

Mini-Series: AAI's Database Management (3)

Part 3: Geographic Information System (GIS)

GIS is a system with which spatial data (e.g. maps) and numerical data (e.g. statistical information) can be linked and analyzed at the same time, using the combined functions of map processing / display and the database. Today it is widely used in various fields, including urban / regional planning, environmental resources management, disaster prevention planning, marketing management and so forth. Satellite images used in remote sensing analysis with GIS is one of the most typical forms of spatial digital data collection. In the field of agriculture and forestry, for example, satellite images are used for land use surveys (e.g. classification of agricultural, forestry and residential areas), survey of forest cover / status (e.g. extent of forest destruction or plantation), monitoring of desertification processes (e.g. vegetation changes), etc. There are a number of GIS softwares, and at AAI we have been mainly using MapII, MFWorks (for grid maps), IDRISI (for remote sensing analysis) and ArcView.

We have been engaged in various projects of development studies and dispatch of expert in the agricultural field. For such activities, for example, when we conduct survey of land uses and vegetation distribution, satellite imaging often proves to be very useful to spatially and comprehensively grasp the situation of the survey area, and we have made full use of it as needed. Among the various uses of satellite imaging, as discussed in AAINews Vol. 6, with grid maps we can overlay different theme maps and apply these according to requirements. MapII was a software designed originally for Macintosh, but a Windows version was released as MFWorks.

With IDRISI, images from satellites such as LANDSAT and SPOT can be analyzed in full, and it can also be used for land use analysis and biomass evaluation with vegetation index (NDVI). The figures on the right show JERS image of NDVI of Salalah regions of Oman in two seasons. The area with relatively high vegetation (denoted in purple) is a mountain range called the Jabal Al Qara, where the decrease in vegetation due to overgrazing has been a major problem in recent years. However, little quantitative surveying has been carried out and no specific measures for environmental conservation have been set up to counter this problem. Some formulas to calculate/quantify vegetation from NDVI have been proposed, and such methods are expected to make it possible to grasp seasonal and yearly vegetation changes in quantitative and spatial terms, which would lead to the development of rational pasture management plans.

Arc View is a GIS software which links and processes statistic data, maps and photographs comprehensively, and it can visualize and display complicated figures such as agricultural production on a map. We have used this software for studying plantation management in UAE, agricultural information in Syria, cereal production and the accompanying movement of water in the world etc.

Let us end this mini-series by giving our general thoughts on using GIS and various databases at AAI. Depending on their types and the ways they are utilized, such softwares can achieve a great deal. But, sometimes handling can be very complicated and special operators may be necessary, making it rather costly. However, there should be some easy ways for everybody to use the softwares and apply them to an individual's work according to his/her field. At AAI we consider GIS and database softwares as handy daily tools, or useful means applicable to our field work, and we hope to carry on developing various databases as 'thinking tools'.

