

## Software Review

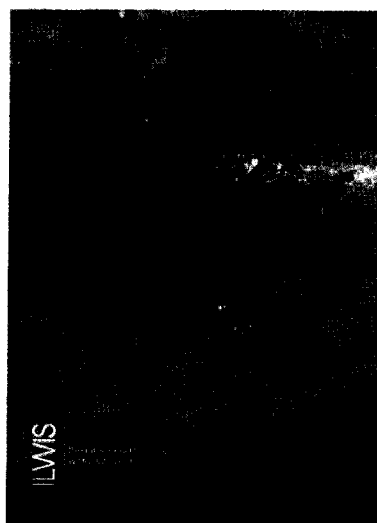
# ILWIS version 1.3 .... an interesting and affordable tool

Integrated Land and Water Information System

Reviewed by Alias Abdul Rahman

### Introduction

It is a PC based low cost GIS and Remote Sensing software. A dual monitor system, i.e. one monitor for alphanumeric text, and one for graphics or images display. The software is developed at the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, The Netherlands by a group of researchers lead by Prof. Allard Meijerink. This particular version was released in March, 1992 with some new and improved facilities, e.g. the whole programs have been speed up, limitations on file size have been reduced or removed. Some cartographic map projections, and several new data formats e.g. TIFF file format are supported. The software is being used by many organizations ranging from private mapping company to research and training agencies. I have some experiences using the software for my post-graduate diploma image processing exercises. As far as image processing is concerned, I can say that ILWIS can handle most of the tasks, e.g. production of satellite image maps, 3-D visualization, etc., see the given example. The software is being used intensively by ITC reseachers and students as well as other geoinformation engineers around the globe. As a teaching tool, ILWIS deserves considerable praise for providing tutorial disks and notes with some real case study datasets. The two-volume manual is very informative but poorly bind.



### The low cost solution

I consider the software as a low cost and affordable because the system can integrate conventional GIS technique, image processing, raster-based spatial modelling, and tabular databases into one single solution, plus because it only requires the following inexpensive hardware:

- IBM-AT 286, 386, 386SX, 486 computer or compatible using MS-DOS version 3.2 or later, and appropriate math co-processor.
- Any graphic display of the following: VESA Standard, ATI VGA Wonder (512KB/1MB), Trident 8900(512KB/1MB), VGA Tseng Labs chip(512KB/1MB), Genoa Super VGA 6000 series, Paradise 640 x 480 resolution, Standard VGA, and Matrox PGA-640A, PG-1280A, PG-641, PG-1281

- Optional devices:
  - **Digitizer:** any digitizer that can send the data using serial communication RS-232, e.g. Calcomp, GTCO-DigiPad, Summagraphics Microgrid II, Graphtec, Mypad, and Numonics.
  - **Pen plotter:** any plotter supports HP-GL Hewlett Packard Graphics Language, which can receive data using serial communication RS-232
  - **Colour printer:** supports the following printers HP Paintjet A3 & A4, IBM Inkjet, Tektronix 4986, Epson 24 pins or 8/9 pin, HP Laserjet+ and compatibles with 1.5 MB memory.
  - **Scanner:** any scanner that supports the TIFF format.

