ANALYSIS OF MULTITEMPORAL SATELLITE IMAGERY FOR PERI URBAN GROWTH ANALYIS AND CHANGE DETECTION IN THE INDIAN MEGA-CITY HYDERABAD

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Abstract: This paper describes the temporal urban monitoring of a large Indian agglomeration by comparing satellite images. The emerging megacity of Hyderabad (India) serves as an example of a rapidly growing agglomeration on the Indian subcontinent with one of the most extremely increasing number of inhabitants during the past decades. Large slum areas exist from uncontrolled and unplanned immigration into the megacities of Asia, partly appearing even within the inner parts of the city, in which humans are living under catastrophic conditions. Additionally strong economic and industrial growth, often in direct neighborhood to populated areas, causes health problems for the adjacent residents within the respective cities. The strength of satellite remote sensing is to structure and classify such large and complex urban areas as well as evaluating their spatial development by change detection studies. Since there are hardly or only very few GIS based map bases for these large cities available in India, the satellite-based remote sensing represents a chance to structure and map such expanded urban residential areas at least approximately into different land coverage or land use classes.

For this analysis ASTER *(= „Advanced Spaceborne Thermal Emission and Reflection Radiometer")* data with a resolution of 15x15m per pixel was used. The area that has been covered by the data extends over the largest part of the city.

In detail the following analysis steps have been conducted:, i.e.

- Multitemporal urban Land Cover/Land Use surface and structure classification analysis, basic urban parameters: degree of imperviousness, extent and quality of green and open areas, urban structure types and brownfields/potential development areas; Examining whether a spatial correlation exists between the results of the different thematic land-use/ land-cover analyses
- Identification of land-use patterns combined with a vegetation index analysis (NDVI) and Urban Structure Types (UST); and
- Estimatiion of spatial indicators for quality of life and vulnerability to natural hazards such as flooding.
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The scientific results are change maps of the urban agglomeration of Hyderabad between 2001 and 2009 using temporal transects of remote sensing data and applying up-to-date change detection techniques at different spatial and temporal scales. This is used for quantifying urban and peri-urban processes (land use / land cover changes of settlements, agriculture, industry, and landscape) in this urban agglomeration (growth rates, urbanization) and additionally, for predicting the development of urban fringes, rural settlements, informal settlements, urban and peri-urban agriculture. Data of macroeconomic and demographic development, instruments of urban planning, and socio-economic settings have been integrated as data were available.