</td>
<td>RO focal points</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
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</tr>
<tr>
<td>13:30-14:00</td>
<td>Increasing resiliency of health sector to climate change impact through development of seasonal based early warning system</td>
<td>Dr. Rizaldi Boer (CCROM-SEAP)</td>
</tr>
<tr>
<td>14:00-14:30</td>
<td>Third E&amp;H Ministerial Meeting and the Framework for Cooperation on Environment and Health</td>
<td>UNEP/WHO</td>
</tr>
<tr>
<td>14:30-14:45</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>14:45-15:15</td>
<td>GIZ Programme on Adaptation to Climate Change in the Health Sector</td>
<td>Ute Jugert (GIZ)</td>
</tr>
<tr>
<td>15:15-16:00</td>
<td>Project financing opportunities and processes (GEF)</td>
<td>Conrado Heruela (UNEP)</td>
</tr>
<tr>
<td><strong>DAY 4</strong></td>
<td><strong>Way Forward</strong></td>
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<tr>
<td><strong>Thu 12 Dec</strong></td>
<td><strong>Summary of previous days of the meeting</strong></td>
<td>TWG Chair</td>
</tr>
<tr>
<td>08:30-09:00</td>
<td>Roundtable discussion for the identification of priorities, activities, objectives and prospects for linking climate change strategies and health impacts ***</td>
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<tr>
<td>10:30-10:45</td>
<td>Coffee break</td>
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<tr>
<td>10:45-11:15</td>
<td>Preparation and approval of CC TWG statement/output document</td>
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<tr>
<td>Time</td>
<td>Activity</td>
<td>Presenter/moderator</td>
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<tr>
<td>11:15-12:00</td>
<td>Revision of the draft Work Plan of the CC TWG 2014-2016</td>
<td>Moderated by TWG Chair</td>
</tr>
<tr>
<td>12:00-12:15</td>
<td>Closing remarks</td>
<td>TWG Chair, UNEP,WHO</td>
</tr>
<tr>
<td>12:15-13:30</td>
<td>Lunch</td>
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### ANNEX 3: DRAFT WORK PLAN ACTIVITIES

**Meeting of the Climate Change and Health Thematic Working Group of the Regional Forum on Environment and Health, 9-12 December 2013, Jakarta, Republic of Indonesia**

**Background; Overall objective/vision of the TWG**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Activities</th>
<th>Timeline</th>
<th>Facilitator</th>
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<tbody>
<tr>
<td>a) Enhance knowledge management communication and technical support</td>
<td>1) Regional workshop and capacity building on National Adaptation Plans and H-NAP formulation. Facilitate countries in access to funding opportunities.</td>
<td>3q. 2015</td>
<td>Brunei Darussalam?</td>
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<tr>
<td></td>
<td>2) Training for health and environment officials on proposal formulation to access funding opportunities</td>
<td>4q. 2014</td>
<td>UNEP?</td>
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<td></td>
<td>Training for health and environment personnel on climate change resilience.</td>
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<td>3) CC&amp;H country profiling; compilation, analysis, verification and publication of the country data acquired during the TWG meeting</td>
<td>1q 2014</td>
<td>WHO</td>
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<td></td>
<td>4) Regional inventory of experts and research centres</td>
<td></td>
<td>WHO/UNEP</td>
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<td></td>
<td>5) Awareness raising and communication Policy brief</td>
<td></td>
<td>WHO HQ</td>
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<td></td>
<td>6) Building capacity on impact assessment and early warning systems with the use of modeling and data management tools.</td>
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<tr>
<td>b) Promote research and development</td>
<td>1) Organization of a Climate Change and Health side event at the 2014 Asia Pacific Adaptation Forum</td>
<td>4q,2014</td>
<td>Malaysia??</td>
</tr>
<tr>
<td></td>
<td>3) Training on vulnerability assessment for the production of risk mapping tools and data collection;</td>
<td></td>
<td>Indonesia</td>
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<tr>
<td></td>
<td>4) Impact assessments of air pollution and water pollution on health and climate using measurement data and modeling simulations. Workshop</td>
<td></td>
<td>WHO/UNEP</td>
</tr>
<tr>
<td>c) Effective management of the climate change</td>
<td>1) Creation of a task force of members for the formulation of a regional project</td>
<td>1q2014-2q2015</td>
<td>UNEP/RRCAP</td>
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</tbody>
</table>
impacts for benefit of human health proposal on black carbon to submit to GEF6 and adaptation fund board.

<table>
<thead>
<tr>
<th>GCF</th>
<th>2015</th>
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d) TWG meeting

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<thead>
<tr>
<th>2014</th>
<th>Republic of Korea?? Brunei?</th>
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<tbody>
<tr>
<td>2015</td>
<td>Indonesia? Brunei?</td>
</tr>
<tr>
<td>2016</td>
<td>Philippines? Back to back with Regional Ministerial Forum</td>
</tr>
</tbody>
</table>

e) Regional Network on CC&H Website hosted by Regional Forum

f) Support the development of H-NAP and improve collaboration among countries through networking and information sharing

| WHO/UNEP |

g) Determine governance structure of the TWG Terms of Reference

h) Establish a task force for fundraising

Subject to availability of funds
Presentation 1: Status of climate change and health: Update from the UNFCCC CoP 19 by Diarmid Campbell-Lendrum

Status of climate change and health: Update from the UNFCCC CoP 19

Diarmid Campbell-Lendrum
Team Leader, Climate Change and Health,
Public Health and the Environment Department,
WHO Geneva

Evidence for climate change continues to accumulate

(a) Atmospheric CO₂

Evidence for health protection continues to accumulate

3: Overview of health engagement in climate change

4: Overview of health engagement in climate change

Note: 17 presentations are included in this annex. The country presentation will be synthesised into a separate paper and would be published separately by the Secretariat.
Evidence for climate change continues to accumulate

- Global average sea level change

- Observed change in surface temperature 1901–2012

Projections of climate change

- Global average surface temperature change
- Global mean sea level rise

Overview of health engagement in climate change
49

Burden of climate-sensitive diseases remains high

- Each year:
  - Undernutrition kills 3.5 million.
  - Diarrhoea kills 2.2 million.
  - Malaria kills 900,000.
  - Extreme weather events kill 60,000.

