

Cost effective water management

A watershed management project in India, spread over nearly 13,000 sq km, combined high resolution satellite imagery with conventional survey and optimised ground control to prepare high accuracy datasets

Narmada Valley Development Authority, under the Government of Madhya Pradesh State, initiated a project to ensure integrated water utilisation for an area of 12,769 sq km of Narmada River sub-basins involving 10 watersheds. The project was valued at USD 800 million.

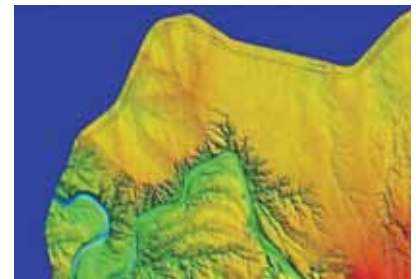
In any water resource project, preparing a very accurate base map and digital terrain model (DTM) providing details of 3D terrain, network of hydro features, contours, road network, villages and other human habitat locations are prerequisites to successful implementation of the project. SECON, the surveying company involved in the project, used a hybrid method combining high resolution stereo satellite imagery (HRSI) with conventional survey and optimised ground control for planning and design of

medium and minor-sized dams and tanks. This was one of the first attempts in India of using HRSI for identification, planning and design of irrigation projects covering an area as large as about 12,769 sq. km.

The task was divided into the following components:

- Preparation and data collection
- Ground survey - horizontal and vertical control provision
- Photogrammetric compilation using high resolution stereo satellite images to generate DEM and 0.5m contour map
- Site validation and field checking of photogrammetric output
- Generation of updated base map with 0.5 m contours
- Planning of medium and minor projects (micro watersheds) in the 10 sub basins which included the design of dams, canals and irrigation structures
- Creation of colour orthophotos that were further analysed for purposes such as planning, environmental impact assessment (EIA) etc.

With accurate ground survey and well-planned GCP locations, SECON achieved sub-pixel accuracy. The software-derived XY accuracy was as high as 0.4m. It is practically not possible to measure sub-pixel accuracy in XY but the advanced aerial triangulation tools provided reliable



Digital terrain model using HRSI



Contours

statistics. As an add-on from HRSI, EIA analysis was done from the multispectral image.

This method achieved accurate results in a faster and cheaper manner compared to purely conventional surveying or aerial photography methods. The accuracy derived from this method of mapping was a benchmark even for the satellite imagery provider. This approach not only saved time, money and other resources but also helped in smooth execution of the project without compromising on accuracy.