Flood analysis using aerial photography



n March of 1999, floods inundated a twentieth of Hungary's 6.2 million hectares of agricultural land and a state of emergency was declared. The problem, caused by the heaviest rainfall of the century, combined with a sudden thaw of snow and ice, was particularly severe in the north of the country and where a tenth of Hungary's Great Plain was under water. For example, in just one county, Hajdú-Bihar, 3,000 houses were threatened and 300 collapsed.

Airphotos can be of immense value in surveying the extent of flooding, implementing protection measures where possible, and assessing damage for insurance purposes.

In a project sponsored by the Lower Tisza District Water Authority, the Department of Physical Geography at the University of Szeged, 200 km to the south of Budapest, set out to study not only the applicability of such aerial surveys but their limitations, too.

For this purpose, its five-strong Applied Geoinformatics Laboratory headed by Dr. László Mucsi acquired infrared images at 2.5 x 2.5 m resolution. Using the ERDAS IMAGINE 8.3 package, these images were transformed using topographical maps at a scale of 1:10,000. The extent of the flooding was mapped partly by a semi-automatic process that involved generating a region from a given seed-pixel, and partly by supervised classification based on training sites. Eight vegetation, two soil and five water cover categories were combined into three main classes to show the dry and wet soil surfaces and areas of flooding (Fig. 1-2).

The study indicated that semi-automatic evaluation, even within a single photo, was affected by varying illumination levels depending on the position of the sun. Post transformation analysis revealed even greater differences in illumination between consecutive flight passes. A detailed field survey is now underway to interpet the findings and refine the analysis.

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Fig.1 (above): Airphoto mosaic of a 6 x 4 km investigated area and fig 2 (below) flooding over the same area. (Legend: blue - flood water, yellow - wet soil surfaces, green - dry soil surfaces, black - lake)









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