

## Session DD 8.1: Climate change and health in delta areas

<b>Chair</b>	Prof.dr. Pim Martens, Maastricht University, ICIS, the Netherlands
<b>Keynote speaker</b>	Dr. Andrew Githeko, Climate and Human Health Research Unit, Kenya Medical Research Institute, Kenya
<b>Speakers</b>	Simone Boër, Federal Institute of Hydrology, Germany Dr. Elsa Casimiro, Infotox, Portugal Dr. Sofia de Almeida, FSC, Portugal Su-Mia Akin, Maastricht University, the Netherlands Dr. Emil Augustiono, Deputy Minister Coordinator for People's Welfare, Indonesia Dr. Eva Kunseler, Netherlands Environmental Assessment Agency, the Netherlands Ali Akanda, Tufts University, USA
<b>Rapporteur</b>	MSc. Kees Dorland, Climate changes Spatial Planning, the Netherlands

The keynote by Andres Githeko starts with projections no fuel consumption and emissions. Examples are given from New Orleans, Pakistan and the Bay of Bengal about floods and water pollution, food shortage and people. We need to reduce the vulnerability and increase the adaptive capacity since we cannot change the hazards health impacts of floods. For example, floods include a tripling of suicide rates in New Orleans, cities that depend on wells are vulnerable to diarrhea and water borne diseases such as Cholera, Typhoid and Salmonella. Vector borne diseases such as Malaria, Rift Valley Fever, Dengue Fever, Leishmaniasis and plague increase as well. Dengue fever has doubled in south-east Asia this year. Food borne diseases also increase. But it is not only diseases that increase. Also health infrastructure is damaged. We need to take the precautionary principle, especially in developing countries. Stepwise, incremented adaptation seems the best option, however in some cases (especially when the risks are clear) more radical measures are necessary. Protection of coastal cities must be included in the development agenda and adaptation strategies. The Kenya Medical Research Institute still has to start adaptation.

According to Simone Boër fecal contaminated water leads to 100.000 cholera infected people and 4230 deaths in Zimbabwe in 2008/2009 alone. This can be prevented by good sanitation and water pipes for fresh water supply. Since 1994 there have been repeated reported instances of *Vibrio* spp in Northern Europe, especially around brackish water areas (Baltic Sea) and the North Sea. This observation leads to a study along the coast of the North of The Netherlands and Germany. First results show that *Vibrio Algorolyticus* and *Vibrio Paraharmdythicus* are more frequently seen with high temperatures. The organisms are found in all sampling sites with higher concentrations in sediments than in water. Positive *Vibrio Vulnificus* concentrations are only found at water temperatures of 20 degrees Celcius. Hotspots are the estuaries. The study still has to show if the organisms are damaging for health.

Three municipalities of Cascais are developing climate change strategic plans including adaptation says Elsa Casimiro. They concentrate on heat stress, air pollution impacts and vector borne diseases. The region has a history of heat waves. The excess death in 1981 and 2003 were around 1900 against a population of 190.000. This is 1% of the population where especially the elderly are hit where elderly consist of around 17% of the population. Thresholds in temperature were established in which an action plan comes operational. With climate scenario's for 2097 these thresholds would be exceeded 100% of the days of the whole summer and in 50% of the days in 2047. Apart from heat stress malaria is reported every year as are various vectors of West Nile Fever and other vector borne diseases. The study shows that Mediterranean Spotted Fever and Leishmanisosis have a high risk.

Sofia P. Almeida: Especially cardiovascular diseases and respiratory diseases increase with apparent temperature increase at around 2,1% in all population and up to 3% in elderly people. The study separated out PM10 and ozone from temperature increase. Results in The Netherlands show that around 20-30% of the mortality increase in warm periods is due to combined heat stress and pollution levels. This would be interesting to study in Portugal.

Focus of the project (Si Mun Akin) is on pathogens that are sensitive to climate factors. Since they are also sensitive to non-climate factors these are also included in the study using a multilevel / systems approach. The framework includes the contextual, indirect and direct drivers which have different timeframes. Hence measures taken at the contextual level will take decades to render effect while direct drivers have instant effects. Climate change is seen as part of the indirect drivers, also including land-use change. The framework will be used for scenario development and for identifying adaptation measures. The health community has an important contribution to make in the climate change context.

Emil Augustino: Health effects are observed during El-Nino as well as during dry seasons. Moreover, malnutrition amongst children under 5 years old becomes important. Mangrove destruction in delta areas lead to higher instances of water borne diseases. Malaria is responsible for 45% of vector borne diseases in Indonesia. The health system in general needs improvement in delta areas, especially with the threats of climate change. Priority is to implement sustainable public health intervention policies such as strengthening food security and increase the commitment of local communities and private actors. One of the measures to take is to inform people not to cut mangrove.

According to Eva Kunseler the study includes a wide range of morbidity and mortality effects. Adaptation options identified were changes in exposure such as cool buildings, proper clothing in summer against tick bites but also changes in the medical sector. In 2010 a lot of work was done including analyzing the WHO recommendations and expert surveys. Policy themes identified are including health in all mitigation and adaptation policies, measures and strategies: Health systems should be strengthened to cope, prevent and prepare for climate change, awareness raising and research information systems should be strengthened. The study thus far identified seven measures which are still to be analyzed on their political and practical implementation potential. An example is including climate change in curricula of medical studies. It showed that curricula are so full that this proved impossible. However, students found it interesting and developed their own study group in their free time. This might be something to stimulate.

The chairman concludes that it is good to see that from the second assessment report of IPCC, when only a handful of scientists were working in the field of health, the attention for climate change and health research is growing. Health experts and climate change experts should work together more on impact research and with health practitioners for identification and implementation of adaptation measures.