WHO estimates that the climate change that has occurred since the 1970s already kills over 140,000 per year.

- 85% of these deaths are children in developing countries

Inequitable health effects continue

Cumulative emissions of greenhouse gases, to 2002

WHO estimates of per capita mortality from climate change, 2000

Extreme weather events continue to destroy lives

Polluting energy sources and over-consumption continue to cause huge health impacts

- Outdoor air pollution → 3.3 million deaths/yr — large proportion urban exposures
- Indoor air pollution → 3.5 million deaths/yr — mostly from inefficient biomass and coal cookstoves

(Lim S et al, Lancet, 2012)
Status of health in climate change negotiations

1992 Rio conference and the UNFCCC

What is the status of health in the UNFCCC?

1992 RIO DECLARATION Principle 1: "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."

UNFCCC Article 1: Prevent “Adverse effects of climate change”: ...changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.

Overview of health engagement in climate change

Health and climate change timeline

Inconvenient truths for health in climate policy

1) How many times was health mentioned in the 200 page draft agreement proposed in Copenhagen?

2) How many of the 323 side events focussed on health?

3) What percentage of global climate funds were allocated to health projects?

4) Of the 13 main economic models to inform climate mitigation decisions, how many incorporated health co-benefits?
Health is currently neglected in climate change support mechanisms

What is the status of health in the UNFCCC?

- LDCs identifying health as adaptation priority

Number of adaptation projects submitted

Funds requested for health

Funds awarded for health

Potential explanations for lack of support to protect health:

- Overall lack of funding for adaptation in general
- Health community largely absent from the NAPA process
- Health sector not submitting proposals
- Not enough technical guidance to develop the proposals

Public identifies with connection between health and climate change

Globescan poll in 30 countries (UNDP 2007):”Now I would like to ask you some questions about climate change, which is sometimes referred to as global warming or the greenhouse effect. Which ONE of the following possible impacts most concerns you personally, if any?”
Clearer approach to health adaptation planning and content

Ebi et al, WHO Guidance for health in national adaptation plans

Guillemin et al, WHO draft operational framework for health adaptation:

Opportunities
UNFCCC negotiations and mechanisms have:

- Continued to raise the importance of adaptation, and the need for international support – US$100 billion/year after 2020
- Maintained the Nairobi Work Programme on Adaptation
- Established the Green Climate Fund, with aim of US$30 billion per year for mitigation and adaptation
- Established the process of National Adaptation Plans, to move to sustained, mainstreamed support

Outcomes from Warsaw CoP19:

<table>
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<th>General</th>
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<tbody>
<tr>
<td>- Continue incremental progress through Lima (2014), to planned agreement in Paris (2015)</td>
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<td>- Mitigation commitments insufficient to keep within 2°C limit, and remain voluntary</td>
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<tr>
<td>- Green Climate Fund established – but not operational. No new commitments made for period 2013-2019</td>
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<tr>
<td>- Continue process of National Adaptation Plans, and added new programme on &quot;Loss and Damage&quot;</td>
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<table>
<thead>
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<th>Health</th>
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<tr>
<td>- Health now widely recognized as one of the key objectives of adaptation, and of reducing black carbon</td>
</tr>
<tr>
<td>- Request made specifically for a health report under the Nairobi Work Programme on adaptation</td>
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<tr>
<td>- Unclear how health will be represented in Green Climate Fund</td>
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<td>- Climate and Clean Air Coalition is an important opportunity to promote health</td>
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</table>

Conclusions and Recommendations

- The health sector should support and engage with the national climate coordination mechanisms
  - A high-quality "H-NAP" within the overall NAP process is essential
  - Don’t rely only on the UNFCCC mechanisms for financial support – the same plan can be used for others
  - Make use of the opportunity to link climate change and air pollution.
Flooding and diarrhoea: methodological challenges for scientific evidence by Masahiro Hashizume

Background

- Flooding is the most frequent natural disasters affecting over 2.5 billion people during the last 30 years (Centre for Research on the Epidemiology of Disasters 2007).
- Recently floods have tended to intensify, and this trend could increase with climate change (Easterling et al. 2000; Milly et al. 2002).

Earthquake
Slide
Extreme temperature
Drought
Windstorm

Source: CRED 2007

In high-income countries,
- Risk of diarrhoea due to flood is low (Ahern et al, 2005).
- An increase in risk of gastroenteritis for flood exposed individuals in UK (Reacher et al, 2004).
- Flooding house or yard was associated with increased risk of gastrointestinal illness in US (Wade et al, 2004).

In low-income countries,
Post-flood increases in cholera, rotavirus diarrhoea, cryptosporidiosis and non-specific diarrhoea have been reported.

Methodological problems
lack of pre-flood data, lack of comparison groups, potential recall bias.

Background

• Little evidence on the long-term health impact of flooding

WHO definition of three main exposure periods (WHO Europe 2002)

Immediate: During/immediately after the flooding
Short term: In the days or early weeks following the flooding
Long term: May appear after and/or last for months or years

• Previous findings on long-term health impact
  - Bristol, UK 1968 (Bennet 1970): 50% increase in mortality and GP attendance and >100% increase in Hosp. ad. in the 12m after the flood
  - Brisbane, Australia 1974 (Abrahams et al 1976): No difference in mortality between those who had been affected by flooding and those who had not.
  - England&Wales 1994-2005 (Miljorvic et al): 30% decrease in mortality in the 12m after the flood in flooded area. Due to relocation?
1. Effects of flooding in urban Bangladesh
   - Episode analysis -
Definitions and statistical analysis
(episode analysis)