### What can the ILWIS offer?

It is a GIS software that integrates image processing capabilities, tabular databases, and conventional GIS characteristics. Analogue data can be converted through a user friendly digitizing program plus the capability of 'on screen digitizing'. **Input** can be varied from satellite images, e.g. ERDAS-LAN, ERDAS-GIS format, Window bitmap, LIP file, Geosoft, IDA Image, GIF, PCX, Arc/Info-NAS, to ASCII and other image files. Vector data from other systems e.g. SMT-List, Integraph SIF, AutoCad-DXF, Arc/Info, HPGL, ERDAS-DIG, IDA Map, UseMap, Sicad GDB, Syscan, Cart/o/graphix, and Themak2 can be imported into the ILWIS format. A number of table files e.g. dBase-DBF, Delimited, Lotus-DIF, and dBase-SDF can be read. The ILWIS also can **export** the files into a number of commercial files formats. **Image processing** facilities include integrating with spatial modelling and tabular databases. Other capabilities e.g. filtering, geometric correction and classification procedures are also available. Generally, there are two type of processing modules available, namely, vector, and raster module. **Vector module** has Digitize, Network, ChangeProjection, Display&Change, and RasterToVector conversion. Some DTM/DEM interpolation procedures are available e.g. point data and contour lines interpolations. The **Raster Analysis** module has several submodules such as Visualization, Spatial Modelling, and Image Processing. Each submodule e.g. Visualization has several functions e.g. Display&Store, ColorLut, PixelInfo, ViewValues, Display3D, and StereoPair. Another interesting submodule is **Spatial Modelling Module**. It has several functions e.g. Calculation (performs: spatial analysis on multiple input raster maps for map overlay and various other spatial analysis functions. The module also incorporates logical, arithmetical, conditional, and neighbourhood operators, including iterations). The Crossing submodule performs the crosses of two raster maps and creates an output cross table). The Filter provides digital processing facilities for the spatial enhancement and analysis of raster maps. The Distances calculates distances and Thiessen polygons from user defined objects on a raster maps. The **Interpolation Module** has three submodules of FromIsolines (performs linear interpolation between rasterized isolines), FromPoints (interpolates between rasterized points), FromRaster (interpolates between individual raster elements on a grid basis, provided with bi-cubic and cubic-spline interpolations). Image Processing Module has **Statistics**, and Classification submodule. The Statistics can performs **Histogram**( calculates and display a histogram of raster maps), Multivariate (calculates the covariance and correlation matrix of a dataset of 8 raster maps, calculates the Optimum

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Index Factor (OIF)). It also has PrincipalComp which can perform principal components and factor analysis. AutoCorrelation calculates the autocorrelation and semivariance of a raster map. Another powerful feature is the **Classification Module**, it has Sample submodule which can interactively sample pixel values from a data set and statistically analyse the sample set. Cluster submodule performs cluster analysis on sample data sets for unsupervised classification. The Classify submodule incorporates box classifier, maximum likelihood classifier, and nearest neighbour classifier classification algorithms. The DensitySlices performs one-dimensional classification on a raster map by defining intervals of pixel values interactively. The ILWIS also has some facilities on making cartographically finished image maps. All the annotation and presentation can be executed by the **Output Module** with full colour and grey scale printing and plotting, 3D grid plotting, font editing, standard and user defined pattern files. So the overall representation of the ILWIS software may be visualized in the following schematic diagram.

