

Recent Climate Change Vulnerability Index Ranked Densely Populated Asian Countries Including Bangladesh and India At Most Risk From Climate Change

By Golam Kibria, Ph.D; November 2011

Key points: A recently released Climate Change Vulnerability Index (CCVI) ranked Bangladesh (rank 1) and India (rank 2) as most vulnerable to climate change (out of 170 countries evaluated). In total, sixteen countries rated as 'extreme risk' category, of which ten of them are from Asia. Bangladesh is at extreme risk due to high level of poverty, highest population growth, high dependency on agriculture, high risk of drought and highest risk of flooding and lowest capacity of all countries to adapt to predicted changes in the climate. International adaptation funds are available to help developing countries cope with climate change in the areas of agriculture, biodiversity, coastal zone management, ecosystem management, health, infrastructure, land degradation, marine resources, and water resources.

Climate change (changes in climate over comparable time periods) is one of the greatest economic, social and environmental challenges facing the world. Climate change is projected to cause a rise in global temperature, atmospheric carbon dioxide (CO₂), sea level and an increase in the frequency and intensity of extreme events (storms, cyclones, floods (Figure 1), droughts, heat waves and bush fires) (IPCC 2007)). Such changes of climate will impact on *water resources* (e.g. variation in river flows, melting of snows and glaciers, changing in water quality), *agricultural food production/food security* (e.g. reduced crop yields, enhancing mycotoxins contamination of agriculture food & seafood by algal toxins, bioaccumulation of inorganic & organic micro-pollutants in fish, proliferation of pests and diseases), *environment* (e.g. extinction or loss of corals and terrestrial plant species, decline of fish population, proliferation of toxic algal blooms), *human health* (increased deaths, disease and injury due to increase in food poisoning, malaria, dengue, aeroallergen/pollen disease, water borne diseases), and *engineering infrastructure* (degradation or failure of water, power, transport, and buildings infrastructure) etc. Vulnerability refers to the degree to which a system is susceptible to or unable to cope with adverse effects of climate change, including climate variability and climate extremes. The vulnerability index is indicators which determine the vulnerability of a sector to climate change. For example, agricultural vulnerability indicators may include relative variability of rainfall, or percentage inter-annual variability of rainfall.



Figure 1: Floods in Bangladesh [photo source: <http://www.celsias.com/article/where-do-you-rank-climate-change-vulnerability-ind/>]

The recently released Climate Change Vulnerability Index (CCVI-2011) calculated the vulnerability of 170 countries to the impacts of climate change over the next 30 years (see <http://maplecroft.com/about/news/ccvi.html>).

The study reveals that Bangladesh and India are most vulnerable to climate change; these two countries are ranked 1 and 2 respectively (Table 1 and Figure 2). In total sixteen countries rated as 'extreme risk' category, of which ten of them are from Asia including Bangladesh, India, Nepal, Philippines, Afghanistan, Myanmar, Cambodia, Vietnam, Thailand, Pakistan (see Table 1). In general, countries under 'extreme risk' or 'high risk' category will become more exposed to climate related risks and would be more vulnerable compared to low or medium risk countries (Table 1, Figure 1). The CCVI study found that these countries ('Extreme risk') have high levels of poverty, dense populations, and rely on flood and drought prone agricultural land (see <http://maplecroft.com/about/news/ccvi.html>)

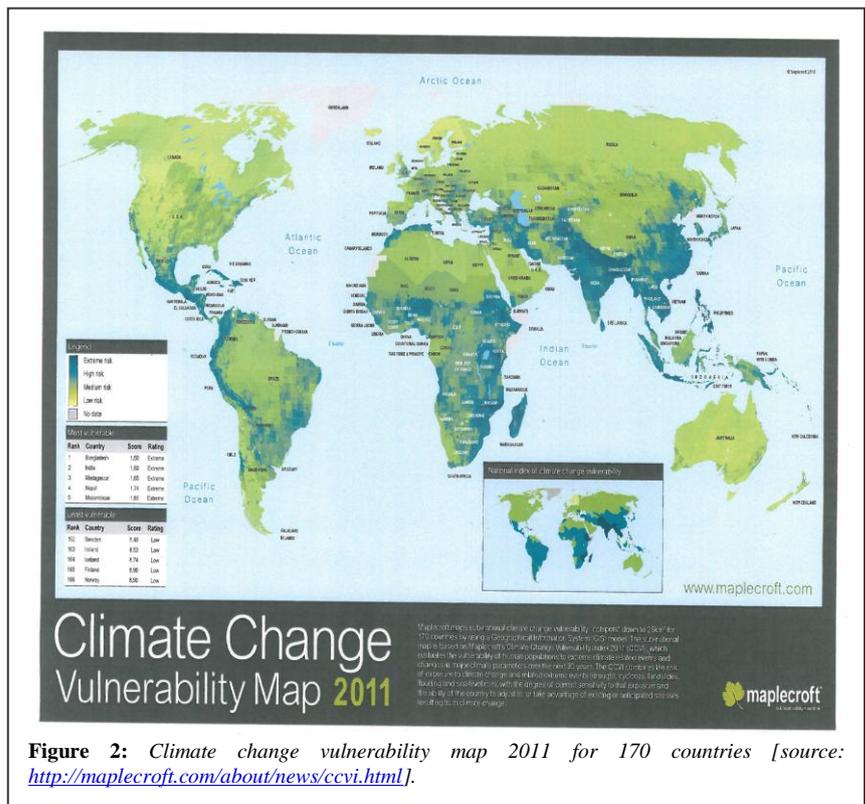


Figure 2: Climate change vulnerability map 2011 for 170 countries [source: <http://maplecroft.com/about/news/ccvi.html>].

