

# **ILWIS 2.1 for Windows**

The Integrated Land and Water Information System

## **Applications Guide**

ILWIS Department,  
International Institute for  
Aerospace Survey & Earth Sciences  
Enschede, The Netherlands

### **ITC**

The International Institute for Aerospace Survey and Earth Sciences, Enschede, is the largest institute for international higher education in the Netherlands. Its main objective is to assist developing countries in human resources development in aerospace surveys, Remote Sensing applications, the establishment of geoinformation systems and the management of geoinformation. To this end, ITC concentrates on three activities: education/training, research and advisory services. In-house expertise covers an extensive range of disciplines in the above fields.

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The exercises were tested by the members of the ILWIS test team, listed below.

The SPOT images for the exercises are used with the permission from SPOT Image, and the Landsat TM images with the permission from EOSAT.

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### Note:

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! The methods and the data used in the case studies are the sole responsibility of the authors listed on the title page of each exercise. For questions and remarks concerning a case study, please contact the author.

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# Preface

ILWIS is an acronym for the Integrated Land and Water Information System. It is a Geographic Information System (GIS) with image processing capabilities. ILWIS has been developed by the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, The Netherlands. For more than a decade, since 1985, the software has undergone major improvements. The last of which includes the change from DOS to the Windows environment. The release of ILWIS for Windows marks a new era in the development of the software.

As a GIS package, ILWIS allows you to input, manage, analyze and present geographical data. From the data you can generate information on the spatial and temporal patterns and processes on the earth surface.

## The ILWIS media

The ILWIS Applications guide is part of the documentation for ILWIS 2.1. The full documentation includes:

- **ILWIS Installation Guide.** Instructions for setting up ILWIS and guidelines for setting up hardware, such as digitizers and printers;
- **ILWIS Beginner's Guide.** A first look at ILWIS, introducing the basic concepts, some essential ILWIS techniques and the main operations included in ILWIS;
- **ILWIS User's Guide.** Training in the skills you need to work with ILWIS. It provides numerous exercises to practice GIS techniques and Image Processing operations;
- **ILWIS Applications Guide.** Advanced procedures to work with ILWIS, providing 25 case studies for various research disciplines;
- **ILWIS Reference Guide.** Detailed description of the functionality of ILWIS including its window types, the objects, the operations, etc., illustrated with tips and examples.

Besides these Guides, extensive on-line and context-sensitive Help is available in the program.

## The ILWIS Applications Guide: Main objectives

The ILWIS Applications Guide contains discipline oriented case studies, and is intended for those who want to know how ILWIS 2.1 can be used for specific problems in various disciplines.

The ILWIS Applications Guide is meant for experienced ILWIS 2.1 users. Therefore, the descriptions of the operations to be carried out, are not fully written

out in detail. Those persons who want to learn how to work with ILWIS 2.1 are referred to the ILWIS User's Guide.

The ILWIS Applications Guide can be used both by persons on an individual basis, as well as in a course environment. Many of the case studies presented in this book are used in courses given at ITC.

### Structure of the ILWIS Applications Guide

The ILWIS Applications Guide consists of 25 case studies, arranged more or less according to the disciplines, reflected by the ITC departmental structure.

- **Applications in Earth Sciences.** Chapters 1 to 15 all relate to earth science topics:
  - *Applied Geomorphology and Natural hazards.* Chapters 1 to 7 deal with problems concerning natural hazard, such as flood hazards, cyclone hazards, volcanic hazards, landslide hazards, and seismic hazards.
  - *Engineering Geology.* Chapter 8 shows how to create an engineering geological data base for a mountainous area with a scarcity of borehole data.
  - *Surface hydrology.* Chapters 9 to 12 deal with hydrological problems related to irrigation, determination of peak runoff, and erosion modelling.
  - *Hydro-geology.* Chapter 13 explains a method for the evaluation of aquifer vulnerability to pollution.
  - *Geology.* Chapters 14 and 15 deal with the use of satellite images in geological surveys.
- **Applications in Environmental Management.** Chapters 16 to 18 relate to multi-disciplinary environmental problems.
  - *Neighborhood modelling.* Chapter 16 and 17 deal with the use of neighborhood modelling in GIS for specific environmental problems.
  - *Data combination.* In chapter 18 a number of methods are shown to combine multi-disciplinary data for the selection of a waste disposal site.
- **Applications in Land Resource and Urban Surveys.** Chapters 19 to 24 are concerning problems related to land resources analysis and urban studies.
  - *Urban Surveys.* Chapters 19 to 21 cover the suitability analysis of urban expansion and the monitoring of this expansion.
  - *Land use planning.* Chapter 22 is concerned with the analysis of fuelwood demand.
  - *Soil Surveys.* Chapters 23 and 24 are about soil erosion analysis.
- **Cartographic applications.** The last chapter (25) shows how ILWIS can be used in the preparation of a layer tinted map.

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## The data set

All data files required for the exercises in the ILWIS Applications guide are included on the CD-ROM, which also contains the software, the data for the *Beginner's Guide* and the data for the exercises of the *User's Guide*. The files for the *Applications Guide* can be found in the directory `d:\appguide` (where `d` is the drive letter of the CD-ROM drive).

For each chapter, there is a separate subdirectory in which the data required for the exercises of that chapter are stored (e.g. `d:\appguide\chap01` for chapter 1).

During the installation of ILWIS you can install the data files on your hard-disk, normally in the directory `c:\ilwis21\data\appguide` and the subdirectories for the 25 chapters.

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! If you did not install the data files during the installation of ILWIS, you should do so, before continuing. See the *ILWIS Installation Guide* on how to install data files. You can also use the *Windows File Manager* to copy the data files from the CD-ROM to your hard-disk.

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The subdirectories of `c:\ilwis21\data\appguide` will be the working directories for the exercises of each chapter. For example, when you start with the exercises of the first chapter, you should go to the directory `c:\ilwis21\data\appguide\chap01`. When you have finished the exercises for a certain chapter, and you want to continue with the next one, you should change directory.

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! When you want to repeat the exercises for a chapter, we recommend that you copy the original data files from the CD-ROM, or use the *ILWIS Installation* program, so that you always start with the original files, and not with files which may have been altered.

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## Conventions used in the ILWIS Applications Guide

This manual is formatted in such a way that the specific actions dealing with the software are separated from the accompanying text.



- This is an *exercise box*. You can follow the instructions step by step.
- Words in *Times New Roman 10 Italics* are *keywords*.
- Formulas that should be entered are shown in *Courier New 10*.  
For example: `Mapc = Mapa + Mapb`

- All information that should be supplied by the user is also shown in Courier New 10, as well as all the names of objects (maps, tables, columns, etc.)  
For example: Geology.
- The names of, operations, dialog boxes and the options in dialog boxes are shown in Arial 10.  
For example: Display Options - Raster Map.

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! This is a *tip-box*. It is used to give tips.

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Although we have tried to make the different case studies as uniform in style as possible, you will see that there are some differences between the chapters with respect to the structure of the case study, the detail in which the steps of the analysis are explained, and the amount of theory. Some case studies only contain very basic instructions on how to do an analysis, while others explain the steps in more detail.

### Request for new case studies

It is the intention of the ILWIS team to expand the ILWIS Applications Guide with new case studies in a next release. We are also considering to put a number of case studies on our Web-site (<http://www.itc.nl/ilwis>). We are interested in the way ILWIS is being used for all kinds of applications.

If you have been succesfully applying ILWIS in your own specialization, and you want to share your findings with others, you have the opportunity to contribute with a case study in the next release.

If you are interested, please contact:

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