The Land Use Database

Internet Course

First Internet Course offered by ITC

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THE LAND USE DATABASE INTERNET COURSE

Objectives

<u>After this course you will:</u>

- have experience to work through Internet;
- have experience regarding distance education;
- be familiar with The Land Use Database, i.e.:
  - know the used concepts to describe and classify land use;
  - have on-hands experience with the supplied software, i.e. regarding storing and retrieving land use data;
- be a "real" user of the prepared software.

Introduction

The *maximum* time span of this Internet course is 6 weeks; it consists of 6 modules.

Through the World Wide Web (WWW; ITC web server), the software, the User's Reference Manual and seven demo's are made available. The software and demo's must be downloaded to your PC. The electronic manual can be consulted while carrying out given tasks. A hard copy of the reference manual must be available to you at the beginning of the course.

Through E-mail tasks organized into modules are forwarded to you. You can complete the tasks of each module in one single working day. We expect however that you will need an additional 'learning' day for :

- getting used to the concept of distance education;
- exploring the provided demo packages;
- experimentation with the provided software;
- consultation of sections of the electronic manual (see the WWW);
- communication with fellow participants;
- communication with the tutor (Kees de Bie) and education expert (Esther Rikkerink), i.e. to ask questions, get clarifications and hints, to solve problems, to forward results of completed tasks, and to explore the software beyond the set objectives.

Task-1

Please confirm to me by E-mail that you receives this message. My E-mail address is: **in%"DeBie@ITC.NL"**

Include questions that you have at present. I will reply through E-mail, answering forwarded questions, and attach the tasks of the module-1: "**The Glossary**".

MODULE 1: THE GLOSSARY

Welcome, you have successfully completed **Task-1**, i.e. you confirmed my first E-mail message. That means we can now start Module-1 of the course. To complete this module the software plus the first demo must be downloaded to your PC. The following tasks describe how to do that, and how to actually start working with the Glossary embedded in The Land Use Database.

Objectives

After this module you will be able to:

- communicate with colleagues through Internet;
- download files from the Internet;
- send E-mail messages with attachments;
- describe the functionality of the Glossary Module;
- upgrade the Glossary as required.

Aims

Although you are lucky that you received a hard copy of the manual, we will not let you escape consulting and working through the World Wide Web site of ITC. It contains valuable information related to this course.

You will need the WWW to:
- download The Land Use Database software;
- get various pieces of background information;
- download the first demonstration package;
- consult the electronic manual;
- communicate with your colleagues who also attend this course;
- communicate with Esther and me.

Further on we aim that you carry out the following software related activities:
- install The Land Use Database;
- run Demo-1 ;
- read sections of the Reference Manual;
- work with the Glossary Module;
- print the modified glossary sections.

Questions Raised

1. *Can I install the software at home* ?
   Yes, note that it is a shareware, so you can even copy it to others.
2. *How do I transport entered data from my office to my residence* ?

Note that in the Glossary Module a backup-restore option is build-in. All data fit on one HD flop.

The ITC WWW-Site

The site name is: HTTP://WWW.ITC.NL/EDUCATION/LARUS/LANDUSE

How to get there:
- Start MS-Windows;
- Start a WWW-browser, e.g. Netscape;
- 'Open' the above site;

Task 2: Explore the ITC WWW-site

Find out 'who' your colleagues are, and send each of them a short note stating who you are plus what you expect to get from this course. Use the provided buttons at the WWW-site to prepare and send the E-mails (mail copies to Esther and to me).

Note: You will have to specify in Netscape under 'Options' the 'Preferences' regarding Mail and News in order to send the E-mails.

Task 3: Glossary Demo

Instructions how to get the demo running:
- Download the file **Demo1.ZIP**. The web pages provide guidance where the demo can be found.
- The downloaded file is a so-called 'ZIP archive'. You must unpack it by typing the statement **pkunzip Demo1.ZIP**. It will produce the un-packed original file, i.e. **Demo1.EXE**.
- When in DOS, type **Demo1.EXE /g** and the demo will start. Select the best available Video Resolution listed, but minimal a 800 x 600 pixel resolution (SVGA resolution !). If your PC can not match that resolution, then please contact your system manager or find a PC with the required Video resolution.

$\Rightarrow$ The demo shows various aspects of the Glossary Module of The Land Use Database. Consider running the demo more than once;

⇒   E-mail to me what is stated as 'last phrase' on the last slide of the demo;

⇒   E-mail to me your questions, comments, and/or suggestions.

Task 4: Installing the Land Use Database

Instructions on how to download and install The Land Use Database software.
- Start MS-Windows;
- Start your World Wide Web browser;
- 'Open' the World Wide Web site;
- Move to the buttons *'Download software'*.
- Click one by one on each of the highlighted filenames;
  - **DATA.ZIP**
  - **GLOSSARY.ZIP**
  - **PROGRAM.ZIP**
- Put these files anywhere on your hard disk (remember where!!!).
- Put an *empty* HD flop in drive A and unpack each of the three downloaded files as follows: **PKUNZIP *.ZIP a:**
- Delete the downloaded ZIP files from your hard disk.
  Note: When you have unpacked all three files, the flop in drive A contains in total 9 files. The HD-flop is now a 'complete' installation diskette. Check, **using the manual**, if all files are present on the flop and if your computer has enough hard disk space to install the software.
- To install the software, go to drive A and type INSTALL (refer to Chapter 3 of the User's Reference Manual);
- After installation, check if all files that must be present in the C:\LUSE directory are indeed present (use the provided manual.

