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Mapping for the masses: using free remote sensing data for disaster management

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We examine the uses of free satellite imagery and Digital Elevation Models (DEMs) for disaster management, targeting three data sources: the United Nations Charter on Space and Disasters, Google Earth and internet-based satellite data archives, such as the Global Land Cover Facility (GLCF).

The research has assessed SRTM and ASTER DEM data, Landsat TM/ETM+ and ASTER imagery, as well as utilising datasets and basic GIS operations available via Google Earth.

As an aid to Disaster Risk Reduction, four sets of maps can be produced from satellite data: (i) Multiple Geohazards: areas prone to slope instability, coastal inundation and fluvial flooding; (ii) Vulnerability: population density, habitation types, land cover types and infrastructure; (iii) Disaster Risk: produced by combining severity scores from (i) and (ii); (iv) Reconstruction: zones of rock/sediment with construction uses; areas of woodland (for fuel/construction) water sources; transport routes; zones suitable for re-settlement.

This set of Disaster Risk Reduction maps are ideal for regional (1:50,000 to 1:250,000 scale) planning for in low-income countries: more detailed assessments require relatively expensive high resolution satellite imagery or aerial photography, although Google Earth has a good track record for posting high-res imagery of disaster zones (e.g. the 2008 Burma storm surge).

The Disaster Risk maps highlight areas of maximum risk to a region's emergency planners and decision makers, enabling various types of public education and other disaster mitigation measures. The Reconstruction map also helps to save lives, by facilitating disaster recovery.

Many problems have been identified. Access to the UN Charter imagery is fine after a disaster, but very difficult if assessing pre-disaster indicators: the data supplied also tends to be pre-processed, when some relief agencies would prefer to have raw data.
The limited and expensive internet access in many developing countries limits access to archives of free satellite data, such as the GLCF. Finally, data integration, spatial/temporal analysis and map production are all hindered by the high price of most GIS software, making the development of suitable open-source software a priority.