The CCVI (2011) evaluated social, economic and environmental factors in order to assess national vulnerabilities across three core areas: (a) exposure to climate-related natural disasters and sea-level rise; (b) human sensitivity, in terms of population patterns, development, natural resources, agricultural dependency and conflicts (c) future vulnerability with reference to adaptive capacity of a country's government and infrastructure to combat climate change.

Bangladesh (which is ranked 1 in CCVI 2011 (see Table 1) is at extreme risk due to high level of poverty, highest population growth in the world, high dependency on agriculture, high risk of drought and highest risk of flooding and lowest capacity to adapt to predicted changes in the climate

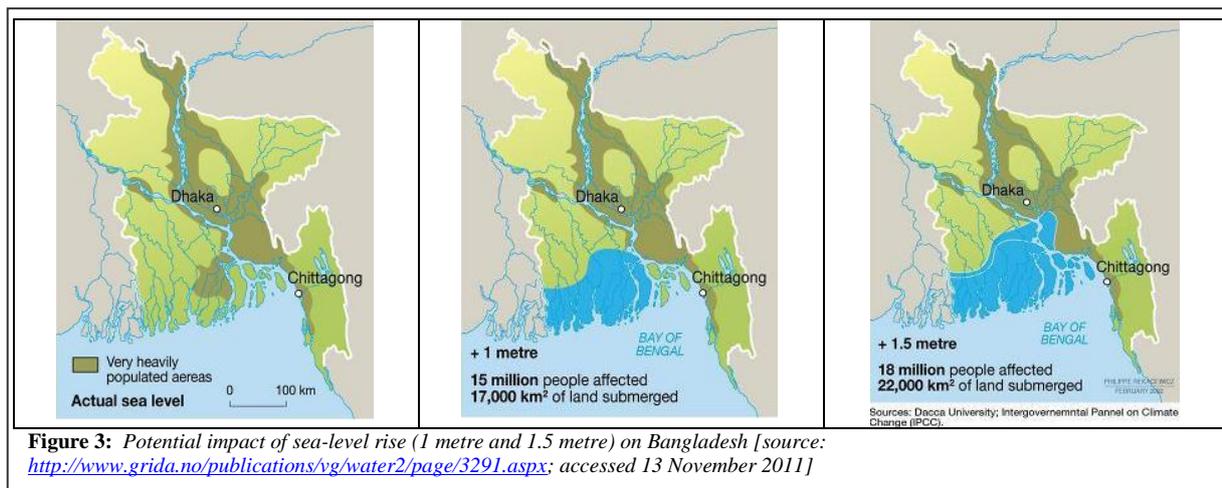
(<http://maplecroft.com/about/news/ccvi.html>).

For example, in Bangladesh, 1.5 meter of sea level rise may flood about 16% of the country's land area

(22,000 square kilometre) of which southern subregions are more vulnerable to sea level (see Figure 3). As a consequence of sea level rise, rice lands becoming salty and unsuitable for rice production which may cause an average losses of -18% boro, -10% for aus and aman in Khulna by 2050 (Yu *et al.* 2010). One of the adaptation measures that may be taken to counteract the losses of rice lands is to grow brackish water prawn and fish farming to take advantages of the salty water to sustain the livelihoods of farmers.

Table 1: Examples of countries falls into extreme, high, medium and low risk categories according to CCVI.

Risk category	Country and CCVI rank
Extreme risk countries (16 countries)	Bangladesh (1), India (2), Madagascar (3), Nepal (4), Mozambique (5), Philippines (6), Haiti (7), Afghanistan (8), Zimbabwe (9), Myanmar (10), Ethiopia (11), Cambodia (12), Viet Nam (13), Thailand (14), Malawi (15), Pakistan (16); these countries performed poor in CCVI analysis
High risk countries	China (49), Brazil (81) and Japan (86).
Medium risk countries	Russia (117), USA (129), Germany (131), France (133), United Kingdom (138)
Low risk countries (11 countries)	Denmark (165), Sweden (166), Ireland (167), Iceland (168), Finland (169), Norway (170), these countries performed best in CCVI analysis



India (ranked 2), has a high or extreme degree of sensitivity to climate change, due to acute population pressure (1 billion) and a consequential strain on natural resource, plus a high degree of poverty, poor general health and the agricultural dependency of much of the population (<http://maplecroft.com/about/news/ccvi.html>). India is likely to experience frequent floods and droughts due to variability of monsoon rains and fast depletion of Himalayan Glaciers. For example, the reduced rainfall may lead to 18% fall in total cereal production. Wheat production may drop substantially due to climate change by 2050 that could cause million people at greater risk of hungry (Chaudhary and Aggarwal 2007). China has been ranked as relatively lesser risk from climate change because of lesser number of poor and improving infrastructures.

Climate change is a global issue that has impacts on countries throughout the world and some countries are more able to adapt to climate change than others. Adaptive capacity is especially limited in less-developed countries, since they are lacking of financial resources or their local workforce does not have the skills or technology to adapt to climate change efficiently and effectively. International adaptation funds (e.g. global environmental facility fund and climate funds) have been set up for less- and least-developed countries, particularly for those most impacted by climate change. Funds are available to help developing countries cope

with climate change in the areas of agriculture, biodiversity, coastal zone management, ecosystem management, health, infrastructure, land degradation, marine resources, and water resources.

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