

Nuclear and Isotopic Techniques in Natural Hazards Associated with Climate Change

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In a climate affected by global warming, two factors may act to increase the risk of storm surge: Sea-level rise caused mainly by thermal expansion of the oceans; and possible changes in intensities and frequencies of cyclone/typhoon in the region. Nuclear and isotopic techniques applied in a regional project “Mitigation of Coastal Impacts of Natural Disasters like Tsunami using Nuclear or Isotope Techniques” can also be useful in studying the impacts in the coastal environment of a natural disaster like storm surges.

This aforementioned regional project, implemented in 2006-2009, is sponsored by the Regional Co-operative Agreement (RCA) Regional Office in Korea with funding from UNDP (K) and the Korean Government. The RCA is an intergovernmental agreement for East Asia & Pacific region, under the auspices of the International Atomic Energy Agency (IAEA), in which the Government Parties undertake co-operative research, development (R&D) and training projects in nuclear science and technology through their appropriate national institutions. The project collected scientific data that will assist in assessing the impact of tsunami in the coastal environment due to the 2004 Boxing Day Tsunami of Indian Ocean. Although the project looks specifically at the impact of tsunami, the techniques can also be applied to understanding the impact of other natural disasters like storm surges in the coastal environment. This event is likely to increase in frequency and severity as a result of climate change.

Storm surges can cause erosion, sediment deposition and contamination in the coastal environment. The combined use of ^{137}Cs , ^{210}Pb , ^{234}Th and ^7Be as radiotracers can give information on sources of sediments and sediment transport resulting from storm surges in the coastal area. Storm surges like tsunami can also bring sea water to the coastal area, resulting in the contamination of the freshwater system including the groundwater. The contamination of groundwater reduces agricultural production and the availability of drinking water. By using



nuclear and isotopic techniques, the vulnerability of the groundwater system to contamination arising from storm surges can be assessed. The characterization of the ground water in coastal areas, aided by nuclear and isotopic techniques, will also be useful in the development of models predicting coastal response to sea level rise.

The paper will describe the nuclear and isotopic techniques that were used in studying the impact of tsunami in the coastal area and which can also be useful in assessing impacts of other natural disasters like storm surges.