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Principal Outcomes of the German – Bangladesh Technical Cooperation Project on Geo-Information for the Implementation of a Climate Change-Resilient Urbanization (GICU)

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Abstract: Rapid urbanization, population growth and the impact of climate change make urban resilience an urgent need in Bangladesh. An integrated approach to incorporate urban planning, development studies, disaster risk reduction and sustainable development is important in this regard. The consideration of disaster risk in community-based initiatives and policies creates opportunities to increase resilience. In the scope of projects of the German -Bangladesh technical cooperation, geo-information was acquired to support sustainable urban planning in Dhaka and other cities in Bangladesh. Technical training of staff in the Geological Survey of Bangladesh and close interaction with stakeholders from the different urban areas are fundamental to the success of the projects.

Keywords: ***Geo-information, Urban development, Seismic hazard, Climate change, Bangladesh.***

Introduction

According to the Long-Term Climate Risk Index (CRI), Bangladesh is ranked 7th among the countries most affected by climate change from 2000 to 2019 (Germanwatch, 2021). In addition, its population is growing rapidly, and its population density is among the ten highest globally. Almost 40% of the population already live in urban areas, with an urbanization rate of about 3% per year.

Densely populated countries are highly vulnerable to natural hazards such as dry and wet mass movements, earthquakes, floods and storms, which resulted in 15.5 million people being displaced from their homes between 2008 and 2021 worldwide.

The ongoing GICU project (Geo-information for the implementation of a climate change-resilient urbanization) is part of a long-standing cooperation between the Federal Institute for Geosciences and Natural Resources (BGR), Germany and the Geological Survey of Bangladesh (GSB).

It is the fifth in list of successful projects, the four previous projects were "LiDAR (2005-2007)", "BGIS" (2007-2009), "Geoinformation for Urban Development (GUD)" (2013-2016) and "Geoinformation for Urban Planning and Adaptation to Climate Change (GeoUPAC)" (2018-2022), GUD project was focused on Dhaka Metropolitan Area. The principal products in Dhaka and other 6 project areas (Barishal, Satkhira, Khulna, Faridpur, Kushtia, and Sirajganj) were geomorphological and engineering geological maps , three-dimensional geological model considering the geological and geotechnical information of the surface down to a depth of 30 m, including infrastructural building suitability, flood potential, Digital Terrain Map (DTM). The information was used for the revision process of RAJUK Framework Plan 2016-35.

Information was shared among professionals and policymakers about the need for geospatial information for sustainable urban planning and development, and awareness was created through seminars, workshops, and professional meetings. We will present the principal outcomes of the recent GICU project and discuss their importance for climate change-resilient urbanization.

Results

The rapidly growing population, rapid urbanization and climate change had a negative impact on Bangladesh's natural drainage system and floodplains. Furthermore, to mitigate the negative impacts on urban populations due to climate change and natural geomorphological conditions, information on soil conditions, seismic hazard, flooding and land uplift/landslide is needed. Technical experts have developed their capacity and

contributed to increasing the resilience of urban areas affected by climate change by integrating quality-assured geospatial information into urban development processes using reliable geospatial data. Urban and development planning staff collect geospatial data to implement this process.

Engineering geological and geophysical investigations have been conducted in the project cities of previous projects (Barishal, Faridpur, Khulna, Kushtia, Satkhira and Sirajganj), to support climate-change-resilient urbanization in Bangladesh. These efforts have allowed us to strengthen a working group at GSB which is focused on the generation of geo-information. Within the GICU project, the quality assurance of these data was ensured through workshops by setting the professional-technical framework. Standard Operational Procedures (SOPs), developed during the previous projects, guide the generation of geodata in a way that they are transparent for stakeholders. Dissemination of the information and interaction with urban planners in the use of geo-information, training of stakeholders, awareness activities and setting up of IT facilities is a fundamental part of the project activities.

The project areas are areas of potential rapid future urbanization away from the capital; changes in geomorphological and geological processes, potential land erosion, increasing natural hazards, climate change factors, etc. have been considered. The urban planning agencies of those areas may incorporate the geological data generated from this project to avoid or control unplanned urbanization and for sustainable development. Geotechnical investigations will be carried out by expert geologists in these areas.

Rangpur City Corporation and its surrounding areas have been included in this GICU project as a new study area. Rangpur city is located in the northwestern part of Bangladesh and is also a divisional headquarters. This area is located in a seismically active zone (Zone II) on the seismic zone map of Bangladesh. During the project implementation, geotechnical boreholes will be drilled, and necessary surface soil samples will be collected from the boreholes. Simultaneously, other geological, engineering geological and geophysical, and earthquake-related surveys will be conducted. Then, laboratory analysis will be done to determine the geotechnical properties of the soil samples. In addition, information dissemination, training of stakeholders, awareness activities and setting up of IT facilities will be carried out in this area.

In all project areas, depending on the technical/stakeholder needs, new/emerging types of data collection/instrumentation testing and site-specific investigations will be conducted.

During the GICU project, the use of passive seismic data has been implemented in GSB for determination of predominant soil frequencies and shear wave velocity (Vs) profiles. After a training phase in Germany and in Dhaka, the knowledge was applied in Rangpur. Comparative measurements at sites with high predominant frequencies in Dhaka (Helaly and Ansary, 2021) have already led to some interesting findings.

Conclusion

During the GICU project and previous cooperation projects on the generation of geo-information for the implementation of climate-change-resilient urbanization, master trainers have been developed at GSB, enabling the geological survey to take a lead in the analysis of surface effects, as well as subsurface information essential for resilient urban planning.

There is still a long way to go to ensure the effective use of this information in urban planning. Partnerships with public and private institutions could foster the use of such information for local development plans.

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