- Flood period: river level exceeded danger level (weeks 30-38, 1998)
- Post-flood period: 6 months after the flood (week 39, 1998-week 14, 1999)
- Outcome measure: The ratio of the observed against expected number of diarrhoea patients visited a hospital
- Expected number of patients: season-specific average over the two preceding (1996-97) and subsequent (2000-01) years using Poisson generalised linear models.

\[
\log[E(Y)] = \alpha + \text{time(Fourier, 6 harmonics/year)}
\]

where \( E(Y) \): the expected weekly count of patients, Fourier: Fourier terms
Excess risk of cholera

<table>
<thead>
<tr>
<th></th>
<th>Flooded period</th>
<th>Post-flood period</th>
</tr>
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<tbody>
<tr>
<td>Observed</td>
<td>288</td>
<td>366</td>
</tr>
<tr>
<td>Expected</td>
<td>199.8</td>
<td>219.9</td>
</tr>
<tr>
<td>RR</td>
<td>1.44</td>
<td>1.66</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.87, 2.38)</td>
<td>(1.32, 2.13)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.15</td>
<td>0.00</td>
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</tbody>
</table>

**Duration of excess risk**

- **Cholera**
- **Non-cholera**

Summary findings

--- flood and diarrhoea ---

1. Incidence of diarrhoea was higher than expected during the flood (O/E=5.9 for cholera during the flood).

2. Excess risk of cholera persisted up to 20 weeks after the end of the flood.

3. Nearly everyone was vulnerable during the flood, while people in lower hygiene and sanitation status were specially vulnerable in the post-flood period.

**Limitations**

- Risk defined by comparison to local baseline: assumption of no other different conditions than flooding between years
- Hospital based study: other health facilities disrupted? --> overestimation
- Lack of comparison groups (flooded vs non-flooded)
- Imprecision in definition of the flood exposure

*The expected values of diarrhoea patients were adjusted by season (Fisher tests up to 0.166).
*p test for heterogeneity.
2. Effects of flooding in rural Bangladesh

- controlled interrupted time-series analysis -

Methods

• Design: Controlled interrupted time-series analysis

• Exposure
  - Flooded and non-flooded areas in the summer 2004 were identified by interviewing the head of 9524 baris (90% of all baris)

• Outcome
  - The number of diarrhea patients visited a hospital

• Analysis
  - Linked with HDSS (Health & demographic surveillance) cohort data
  - Comparison of the rates (cases per person-time at risk) of diarrhea in the flooded area with the non-flooded areas by week throughout the study period (2001-2007).
2004 flood in Matlab

Weekly diarrhoea rate in flooded/non-flooded area

a) Weekly diarrhoea rate (per 1000)

b) Rate ratio (flooded vs non-flooded)

Results

<p>| TABLE 4. Diarrheal Illness: Pre- and Postflood* Episodes in the Flooded and Nonflooded Areas |</p>
<table>
<thead>
<tr>
<th>No. of Subjects</th>
<th>Rate per 1000</th>
<th>Odds Ratio (95% CI)</th>
<th>HR Controlled for Prevalent Period and Seasonality* (95% CI)</th>
<th>HR Controlled for Prevalent Period and Seasonality* (95% CI)</th>
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<tr>
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<td>1 to 4 weeks</td>
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<td>17 to 20 weeks</td>
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<td>29 to 32 weeks</td>
<td>64</td>
<td>48</td>
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</table>

*Rate ratio is defined as weeks 29 to 32 in 2004 (1 set), from 15 May to 15 August.
*Controlled for sex by multivariable regression with Poisson distribution (log link) with annual cycle up to an order of 6.

Fourier terms (sine–cosine pairs) up to the sixth harmonic per year were introduced into the second-stage model.

**Limitations**

- Recall bias: Exposure to the 2004 flood was indirectly ascertained—based on the results of an interview with the head of each bari in 2008.
- Imprecision in definition of the flood period.

**Conclusions**

- Importance of careful control for temporal confounding.
- No evidence of an adverse effect of flood on diarrhoea either during the flood period or afterward.
Discussion

• The reasons of the different results between the studies
  – Analysis method
  – Urban vs rural
  – Strength, length and type of flooding

• Importance of comparison groups and careful control for temporal confounding

• Importance of surveillance throughout a year!

Acknowledgements

| London School | Univ. East Anglia |
| Ben Armstrong | Paul Hunter |
| Shakoor Hajat | Research Institute for Humanity and Nature |
| Paul Wilkinson | Kazuhiko Moji |
| Ai Milojevic | |
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| ASG Faruque | Taiichi Hayashi |
| Kim Streatfield | |
| Md Yunus | Tsukuba Univ. |
| | Yukiko Wagatsuma |
Upcoming in 2013 on climate change

- Reached 400 ppm on 9 May 2013 at Mauna Loa Observatory, Hawaii
  - Goal: 2,450 ppm by 2050 (UNFCCC, 2010)
  - Global average temperature is likely to exceed this goal by 2050, and by 3 to 6°C higher than pre-industrial levels by the end of the century

- COP18, Doha (Dec 2012)
  - Extend Kyoto Protocol to 2021
  - Establishment of Green Climate Fund: Incheon, Korea
  - Compensation for the Loss and damages

- COP19, Warsaw (Dec 2013)

- IPCC AR5
  - WG I: Sep 2013
  - WG II & III: 2014 Planned
Temperature rise, AR5

- AR3 (2001): 0.6°C increase over 1901–2000
- AR4 (2007): 0.74°C increase over 1906–2005
- AR5 (2013): 0.85°C increase over last 133 years (1880–2012)

Historical trend of atmospheric CO\textsubscript{2} level

Source: IPCC AR5 SPM, 2013

Source: Selected from Ahlenius, 2007

Greater certainty in anthropogenic attribution of climate change

- FAR (1990): “unequivocal detection not likely for a decade”
- TAR (2001): “most of the warming of the past 50 years is likely (odds 2 out of 3) due to human activities”
- AR4 (2007): “most of the warming is very likely (odds 9 out of 10) due to greenhouse gases”
- AR5 (2013): “it is extremely likely (95%) that human influence has been the dominant cause of the observed warming since the mid 20th century.”

