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# Geo-information for sustainable urban development of Greater Dhaka City, Bangladesh

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Greater Dhaka City (including Dhaka and five adjacent municipal areas) is one of the fastest developing urban regions in the world. Densely build-up areas in the developed metropolitan area of Dhaka City are subject to extensive restructuring as common six-storied buildings are replaced by higher and heavier constructions. Additional stories are built on existing houses, frequently exceeding the allowable bearing pressure on the subsoil as supported by the foundations. In turn, newly developing areas are projected in marshy areas modified by extensive, largely unengineered landfills. In many areas, these terrains bear unfavorable building ground conditions, and reliable geospatial information is a major prerequisite for risk-sensitive urban planning.

Within a collaborative technical cooperation project between Bangladesh and Germany, BGR supports GSB in the provision of geo-information for the Capital Development authority (RAJUK). For general urban planning, RAJUK successively develops a detailed area plan (DAP) at scale 1 : 50000 for the whole Greater Dhaka City area. Geospatial information have not been considered in the present DAP. Within the project, GSB prepared a detailed geomorphologic map matching the DAP both in areal extent and scale. The geomorphological setting can be used as an important spatial proxy for the characterization of the subsurface since highly segmented, elevated terraces consisting of consolidated sandy Pliocene deposits overlain by stiff Plio-Pleistocene sediments are sharply bordered by low lying-areas. The floodplain and marsh areas are consisting of thick, mechanically weak Holocene fluvial sandy-silty sediments that are sometimes alternated by organic layers.

A first expert-based engineering geological reclassification of the geomorphological map resulting in five building ground suitability classes is highly supported by the spatial analysis of extensive archive borehole information consisting of depth-continuous standard penetration test (SPT) observations, engineering geological sample analyses and lithological profiles. The database compiled within the project currently contains more than 1600 locations. The joining of the spatial geomorphological information with the borehole data allows a specific characterization of the building ground classes in terms of bearing capacities for different foundation designs, earthquake-induced subsoil liquefaction potentials and depth-to-engineering rock head considerations.

First-order hazard and cost scenarios for several general types of projected settlements can already be broadly evaluated with the data presented in a small scale (DAP scale). However, detailed building ground surveys have to be performed at larger spatial scales (1 : 10000 - 1 : 5000) in areas assigned for new settlements. These involve regular spaced borehole observations, 3-D modeling of the subsurface and geophysical loggings. Within the project, specific representative pilot areas in different geomorphological settings are defined where detailed geospatial building ground investigations are conducted, providing a robust basis for sustainable urban planning related to natural and technological hazards and their associated risks.