

# WHY MAPS AND GIS MATTER

## Participatory Mapping

Capturing and managing local knowledge and stimulating public participation are essential for post-damage infrastructure management and relief. Government agencies often lack effective means of accessing knowledge held by residents. The author carried out a case-study in Indonesia showing that maps, GIS and web mapping could provide such means.

Frequent rainfall inundation causes serious damage to urban areas in Indonesia and impacts many small and medium-scale sectors of the economy. Such inundation also hampers development and decreases quality of life within a neighbourhood. In addressing these problems community participation during infrastructure planning and relief is considered a 'must' and has thus been on the agenda for several years. Today every urban community within a sub-district region ('kelurahan') may signal problems and suggest solutions to authorities. However, residents often feel government does not consider their suggestions worthy of serious consideration, or that they are not implemented as part of renovation programmes. The use of maps, GIS systems and web technology could help to bridge the communication gap. Community mapping, mainly facilitated by non-governmental organisations, has already been widely and successfully applied in many rural areas within Indonesia, for example for land conflict mediation.

### Input

To prove our ideas we carried out a case-study in which we used GoogleMaps to build a web map application for Pandeyan Neighbourhood, Yogyakarta City. Residents may draw over maps, superimposing their own point, line and polygon features and annotate these to identify problems, analyses and suggestions. An image of the spot can also be uploaded. Input is by theme, such as rainfall inundation, disturbed drainage and damaged roads, and organised in layers that can be turned on and off. The input for each layer is stored in the database using MySQL. Community input can be viewed as a click list, via which the area of interest can be quickly shown. To ensure accountability, only residents providing an ID number get access. One interesting feature is that comments can be added to the input so that fellow residents can verify, enhance or reject the input: an initial monitoring and verification tool.

### Implementation

The application has been developed as an AJAX (Asynchronous Javascript and XML) application. The server application was built using PHP programming and enhanced with the MySQL databases application. The server application was used to enable web application, MySQL databases, and PHP session data running in response to clients' requests. The client side (browser) is equipped with CSS (Cascading Style Sheet), HTML and Javascript to enable users to send a request (running state) and access response (loading state) through the browser. The database consists of relational tables, including geometry of points, polylines and polygons drawn by residents on top of the map, and associated annotations. Tables relating to session, traffic, counter and users are also stored.

### Onsite Verification

To support verification a government administrator has to convert the input into GIS layers, shapefiles and tables, using an OGR2OGR tool component. The PHP script enables geometry and attributes stored in MySQL to be converted into KML (Keyhole Markup Language), and then into ESRI shapefiles using OGR2OGR. Transfer of layers to mobile devices enables onsite verification by government staff and on-the-spot discussions with residents. Our case-study reveals that the majority of residents (ten out of fifteen) can actively participate in onsite verification. Some elderly residents found the screen too small. Interestingly, half of participants preferred paper maps (satellite imagery), so it was made possible for residents to collectively develop an 'inundation paper map'. Participatory mapping, either web- or paper-based, improves the skills of residents in survey and spatial-problem identification.

### Final Remarks

The effectiveness and efficiency of input collection, verification and GIS database creation was well appreciated by municipality and government staff alike. The research is far from complete, and one urgent topic is the development of database management to enable visual analysis of resident input.

### Further Reading

-Mason, B. C., and Dragicevic, S., 2006; Web GIS and Knowledge Management Systems: An Integrated Design for Collaborative Community Planning. Collaborative Geographic Information Systems, R. Balram and S.Dragicevic, eds., Idea Group Publishing Ltd, 263-283.

-Steinmann, R., Krek, A., Blaschke, T., 2004, Can Online Map-based Applications Improve Citizen Participation? Proceedings of TED conference on e-Government, Bozen, Italy.

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