Temperature projection, AR4 vs. AR5
Climate Change and Health

Diurnal variation of blood pressure

Temperature (°C)

Seasonality of dengue fever

Source: Ministry of Health, Cambodia

Seasonality of malaira

Cambodia  Republic of Korea  Papua New Guinea

Cognaci et al., Contraception 2013
Rainfall and vivax malaria in Republic of Korea

Seasonality of asthma in Taiwan

Mean annual birth weight 1979-1986, Tari, Southern Highland, PNG

Extreme weather events and health in Mongolia
Desertification

Extreme weather in Mongolian steppe: “Dzud”

Source: CDC. MMWR 2002;51(01):5-7

Source: Mandal et al., 2007

Photo credit: CAMDA

Source: http://www.rca.org/neca/resources/church-is-helping-end-the-mongolian-dzud/20100101.html

Source: © Bolor B

FIGURE 1. As part of nutritional assessment, a child’s weight is measured on a standard bathroom scale — Mongolia, 2001
Diurnal variation of PM$_{2.5}$ in Ulaanbaatar

- Wintertime mean PM$_{2.5}$ concentration of 250 μg/m$^3$

Air pollution and health in Ulaanbaatar

- 29% (95% CI, 12–43%) of cardiopulmonary deaths
- 40% (95% CI, 17–56%) of lung cancer deaths in the Ulaanbaatar city are attributable to outdoor air pollution

nearly 10% of the city’s total mortality

Source: Allen et al., Air Qual Atmos Health, 2013
VULNERABILITY: Local Perspectives of Climate Change

DPSEEA model

Pressure
- Non-renewable energy use
- Greenhouse gas emissions
- Industrial and urbanization

State
- Climate change and variability
- Food and water insecurity
- Changes in vector distribution
- Migration from natural disaster

Exposure
- Extreme weather events
- Health of vulnerable populations
- Socioeconomic conditions
- Health care infrastructure

Effects
- Climate-sensitive diseases
- Malnutrition
- Suicide
- PTSD
- Addiction
- Air pollution
- Water pollution
- Unemployment
- Poor health outcomes
- Economic strain
- Displacement

Driving forces
- Economic development
- Population growth
- Urbanization and industrialization

Action
- Sustainable development policy
- Low carbon energy technology and policy
- International agreement
- National mitigation policy
- Energy efficiency
- Low carbon, healthy transport
- National adaptation policy
- National disaster management plan
- Community resilience
- Climate resilient infrastructure
- Healthy cities and healthy islands
- Vulnerability and adaptation assessment
- Health care and public health services
- Hospitals safe from disasters
- Health services for vulnerable populations
- Mental health, suicide prevention
- Warning and response systems

Source: Ministry of Health, Mongolia
Locality: world is not flat!

- Why locality?
- Different level of vulnerability

Climate hazards index in south-east Asia

(Source: Yusuf & Francisco, 2010)

Human Development Index of WPR countries

Drawn based on the data from UNDP

Vulnerability to Health Effect of Climate Change

Health outcome

Exposure

Susceptibility

Adaptive capacity
Process of vulnerability, impact and adaptation assessment

Regional Framework: WHO WPRO

- Title: Regional Framework for Action to Protect Human Health from Effects of Climate Change in the Asia-Pacific Region
- Goal:
  
  Protect human health from current and projected risks due to climate change at country- and regional level
- Objectives
  
  1) Increase awareness of health consequences of CC
  2) Strengthen the capacity of HSs to provide protection from climate-related risks and substantially reduce HS’s GHG emissions
  3) Ensure that health concerns are addressed in decisions to reduce risks from CC in other key sectors

Way forward

What Can Be Done?

Mitigation
- Reducing GHG emission
- Greening sustainable Health and Environment Sector

Governance
- Planning
- Vulnerability and impact assessment
- National action plan and strategy

Adaptation
- Strengthening health sector
  - Raise awareness
  - Build capacities

Planning
- Mitigation
- Adaptation
- Governance
Strengthening health systems

- Strengthening of public health/health sector to cope with climate change
- Enhanced disease surveillance system
- Developed EWS for EWE: heat waves, fires, droughts, cold waves, flooding, air quality
- Strengthened HS engagement in emergency planning for EWE, developed cross-sector plans: heat waves, fires, droughts, cold waves, flooding, air quality
- Improved climate sensitive environmental determinants of health: VBDs, WBDs, FBDs, rodent-borne diseases; air quality, water quality, food and malnutrition, biodiversity loss of ecosystem
- Developed a cross-sector approach on climate change adaptation
- Address health benefits/damages

Awareness raising and capacity building

- Climate change perceived as important in political development
- Health effect of climate change has high relevance in political process
- Level of support for policies targeting climate change and health in public/private sector of society
- Information
- Build capacity and developed workforce on climate change and health-related aspects
- Raised public awareness on climate change and health, mitigation-adaptation measures
- Developed communication message for EWE related with EWS
- Developed communication plans for key messages on climate change and health for other sectors or public
- Main message on protecting health from climate change

Limitation of adaptation

- Low-probability extreme climates
- Agricultural limitations and human nutrition
- Health consequences of displacement, migration, and social conflict
- Reliance on infrastructure

Why mitigation is needed?

- Justice
  - Do good vs. do justice
    - Government: do good
    - Individual: do justice
  - GHG emission reduction: do harm? Yes, it does harm people
    - Future generation
    - Less privileged people
    - Less developed countries

- Contribution of health sector on GHG emission?: Carbon footprint of health and environment section
NHS England carbon footprint

Emissions are expressed as tonnes of CO$_2$ and as tonnes of CO$_2$-equivalent (CO$_2$eq) – the latter taking account also of non-CO$_2$ greenhouse gases such as methane and nitrous oxide.

