Case Study of Use of GIS by AAI

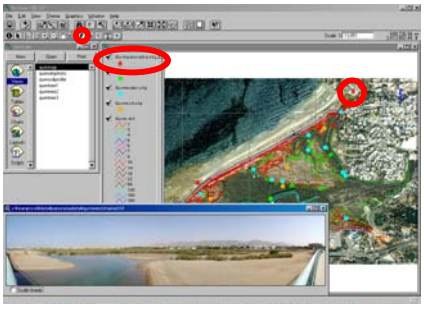
Part 4 – Case Study from Oman

Mangrove forests in Oman play critical roles, preventing coastal erosion, providing timber and firewood as well as non-timber products, recharging water resources, and conserving biodiversity. They also have a tourism resource value. Despite this, the mangrove area is diminishing due to cutting by local residents for firewood, charcoal and livestock fodder over many years. As the majority of Oman's land is desert and the country has little in the way of fresh water resources, expansion and sustainable utilization of mangrove forest that can propagate in brackish water is an important issue for the country. With this background, a study was conducted to formulate a master plan for the restoration, conservation and management of mangrove forests. The study included survey on natural and social conditions for each mangrove site, and based on this survey the sites were categorized into groups by different forest functions. Management plans were formulated according to different development types for each site category. In addition, a long-term monitoring plan was also formulated for each site. Survey results obtained in various field areas were compiled as a baseline for monitoring activities and the information was expressed on maps using GIS.

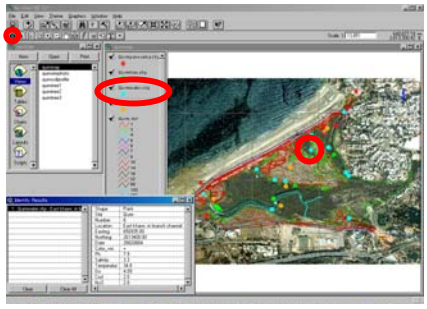
Due to the fact that there was a large variety of data, as below, we made sure that there was a certain uniformity in the data storage system, storing the same kind of data set in a folder with each site name at the beginning of each file.

Main Directory	Sub Directory		File
Mangrove	Project		Project files for each site generated using Arc View and a distribution map of the sites
	Image		Satellite images of each site using IKONOS or LANDSAT
	Data	Existing forest	Polygon data of existing forests made by GIS section
		General	General information such as administrative boundary, population, road network, distribution of major cities
		Fauna/Flora	Description of fauna and flora for each site
		Map	Result of topographical survey for each site, which was undertaken as a subcontract of this study
		Panorama	Panoramic photos taken from the fixed point observation spot for each site
		Photo	Photos of characteristic view, mangrove forest, soil conditions etc. for each site
		Soil analysis	Soil texture, color, and hardness of sampled soil at each site and state of ground water
		Soil profile	Description of soil profile of the sampling pit at each site
		Tree survey	Results of every tree measurement including height, diameter of sampled trees at each site
		Tree photo	Distant and close up photos of sampled trees at each site
		Water analysis	Result of analysis of sample water at each site (color, acidity, salinity, temperature, DO etc.)

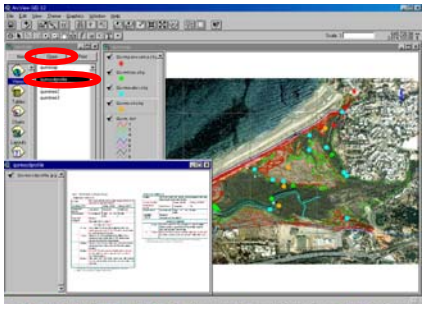
There were 21 target sites in 5 coastal zones. Therefore in GIS, it was designed that one could select a site from a page which showed all the sites or the sites of a specific zone. Once a site was selected, one could go to project files of the particular site. The project files for each site came with a background of a satellite image overlaid with topographical survey results. On the satellite image, we also indicated the panoramic photo shoot point, location of sample trees, and soil and water sampling points. By pressing an information button after selecting each site, results of every tree measurement and soil/water analysis are shown. By pressing a hot-link button, panoramic photos and tree photos can be viewed. Moreover, by selecting the fauna and flora, photo, or soil section from the view list, relevant images and descriptions are displayed. The following is an example.



Display of a panoramic photo



Display of water quality analysis result



Display of soil profile description

Through this work, as already mentioned in the first part of this series, we learned how important it is to shorten the distance between data collection and processing of the data in GIS. It is ideal for one staff member to take part in both works. If different staff deal with different parts of the work, it is necessary to ensure a very close exchange of information. Careful verification work by data collection staff is considered essential for constructing GIS. This time, we used GIS to display baseline data on maps. Refinement will be necessary to enable the system to display periodic changes as continuous collection of monitoring data is envisaged. It is important to understand that GIS does not end when constructed and that there is a need to keep improving the system as monitoring activities progress. Furthermore, with the understanding that it is important to promote data sharing with people and organizations without GIS software, our work includes utilization of internet map servers.