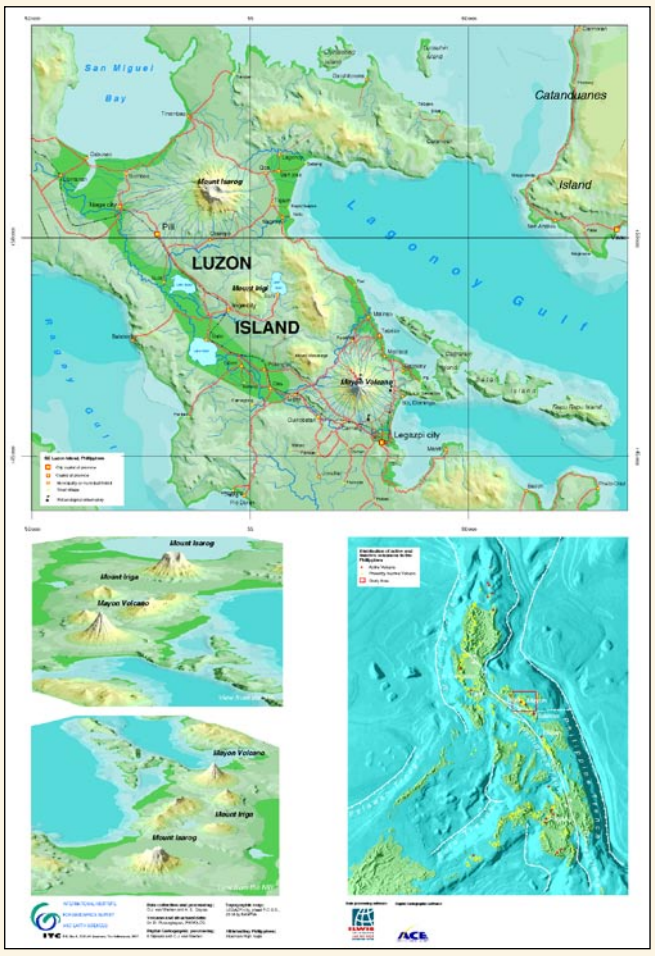
Creating a GIS database for volcanic hazard zonation

The geographic location and tectonic setting of the Philippines make it prone to volcanic hazards. Out of the two hundred twenty volcanoes spread over the seven volcanic belts in the country, twenty one of them are considered active. Mt. Mayon, a stratovolcano located in the province of Albay, is the most active among these volcanoes. It has had 45 eruptions since the first recorded one in 1616, the most recent of which was the February-March, 1993 eruption.