Health co-benefits of climate change mitigation strategies

1. Reduce emissions from health-damaging pollutants
2. Increase access to reproductive health services
3. Decrease ruminant meat consumptions
4. Increase active transport from modifications to the built environment
5. Increase in urban green-space

Co-benefits

- Reduction of co-pollutants
  - Outdoor sources
  - Household sources
  - Primary and secondary co-pollutants

- Access to reproductive health services
  - Population, GHGs emission, and health

Reducing health impact of CC via 1º and 2º prevention
Action for climate change and health (WHO EURO)

1. No action is no option – plan ahead and take action early
2. Options need to fit contexts
3. Put people in the center of climate change policy
4. Establish accountable whole of government approaches
5. Use a mix of measures – including “smart”, “green”, adaptation options
   - Smart options
   - Ecosystem-based responses
   - Technological responses (“grey” adaptation measures)

6. Assess and build capacity where needed
   - Increase funding for interdisciplinary research on climate change A&M approaches

7. Target the most vulnerable
   - Do equity audit on policies

8. Take into account co-benefits when considering GHG mitigation actions

9. Measure and address the “carbon footprint” of your institutions
   - The health sector can lead by example

“We cannot negotiate with nature.”

Ban Ki Mun @ COP19
Secretary-General of the United Nations

hkcheong@skku.edu
Presentation 4: A Synthesis of Climate Change & Health in the Western Pacific Region by Jung-Sub Yeom

1. Overview of Western Pacific Region
- 37 member countries and areas
- 1.8 billion people
- One of the most diverse regions: Geography, Climate, Ethnic, Developmental stage

2. Background/History
- World Health Assembly resolution (WHA61.19) “Climate change and health”
- Western Pacific Regional Committee resolution (WPR/RC59.R7) “Regional Framework for Action to Protect Human Health from the Effects of Climate Change in the Asia Pacific Region”
- Following the Regional Framework, WPRO and country offices have been supporting Member States
  - 2008
  - 2009 - 2010
  - 2011
  - 2012
  - 2013

- Health vulnerability assessment and action planning: Cambodia, Mongolia, Papua New Guinea, and Samoa
- Pacific Island 11 Countries
- Vector-borne Diseases Control Project: Cambodia, Mongolia, PNG [KOICA fund]
- Water-borne Diseases Control Project: Cambodia [Korea MoE fund]
- Synthesis Report of Western Pacific & South Pacific

World Health Organization
Western Pacific Region

Environmental Health Unit
Dr Nasir Hassan (Team Leader / hassanm@wpro.who.int)
Mr Jungsub Yeom (Technical Officer / yeomj@wpro.who.int)
3. Why Synthesis Report?

Based on Regional Frame Work, Many Activities, Reports were done

It is time to synthesize for next step, both Regional and Sub-Regional

4. Synthesis of Science – Climate Change and Health

Projection of Climate Change

Global Temperature Increase 1.5°C

end of 21st C

IPCC, 2013

>140,000 excess death annually by 2004

Climatic Determinants of Health

Direct • Heat Waves
• Cold-spells
• Extreme Weather Events

In-Direct • Infectious Disease
• Malnutrition
• Air Quality-related effects

5. Synthesis of Evidence - Climate Change Impacts on Health

Extreme Weather

• 10 fold increases of natural disasters since 1950s

Communicable Diseases

• Malaria; [Korea] persistence of vivax malaria
  [Papua New Guinea] in highland area, rain fall ➔ incidence ➔ Diseases
• Dengue: 30 fold increase in incidence over last 50 years
• Tick-borne: increasing is particularly due to a reduction of cold spells
• Water-borne: In developing countries, 1 °C ➔ diarrhoea 5%

Malnutrition

• [Papua New Guinea] In a rural village of highland, during highest El Niño(1982-1983) annual average birth weight decreased
• [Mongolia] during doud(1999-2001), malnutrition is evident under 2 years of age

Heat waves

• related with increased mortality due to cardiovascular disease and respiratory disease as well as general mortality


<table>
<thead>
<tr>
<th>Country</th>
<th>Health Risk Related to Climate Change</th>
<th>Policies on Climate Change and Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>Vector,Water &amp; Food-borne Disease</td>
<td>2nd Health Sector Strategic Plan 2008-2015</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Rice-borne Disease, Ground Water Min.</td>
<td>Strategy for Reduction and Adaptation to Climate Change and Health 2013-2015</td>
</tr>
<tr>
<td>Philippines</td>
<td>Affected by Pacific Typhoons, Malaria, Dengue</td>
<td>National Policy on Adaptation for Health Sector</td>
</tr>
<tr>
<td>Korea</td>
<td>Vector, Water &amp; Food-borne Disease</td>
<td>National Climate Change and Health Adaptation Action Plan 2010-2014</td>
</tr>
</tbody>
</table>
7. Synthesis of Policy Direction – Framework of Activities

- **Governance**
  - Identify the body of the national governance on climate change, health aspect of climate change
  - Establish a multisectoral committee to deal with the climate change

- **Planning**
  - Developing evidence (vulnerability, impact and adaptation assessment)
  - Setting priority and action strategy (national adaptation strategies or action plan)

- **Adaptation**
  - Strengthening public health and health services
  - Raising awareness and building capacity

- **Mitigation**
  - Reducing greenhouse gas emissions
  - Green and sustainable health and environment sector

- **Sharing best practice**
  - Breaking down the fences is not just confined to between sectors

---

## Developing Countries

**Governance**
- Government take the lead and adopt comprehensive approach
- Multisectoral involvement with horizontal networking
- National health sector
- Multisectoral involvement with horizontal networking

**Vulnerability Assessment**
- Estimate national burden of disease
- Collaboration for regional early warning network

**Health Sector Capacity Building**
- Strengthen primary health care
- Extension of the surveillance system

**Awareness**
- Fit to local needs, by local language
- Mobilization of evidence

**Greening Health sector**
- Adopt Green Energy in infrastructure and seek appropriate technology
- Trace carbon footprint on all health sector and co-benefit analysis should be done

