Febi, **Dwirahmadi**[1], **Fabby Tumiwa**[2], **Muh. Suhud**[3], **Yan Firdaus**[4], **Siti Badriyah**[5]
[1]Disaster Management Division, International Federation of Red Cross and Red Crescent Societies (IFRC), Indonesia
[2] Director, Institute for Essential Services Reform (IESR) Indonesia
[3]Climate Change Division, World Wild Fund (WWF) Indonesia
[4]Bureau of Metrological, Climatological, and Geophysical (BMKG) Indonesia
[5] Climate Justice Division, Institute for Essential Services Reform (IESR) Indonesia

TOWARDS CLIMATE CHANGE URBAN ADAPTATION IN INDONESIA: CLIMATE CHANGE VULNERABILITY ASSESSMENT FOR CITIES IN JAVA REGION

Abstract

In many urban areas in Indonesia, city development and urbanization enhances the impact of climate related hazards. Jakarta, the capital city of Indonesia, is subject to flooding every year due to increases in rainfall intensity and duration. In 2007, all river basin communities in Jakarta suffered from such climate related disaster events. Moreover, Jakarta is considered the most vulnerable city to climate change in the South East Asian Region. This research aims to provide a better understanding about climate change risks and adaptation in urban areas in Indonesia, particularly in urban communities in the Java region. This research projects changes in climate variables (rainfall, temperature), water availability and sea level rise in Java Island and Jakarta; and identifies the climate related hazards in urban coastal area in Jakarta, as well as the impacts, the local adaptation and its challenges.

This research combines top down and bottom up approaches. A top down approach represented by the climate modelling method using scenarios A1B, A2, and B1 of the Metrological Research Institute (MRI). Statistical downscalling with non linier regression model and bicubic interpolation were applied as the base for data accuracy. Climate change vulnerability assessment, particularly on water scarcity issue, for Java region was done by combining the factors like Human Development Index (HDI), unemployment, poverty index, number of people working on agriculture sectors, population density, and percentage of family with safe water access. The result of the climate change vulnerability assessment was displayed by Geographical Information System (GIS) map. Aside from the top down approach, this research also conducted a bottom up approach by using Participatory Rural Appraisal (PRA) tools to observe the current climate risks and present adaptation strategies including the challenges for an urban coastal community, Kelurahan Kamal Muara.

The study found that all scenarios predicted temperature increase in Java region and Jakarta province from 2010-2100 with the highest increase shown by the A2 scenario which is 3.67^{o}C, and the smallest increase shown by the B1 scenario which is 2.09^{o}C. Meanwhile for rainfall projection, the results indicate a strange pattern for the A2 scenario for 2010, the pattern should indicate a monsoonal wet season in the period of dry seasons which are December-January-February (DJF) and June-July-August (JJA) period, but the JJA period is predicted to be the dry season. This condition occurs only in 2010 in Java Island; while for DKI Jakarta this unusual pattern will happen again later in 2100. Based on the A2 scenario, the water surplus and storage volume projection will decrease in 2050 and then increase in 2100. For sea level rise, it is projected that there will be inundation as far as the area of Central Jakarta which will cause very large socioeconomic impacts. From the climate change vulnerability assessment, 14 districts in Java region were nominated to be the districts with a very high vulnerability on water scarcity issues.

This study also found that the climate related hazards most frequently predicted to occur in Kamal Muara are sea level rise, sea water flooding or high tidal wave, and climate uncertainty. Climate change impacts were observed and reported by the community such as sea water flood and indirect impacts on health such as diarrheal issues, environmental degradation, and also dengue cases. Factors that may enhance the vulnerability level to climate change is lack of drainage system, lack of clean water, poor hygiene, land and space issues, and unstable economy in households. To deal with the impacts, some local efforts have been implemented the communities such as adjusting their houses, preparing for secondary livelihood such as become motorcycle taxi driver or become sea shell labour should their primary livelihood is disrupted, and cleaning houses in the aftermath of sea water flooding. However, many challenges that will be faced in developing the communities adaptation to climate change are habit and attitude change, difficulties in finding and preparing for a secondary

livelihood, lack of drinking water availability, lack of financial resources and also coordination amongst the stakeholders.