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Vulnerability in Megacities: An interdisciplinary approach to analyse the urban water system in Delhi India

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MegaCities in rapidly urbanising regions are hot spots of demographic and socio-economic dynamics. Their rapid growth results in uncontrolled processes of fragmentation which counteracts governance and steering. Quantitative and qualitative undersupply with basic infrastructure is one of the major consequences, affecting large parts of the urban population. This is particular true for adequate water supply and the disposal of waste water.

A German-Indian research project has been launched in early 2005 with the purpose to assess the vulnerability of people in the urban area of Delhi / India. The investigations hereby focus on the water supply and waste water situation within different parts of the metropolitan area.

The internal and external conditions and processes responsible for rising vulnerability normally development with high dynamics, which can not be identified fast enough with traditional methods such as statistical and regional analyses or fieldwork. New monitoring and planning methodologies are therefore required to provide tools to facilitate planning processes in complex urban structures. Remote sensing provides the opportunity to monitor spatial patterns of urban structures. State of the art sensors will offer for the first time the potential to map urban areas at a spatial scale previously unattainable. QuickBird as a new operational high-resolution sensor may be a suitable tool to provide valuable information on settlement patterns and the conditions people are living in. Very high-resolution QuickBird data is therefore used within the project

to examine the potential of satellite images regarding the identification of vulnerable areas by visible spatial structures, as well as landuse structures and dynamics.

The paper presents first results obtained by the analysis of three recent QuickBird datasets. An intense field campaign has been conducted in October 2005 to sample in situ information on the site. Nine different, representative case study areas were selected and analyzed. The paper contains the results of the field survey and comparisons with the image data. The investigations of urban water structure in Delhi using high-resolution remote sensing data are investigated and the potential of identifying urban related water structures is outlined. This information is used for mapping regions of interest according to their vulnerability risk level.

Furthermore the paper explains as an outlook the major aim of the remote sensing part of the research project which is the development of new, object-oriented analytical methods for high-resolution satellite data. In order to benefit from the multispectral information and the very high resolution of the panchromatic image an image fusion will be applied to the QuickBird scenes. With the results specific megaurban risk areas and living quarters of vulnerable population will be identified. These will be evaluated – in combination with quantitative and qualitative socio-economic information – in regard to place-specific infrastructure deficits.