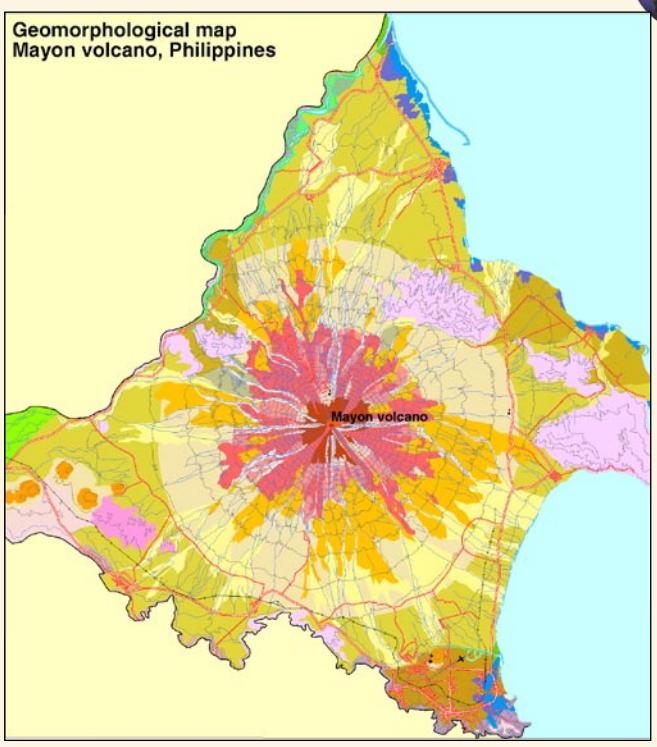


Hazards related to the eruptions of Mayon Volcano include lava flows, pyroclastic flows, lahars and ashfall. Deaths and property damages have resulted from the wrath of its eruptions. In the February 1, 1814 eruption alone, 1,200 people died and the towns of Camalig, Cagsaua, and Budiao and half of Albay and Guinobatan were laid in ruins. During the February-March, 1993 eruption, 77 people died as a result of the base surge which occurred without forewarning. In addition, records of the Provincial Disaster Coordinating Council (PDCC) show that damage to agriculture and reforestation amounted to P77.6 M for this same eruption. Considering that Mayon Volcano has an eruption rate constant of 11.8 years for the present phase (Lizardo, 1986), these damages pose serious drawbacks to the economic growth of a poor province like AlbayTo mitigate the adverse effects of Mayon's eruptions, the Philippine Institute of Volcanology and Seismology (PHIVOLCS) has continuously intensified its researches and studies concerning volcanic hazard assessment and forecasting volcanic events - both short term and long term. Volcano monitoring, consisting of seismic monitoring, geodetic surveying, water tiltmeter and gas measurements, provides the PHIVOLCS the primary data on the volcano's current behaviour which are necessary to issue short term forecasts. Likewise, since the eruptive record of a volcano provides the principal data for long term forecasts, records of Mayon's past eruptions and the nature of their products have also been studied.

However, no semi-quantitative or quantitative studies on the distribution of its products making use of Geographic Information Systems (GIS) has been done on this volcano yet.

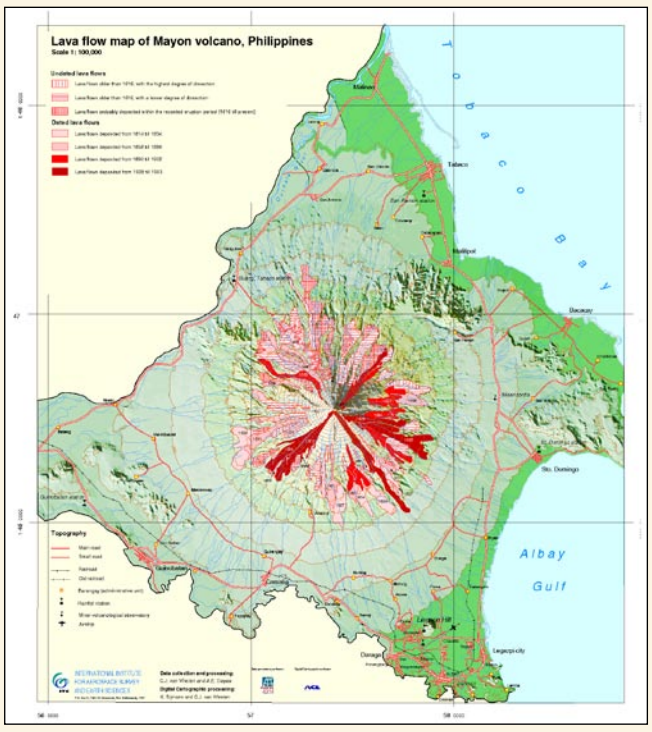
A Geographic Information System (GIS) is defined as computer based system that is used to store and manipulate geographic information (Aronoff, 1991). It provides four capabilities to handle georeferenced data: data input, data management, data manipulation and analysis and data output. A fairly recent tool used by earth scientists, GIS has started to find its way in volcanic hazard and risk mapping. In this work, GIS is used in mapping the distribution of volcanic products in Mayon Volcano and likewise, in susceptibility mapping for lava flows, pyroclastic flows and lahars based on morphological factors.