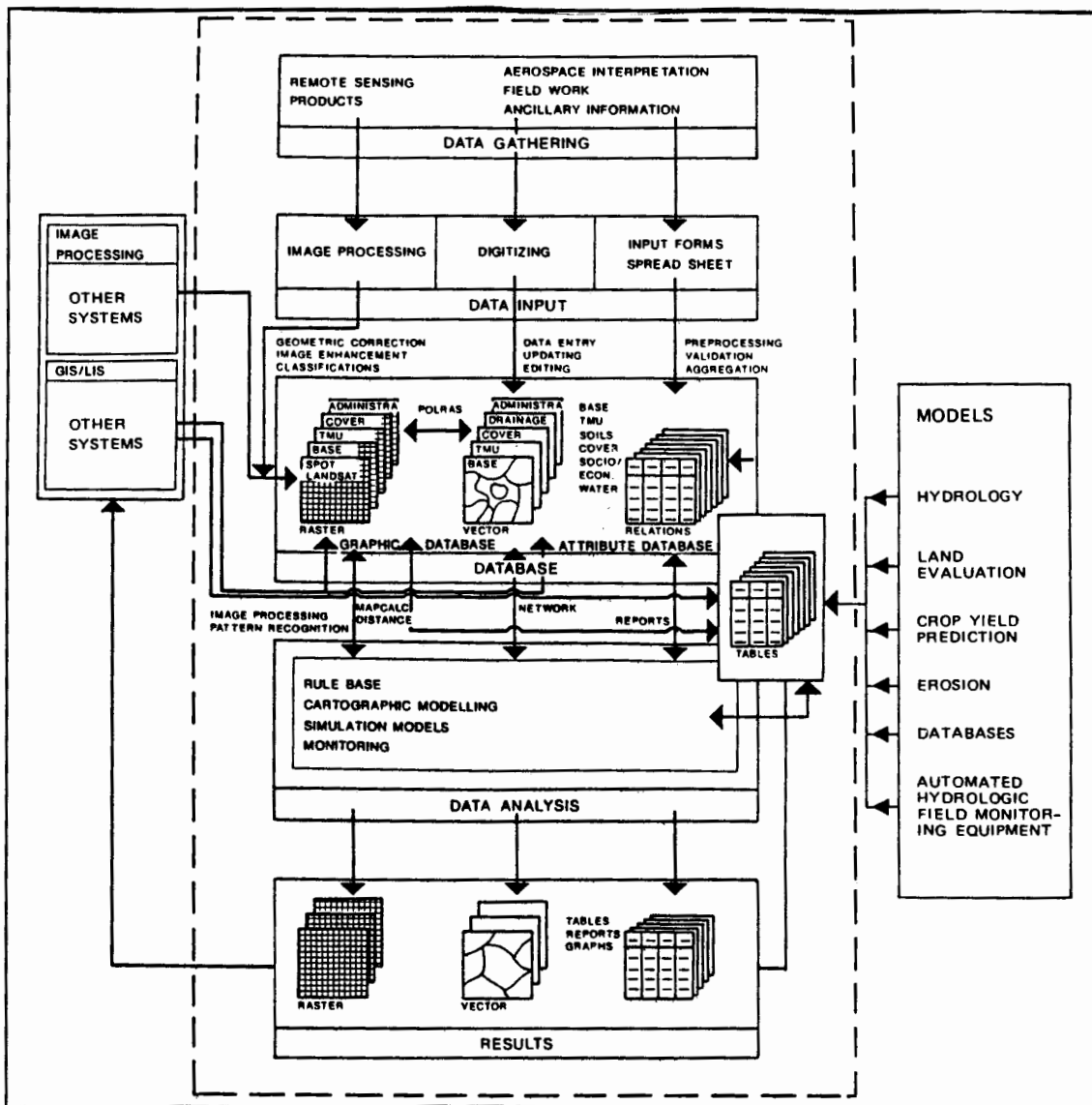


Figure 1 Schematic representation of ILWIS

### Applications

ILWIS are being used in some important applications e.g. environmental managment, hazard monitoring, natural resources assessment, agriculture, forestry, rural development, urban analysis, landuse zoning and planning, and hydrology and watershed managment.

### New development

In early 1994, a new version of the ILWIS software has been unveiled, called ILWIS Version 1.4. For an information to the readers, in early 1995 a new ILWIS version 2.0 for Windows will be released, and undoubted will features more new interesting and useful functions.

### System Dealers

The system is well known in some parts of the world and being distributed by official dealers in Europe, Latin America, Africa, Asia, Middle East, and some parts of North America. From my observation , I think the software is not popular (or not known) among Malaysian geoinformation and remote sensing reseachers and professionals, this is may be because of the 'no link' situation between our mapping and natural resources agencies with the ITC. However, the software can be acquired from the following South East Asia official dealer:

P.T. Geosys Intipiranti  
Jln. M.T. Haryono 3/1 No. 34  
Cikoko, Jakarta 12770  
Indonesia.  
(Fax: 62 21 7981962)

One good thing about the ILWIS producer (i.e. ITC) is that ITC ex-student may purchase the system with NLG250.00 compared to the commercial and educational price worth NLG20,000.00 and NLG7500.00 respectively.

I conclude that ILWIS is an interesting and affordable tool for those who want to do research something on the integration of GIS and Remote Sensing, and for any training and educational institute who is looking for inexpensive system.