**Sharing Best Practice**
- Mobilize intersectoral collaboration
- Supporting regional networking by funding and R&D (appropriate technology including)

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**Sharing Best Practice**
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---

**Thank You**
Climate change and health in the Pacific island countries

Rokho Kim, MD DrPH
WHO Western Pacific Regional Office
Division of Pacific Technical Support
Suva, Fiji

Vulnerability of Pacific Islands

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<td>Palau</td>
<td>Coral, atoll</td>
<td>5100</td>
<td>11000</td>
<td>3</td>
<td>Extreme</td>
</tr>
<tr>
<td>Niue</td>
<td>Coral, reef</td>
<td>90000</td>
<td>105000</td>
<td>8</td>
<td>Severely</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>Coral, atoll</td>
<td>230000</td>
<td>105000</td>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Coastal, reef</td>
<td>250000</td>
<td>105000</td>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>Atoll, coral reef</td>
<td>230000</td>
<td>105000</td>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>Federated States of Micronesia</td>
<td>Atoll</td>
<td>230000</td>
<td>105000</td>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>Tonga</td>
<td>Coral, reef</td>
<td>250000</td>
<td>105000</td>
<td>4</td>
<td>Severe</td>
</tr>
</tbody>
</table>

Current WHO work in the Pacific

- **2010-2014:**
  - Vulnerability Assessment and Adaptation Capacity (V&A) project (WHO/KOICA/JICA)
  - Eleven PICs: FSM, RMI, Palau, Kiribati, Tonga, Tuvalu, Cook Islands, Niue, Solomon Islands, Vanuatu, Nauru

- **2011-2015:**
  - Piloting Climate Change Adaptation to Protect Human Health in Fiji project (Fiji MoH/GEF/WHO/UNDP)
  - Seven partner countries: Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan
Climate change and health in PICs

Most PICs have completed National CC&H Action Plans (NCCHAPs) or equivalent, with some notable exceptions (Samoa, Tokelau). Atoll countries, particularly the low-lying ones (Tuvalu, Kiribati, Marshall Islands, Tokelau) are extremely vulnerable to the impacts of climate change, including its detrimental effects on health:

- increasing incidence of food-, water- and vector-borne diseases, injuries/deaths from extreme weather events, mental health disorders and other NCDs

All PICs will require substantial support from WHO in further developing and implementing NCCHAPs and protecting the public health from the impacts of CC.
### Pacific Regional CC&H Synthesis Report

**Contents (2)**

- 5. Country profiles – results of country-specific vulnerability assessments and adaptation plans for Pacific island countries
- 6. Where are we now?
  - 6.1 Recent developments in climate change and health in Pacific island countries
- 7. Where to from here?
  - 7.1 The way forward for climate change and health adaptation in the Pacific
- 8. Conclusions
- 9. Recommendations – health systems and public health
- References

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### Climate-sensitive health risks in PICs

<table>
<thead>
<tr>
<th>Country*</th>
<th>Main climate-sensitive health issues**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Islands</td>
<td>Dengue fever, diarrhoeal disease</td>
</tr>
<tr>
<td>Federated States of Micronesia</td>
<td>Water- and mosquito-borne diseases, malnutrition</td>
</tr>
<tr>
<td>Fiji</td>
<td>Dengue fever, typhoid fever, leptospirosis, diarrhoeal disease</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Food (safety, security, food-borne diseases), water (safety, security, water-borne diseases) and vector-borne diseases.</td>
</tr>
<tr>
<td>Nauru</td>
<td>Air quality, food security, non-communicable diseases (NCDs)</td>
</tr>
<tr>
<td>Niue</td>
<td>Vector-borne diseases, ciguatera, diarrhoeal disease, respiratory disease, heat-related illness, NCDs; trauma from extreme weather events</td>
</tr>
</tbody>
</table>

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**Driving forces**

- Economic development
- Rapid urbanization
- Deforestation

**Pressure**

- Non-renewable energy use
- Greenhouse gases
- Environmental pollution

**Action**

- Sustainable development policy
- Low-carbon energy technology & policy
- International agreements
- National mitigation policy
- Energy efficiency
- Walk, cycling, and low-carbon transport

---

**State**

- Climate change & variability
- Extreme weather events (droughts, floods, heatwaves)
- Food and water insecurity
- Malnutrition

**Effect**

- Climate-sensitive diseases (cardiovascular; respiratory; diarrhoeal; water-borne; vector-borne; malnutrition; injuries; mental)
### Essential Public Health Package to Enhance Climate Change Resilience (WHO, 2010)

1. a comprehensive vulnerability assessment;
2. preparedness for, and response to, the public health consequences of extreme weather events;
3. an integrated environment and health surveillance system;
4. strengthening country capacities for the delivery of preventive interventions of climate-sensitive disease control;
5. research on local-level health effects of climate change and on locally-appropriate adaptation measures; and
6. inter-sectoral coordination and health representation in national and international development, humanitarian, and climate policy forums.

### Ways forward: key areas of CC&H in PICs

1. Mainstream CC&H into existing public health systems
2. Align CC&H with DRM and WASH activities in PICs
3. Investigate link between CC and NCDs
4. Explore CC impacts on mental health
5. Develop and improve climate-based early warning systems for infectious disease epidemics
6. Support LDCs for establishing sustainable climate health program
7. Develop and implement the HNAPs
Outline of Presentation

- Vulnerability of South-East Asia Region
- Climate related diseases – mortality in SEAR
- Key focus areas
- Regional response to climate change

Vulnerability of SEAR to climate

- Glacial lake outburst floods (Nepal 1998 to 2002)

Nepal Cabinet holds meeting at mount Everest, Dec 2009

Vulnerability of SEAR to climate change

- Sea level is rising- “Coastal areas, islands at greatest risk - increased flooding from the sea and the rivers” (IPCC 2007).