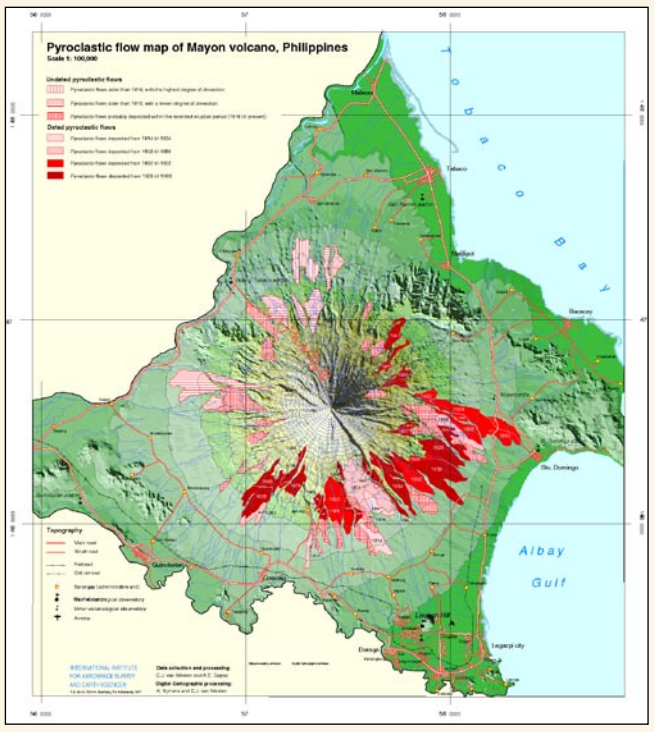
Primarily, this study aims to perform a systematic inventory of volcanic hazards in Mt. Mayon and consequently produce susceptibility maps for lava flows, pyroclastic flows and lahars using the combination of geological-geomorphological mapping techniques and geographic information systems.

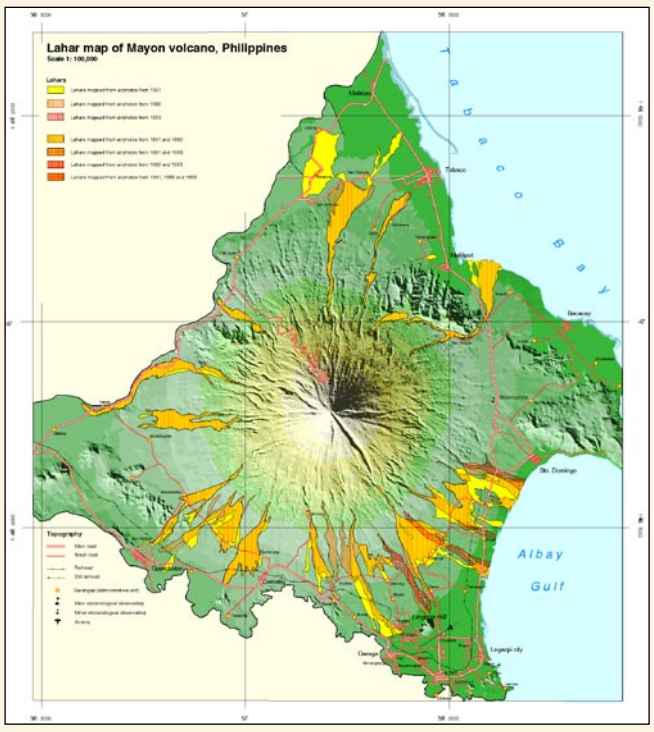


To achieve this general objective, the following specific objectives have been formulated:

- To identify the different volcanic processes and hazards through geological-geomorphological mapping using multi-scale and multi-temporal aerial photographs and through field checks.
- To define the relationships between certain factors like morphometry, morphography and rainfall with specific volcanic processes which may govern the deposition of volcanic products.
- To produce a systematic inventory map of volcanic hazards together with its pertinent attribute database in a geographic information system (ILWIS).
- To represent the information using a cartographic software package (ACE)
- To produce susceptibility maps for lava flows, pyroclastic flows and lahars based on morphological criteria using a geographic information system.







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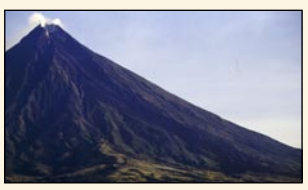

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