



Development of A Digital Watershed Atlas for Guam



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Effective management of island water resources requires accurate information on the physical and environmental components of all the watersheds. There are sixteen (16) watersheds in southern Guam that contribute runoff to the streams and coastal areas. Protecting these watersheds from point and non-point sources of pollution requires a better understanding of the watershed topography, vegetation, soil properties, roads, land use and land cover information, badland and many other features. The watershed's features should be stored and formatted in such a way that it can easily be made available for any water resources study such as; watershed planning and management, estimating upland erosion, and evaluating the impacts of mans activities on the quality and quantity of the streams. In addition, the information should be stored in such a way that it can be easily updated and made available to all interested agencies and researchers.

During the 1990s, geographical information systems (GIS), with their ability to gather spatial data from different sources into an integrated environment, emerged as a significant tool for hydrologic modeling. Particularly, GIS provided a consistent method for watershed delineation using digital elevation models (DEMs). In this project, GIS and related technologies such as remote sensing and global positioning systems (GPS) will be used to collect, digitize, organize, model and analyze data on watershed characteristics. A geo-database was established to incorporate physical, environmental and socio-economic information on the watersheds. Remote sensing was used for data updates for the digital watershed atlas. GPS provided data updating for the GIS database, and was used for some data ground-truthing.

The overall objective of this project was to create an atlas of Southern Guam's watersheds that includes the watershed boundary with its physical and environmental components.

The specific goals of the project were to:

- 1) Form a core user group for atlas development. At the startup of the project, the researchers organized a committee with representatives from the Government of Guam and other related agencies. The role of this committee was to identify the digital elevation model (DEM) that should be used and what other information should be included in the atlas.
- 2) Development of the watershed layers. During this phase the layers that describe the physical characteristics of the southern Guam watersheds were assembled. This included
 - a) Acquisition of a standard Digital Elevation Model (DEM) set for the island,
 - b) Development of watershed boundaries for all major basins in South Guam;
 - c) Development of sub-watershed boundaries according to the consensus of the core group,
 - d) Development of stream maps for all the major streams,
 - e) Development of layers showing river mile locations for all major streams,
 - f) Development of stream profiles (graphs of elevation vs. river mile) for all major rivers, and
 - g) Development of slope and slope aspect maps for all of South Guam.
- 3) Development and acquisition of existing layers identified as being important by the consensus of the core group. All layers were projected into one common projection system.