

Georeferencing specimens by combining expedition maps with Landsat 7, JERS-1 SAR and SRTM satellite imagery



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Introduction

Digitized Herbaria and Natural History Museums collections are important for:

- Understanding spatial patterns of biodiversity
- Conservation planning
- Identification of 'hotspots' of biodiversity
- Forecast the effects of habitat change and global warming
- Establish potential locations for species reintroductions
- Predict the likelihood of invasion of exotic species

Problem:

- Collections need to be georeferenced; many old collections have only collection site descriptions which cannot be found in online gazetteers

Solution:

- Use digitized and georegistered detailed expedition maps of specimen collection localities, and old atlases.

Methods

- Acquire and digitize old expeditions maps, and maps from old atlases which contain old locality names
- Download high resolution satellite data:
 - Landsat 7 - <https://zulu.ssc.nasa.gov/mrsid/> - 28.5m
 - JERS-1 SAR - <http://www.eorc.jaxa.jp/JERS-1/GFMP/> - 100m
 - SRTM 90m Digital Elevation Data - <http://srtm.csi.cgiar.org/> - 90m
- Georegister digitized maps by matching rivers, coastlines and mountains on the maps with localities on the satellite imagery in a GIS application (Manifold GIS).
- Overlay digitized georegistered maps with the satellite imagery
- Identify and georeference the localities



Fig. 1. Old expedition map from Winkler expedition 1937, matched with SRTM digital elevation data.

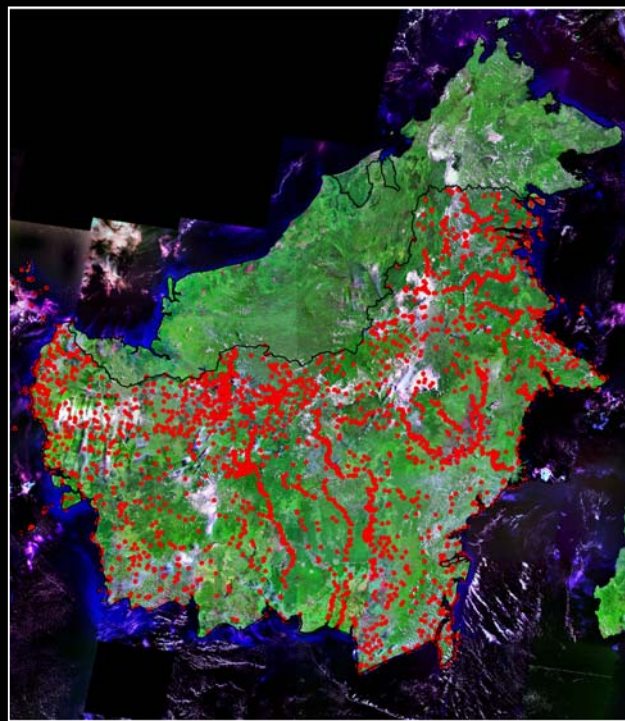


Fig 2. 3149 georeferenced Borneo - Kalimantan - Indonesia localities.

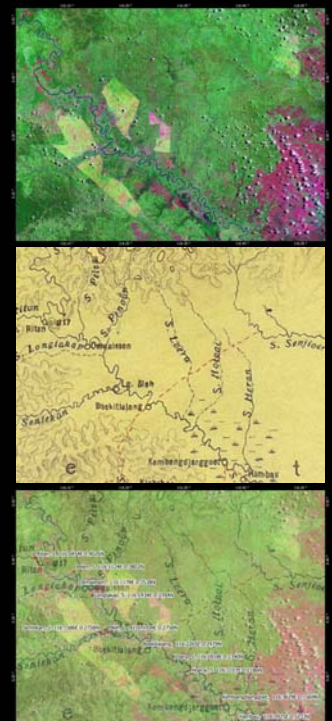


Fig. 3. Detail from 'Grote Atlas van Nederlands Oost-Indië' matched with Landsat 7 satellite image.

3149 georeferenced Borneo - Kalimantan - Indonesia localities, which substantially increased the number of georeferenced collections