- Number of heatwaves-
  - India (1980 & 1998, 2002),
  - Bangladesh (1999)

Under Water Cabinet Meeting in Maldives 2009
Source: scubadivemaldives.com
Vulnerability of SEAR to climate


- More number of drought like situations (Sri Lanka 1998-2002, India 2009)

Increases in diseases of poverty may be even more important

"It is very likely that mean sea level rise will contribute to upward trends in extreme coastal high water levels in the future".
Draft SREX SPM, Pg 12

"It is likely that the frequency of heavy precipitation … will increase in the 21st century over many areas of the globe. Draft SREX SPM, Pg 10

Cholera cases increased by 14% per 10-mm above average rainfall, and by 24% per 10-mm below, in Dhaka.

Commitments to minimize health impacts of climate change

1. New Delhi Declaration on Climate Change and Health – SEA Health Ministers
2. WHO South-East Asia Regional Committee Resolution
3. SEA Parliamentarian’s call for action for protecting human health from climate change in south-east asia

Key focus areas

1. Identify strategies and actions
2. Support health systems to enhance capacity for assessing and monitoring health vulnerability, risks and impacts
Key focus areas

- Share knowledge and good practices
- Generation of evidence
- Inter-sectoral collaboration

Update: Regional action on climate change and health

- Teachers and students guide on climate change and health
- Training module on climate change and health- draft

Update: Regional action on climate change and health

- South-East Asia Regional Parliamentarian’s conference on protecting human health from climate change in 2010
- South-East Regional High Level Preparatory Meeting for COP16
- Various national level advocacy meetings
- Regional Strategy on climate change and health

Update: Regional action on climate change and health

- Retrospective study protocol to assess the linkage between climate change and diarrheal and vector borne diseases.
- India - Health vulnerability and adaptation assessment, Environmental Health conditions in primary health centers
- Sri Lanka - Climatic Factors and Occurrence of Dengue Fever, Dysentery and Leptospirosis
### Update: Regional action on climate change and health

- **Bangladesh**: Study to assess the socio-economic, health and livelihood conditions of the coastal people affected by the natural disasters.

- **Two new projects in Bangladesh and Nepal**: Protecting health by strengthening resilience of drinking water and sanitation services to climate change.

- **Climate change adaptation, and disaster risk reduction in Maldives under the one UN fund**

### Water safety plan project in Bangladesh, Bhutan, Indonesia, Myanmar, Nepal and Timor-Leste

- **Disaster risk reduction and preparedness plans in several countries**

- **Bhutan** – project to build health adaptation capacity

### Examples of adaptation measures

- **Bangladesh**: Cyclone shelters

- **India**: Risk Reduction interventions - based on priority hazards

- **Nepal**: Water related disasters planning and interventions for floods

- **Bhutan**: Preparedness and contingency planning under the multi-sectoral framework of NDMA

- **Indonesia**: Centre for Health Crisis in MOH, 9 regional and 2 sub centres across the country
Short-Lived Climate Pollutants (SLCPs)  
special focus on  
Atmospheric Brown Clouds (ABCs): Monitoring, Assessment and Mitigation  

Meeting of the Climate Change and Health Thematic Working Group of the Regional Forum on Environment and Health  

Jakarta, 9-12 December 2013  

Dr. R. L. Verma  
Regional Resources Center for Asia and the Pacific (RRC.AP), Asian Institute of Technology (AIT), Bangkok  

Outline  
• How to define climate change?  
• How reduction of SLCPs are important to address problem of Climate Change?  
• Initiatives addressing the issues of SLCPs  
  • Atmospheric Brown Cloud (ABC): revealing the science of BC aerosols (i.e., monitoring, assessment and mitigation)  
  • Climate and Clean Air Coalition (CCAC): addressing SLCPs at the political levels  
• Priority sectors to be focus-on for emission reduction of SLCPs  

Evidence of Climate Change  
Accumulation of energy in earth-atmosphere system resulting the increase in temperature level, sea level, glacier melting etc.  
IPCC 2007  

How to define the climate change?  
Earth-Atmosphere radiative budget  

Incoming energy = Outgoing energy (stability in climate)  
Incoming energy ≠ Outgoing energy (instability, lead to a change in climate system)  
Change in radiative budget of Earth-Atmosphere system, induced by the anthropogenic activities, which lead to a change in surface temperature, precipitation levels, melting of ice caps, sea level, biodiversity, crop production, health, and so on.  
Current scenario: Incoming energy > Outgoing energy and net absorption ≈ 0.9 W/m²  
Thus, heating of the earth-atmosphere system is taking place  
IPCC 2007  

Presentation 7: Short-Lived Climate Pollutants (SLCPs) special focus on Atmospheric Brown Clouds (ABCs): Monitoring, assessment and Mitigation by Ram Lal Verma
Major Radiative or Climate Forcing Agents

<table>
<thead>
<tr>
<th>RF Agents</th>
<th>RF (W/m²)</th>
<th>Residence time in Atmosphere</th>
<th>Category</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>+1.66</td>
<td>A decade to century</td>
<td>Long-lived</td>
<td>GHG (Kyoto Protocol)</td>
</tr>
<tr>
<td>N₂O</td>
<td>+0.14</td>
<td>114 years</td>
<td>Long-Lived</td>
<td>GHG (Kyoto Protocol)</td>
</tr>
<tr>
<td>HFCs</td>
<td>+0.32</td>
<td>29 years</td>
<td>Short-lived</td>
<td>GHG (Kyoto Protocol)</td>
</tr>
<tr>
<td>CH₄</td>
<td>+0.48</td>
<td>10-12 years</td>
<td>Short-lived</td>
<td>GHG (Kyoto Protocol)</td>
</tr>
<tr>
<td>O₃ (Trop.)</td>
<td>+0.35</td>
<td>4-18 days (secondary pollutant)</td>
<td>Short-lived</td>
<td>-</td>
</tr>
<tr>
<td>BC Aerosols</td>
<td>+0.60</td>
<td>3-8 days</td>
<td>Short-lived</td>
<td>None</td>
</tr>
</tbody>
</table>

What are SLCPs?

Black Carbon (BC): BC exists as particles in the atmosphere and is a major component of soot. BC is not a greenhouse gas but it warms the atmosphere by intercepting sunlight and absorbing it. BC and other particles (e.g. organic carbon (OC)) are co-emitted from many sources, such as cars and trucks, residential stoves, forest fires and industrial facilities. BC has a strong warming effect in the atmosphere, darken the snow when it deposited, and influence cloud formation. OC is a cooling particle, thus, BC/OC ratio is a critical for designing any mitigation measures.

Tropospheric Ozone (Trop-O₃): Trop-O₃ is a concentration levels of O₃ from ground level to 10-15 km of altitude. Trop-O₃ is harmful to human health and ecosystems. It is a major component of urban smog and is also a significant greenhouse gas. Trop-O₃ formed through a series of chemical reaction between ozone precursors (e.g. CH₄, CO and NOₓ) in presence UV radiation. Reduction of Trop-O₃ precursors will have multiple co-benefits.

Methane (CH₄): CH₄ is a greenhouse gas. Its concentrations has increasing as a result of human activities including the agriculture, animal husbandry of ruminant livestock, coal mining, oil and gas production and distribution, biomass burning and municipal waste landfills. The emission control measures for CH₄ will also reduce co-emitted substances such as VOCs, benzene, carbon tetrachloride and chloroform. Thus, CH₄ mitigation measures provide local air-quality benefits.

Hydrofluorocarbons (HFCs): HFCs are intentionally made to replace stratospheric ozone depleting substances (ODS), in such applications as air conditioning, refrigeration, solvents, foam blowing and aerosols. Although they do not deplete the ozone layer but are potent greenhouse gases.

SLCPs and Climate Change Mitigation Scenario

Inclusion of SLCPs mitigation are important, along with CO₂, to contain the temperature rise to less than 2.4°C relative to pre-industrial levels.

Ref: UNEP and WMO 2011 – Integrated Assessment of Black Carbon and Tropospheric Ozone

Estimated co-benefits of SLCPs (BC and CH₄) reduction

If identified measures implemented by 2030,
• It may reduce global warming by 0.5°C (0.2-0.7) in 2050 half the warming projected and would improve the chance of not exceeding 2°C target, if CO₂ is also aggressively addressed with SLCPs.
• Substantial regional climate benefits, e.g. temperature reduction in Arctic and Himalayas
The win-win benefits for climate, health, food security, and loss of 52 (30-140) million tonnes of agriculture production each year.

Ref: UNEP and WMO 2011 – Integrated Assessment of Black Carbon and Tropospheric Ozone
Atmospheric Brown Clouds (ABCs)
Monitoring, Assessment, and Mitigation

Indian Ocean Experiment (INDOEX, 1999) used multiplatform observations platforms:
• Satellites
• Aircrafts
• Ships
• Surface stations
• Balloons

Atmospheric Brown Clouds (ABCs) are widespread layers of brownish haze of regional scale plumes of air pollutants, consisting of mainly aerosol particles (such as black carbon (BC) and non-BC), and precursor gases (such as CH4, CO, NMVOCs, NOx), which produce aerosols and ozone.

These ABCs and their interaction with build-up of greenhouse gases (GHGs) significantly affect the regional climate, hydrological cycle, glacial melting, agriculture production, and human health.

Network of ABC Observatories in Asia-Pacific

Atmospheric Brown Cloud (ABC)

UNEP commissioned the ABC Programme in 2002:
• To further investigate the impacts of ABCs on climate, precipitation, agriculture, and health.
• To equip the policy makers with science-based information for reducing the emissions of ABCs.

Objectives:
• Observations: Establishment of a network of observatories in Asia-Pacific region for data collection and form a network of scientists.
• Impact assessment: Assessment of the impacts of ABCs on climate, agriculture, water resources, and health using the observational data and modeling simulations.
• Awareness and mitigation: Demonstration of mitigations options and providing science-based information to policy makers for the reduction of emissions of ABCs.

Mechanisms through which ABCs impact the climate

Radiative effect
- Scattering
- Absorption

Cloud properties
- Water cloud
- Ice cloud

Atmospheric Brown Cloud–East Asia Regional Experiment (ABC–EAREX), 2005
Maldives AUAV Campaign (MAC), 2006
ABC–East Asia Regional Experiment (EAREX) 2007
Cloud Aerosol Radiative Forcing Dynamics Experiment (CARDEX) 2012

A network of 12 ground-based observatories with advanced Kathmandu Valley (ABC SusKat) 2012-2013 facilities for the measurements aerosols, aerosol-precursor gases, radiation, and meteorological parameters.

- A network of about 250 Scientists who are working on ABCs.
- Data Analysis Center at Seoul National University, Seoul, Korea
- Modeling Simulation Center at The University of Tokyo, Japan

Ramanathan and Charmichael, Nature Geoscience, 2008

Thick haze of ABCs over Nepal on 14 April 2010
Impacts of BC on regional climate

BC emission (tons/year)

Impacts of ABCs on regional climate

Criteria:
- Annual average AOD>0.3
- Absorbing aerosols >10%

ABC hot spots
1. Indo Gangetic
2. East Asia
3. Indonesian Region.
4. Southern Africa.
5. The Amazon basin.

ABC Report 2008

Impact of ABCs on water resources

Impact of ABCs on water resources (melting of ice caps)

- 0.25°C/decade warming in Himalaya, more than 5 times faster than warming globally due to GHGs.
- BC deposition on snow/ice and atmospheric solar heating contributes at least 30% to snow/ice melting in the Himalayas during 1900-2000.
- Shrinking of glaciers by 5 % since 1950s resulting a loss of

- Weakened Asian Monsoon (~7%).
- 20% decrease in rainfall in Indo-Gangetic plain since 1980s.
- Accelerated melting of Hindu Kush-Himalayan-Tibetan glaciers due to BC deposition on snow/ice and atmospheric solar heating.
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