Task 5: Editing the Glossary

After viewing the demo of the Glossary, you must have a fair idea on the organization of the glossary. The actual use of the Glossary will remain unanswered till you actually use the glossary to specify Land Use Classes or Land Use Descriptions (see figure 2 page 10). Pending those exercises, it is worthwhile to start reading Chapter 2 of the manual. Next week I'll forward some tasks pertaining to the concepts on **what** land use is, how to **describe** land use, and how to **classify** land use.

Presently it is necessary to understand that the Glossary consists of building blocks (nails, cement, wood, glass, etc.) as required to describe a land use or land use class (i.e. to build a house using the building blocks). It is like using the words in a dictionary to compose a story.

However, to tell the story, all required words must be present in the dictionary. If not, nobody will understand your 'broken' tale. Thus, the required land use vocabulary must be specified in the Glossary.

Users of The Land Use Database must thus be able to improve the Glossary. Improving means: adding, editing, documenting, grafting, and even deletion of glossary items.

⇒ Consider reading sections of Chapter 4. Sections of this chapter can very quickly be consulted through the WWW. Use the 'Table of Contents' to move fast to the required sections;

⇒ Start the Glossary Module of The Land Use Database;

⇒ Find **your** country in the 'Administrative Areas' glossary tree;

⇒ Edit it (press F10) and specify the proper rectangular coordinates around it ;

⇒ Sub-divide it in administrative units, ending with the building where you are presently located (province -> district -> municipality -> street -> street no./building).
  Note: Add to the relevant house/building number the name of the organization plus a brief description under "comment".

⇒ Print the branch of Administrative Areas starting with "your country" to a file on your hard disk;

⇒ Send me the printed file as an attachment to your E-mail; include in your E-mail your questions, comments and/or suggestions.

Task 6: End of exercises for this module

- Wait for my response regarding the forwarded E-mails;
- If you appreciate receiving Module-2 immediately state so !
- Communicate with your college participants / exchange notes.

MODULE 2: DATA ENTRY FILTERS, SETTINGS, CONCEPTS

Objectives

After this module you will be able to:

- prepare a Data Entry Filter, i.e.:
    - select parameters from a list of available parameters;
    - when applicable, pre-select parameter values from the Glossary;
    - define other applicable Data Entry Filter settings;
- describe the functionality of the Data Entry Filter settings;
- specify 'general' and 'data entry' specific software settings;
- describe what is land use.

Aims

For the following tasks you will require the reference manual, the ITC-WWW pages, and the installed Land Use Database software. The tasks aim at achieving the following:

- explain various features of the "Data Entry Filter" concept;
- prepare a "Data Entry Filter" (see Demo 2);
- experiment with software setting (see Demo 3);
- explain various questions regarding the applied "Land Use" concept.

Task 7: Run Demo 2

From the ITC-WWW site, download **Demo2.zip**. Extract the ***.exe** file, and run the demo several times (give when in DOS the command **demo2 /g**);

Task 8: The 'Data Entry Filter' Concept

Read Chapter 2 using the ITC WWW pages, or use the provided manual. It is important that all used concepts are understood as soon as possible. At present, emphasis is put on the functionality of the 'Data Entry Filter' concept. Understanding **Figure 2** is essential for this. If you require more clarifications, then also read Section 5.3 (pages 117-125 in the provided manual).

Now, **answer** by E-mail the following three (open-ended) questions:
1. Why are the no. of parameters as included in The Land Use Database limited ?
2. Why must study objectives be known before preparing a Data Entry Filter ?
3. Can you give additional parameters that ought to be present in the software ?

Task 9: Prepare a Data Entry Filter

Below I'll define some objectives of a fictitious project. Then, you are asked to prepare a Data Entry Filter. Be aware that the Glossary must contain all elements required to define the filter like for instance the 'project name'. Give the Data Entry Filter **your** name. When ready, print the filter to a file, and **E-mail** it to me (as attachment) for checking.

<u>State University Soil Management Project</u>
Your manager gave you the task to interview around the capital of your country a number of farmers. Each interview relates to one specific plot where annual cropping is practiced. The project is interested in surveying all possible (soil-)tillage operations that farmers carry out plus the timing, duration, and total task time of each operation, plus the type and sources of labor used. Evaluated will be if farmers on clayey soils spend more or less time on soil management than farmers situated on sandy soils, as to see if a time shift in specific soil management operations between the two groups occur. The crops grown may also influence the statistics, and the farm tools used too. A soil map of the area is available.

Note: Leave the 'A-Priori Land Use Class' field blank. You will learn how to specify land use classes later; only then you can upgrade the prepared filter.

Task 10: Run Demo 3; Experiment with Settings

Demo 3 shows how to specify 'general' and 'data entry' specific software settings; grasp the functionality of each setting (run demo 3; see WWW). Read Section 6.2 (pp. 137-144) of the manual. Experiment with the software and then E-Mail to me the answers to the following questions:

1. When you select as setting the Data Entry Filter 'FAO/ITC Training Course', then how many countries can you select as 'Dataset-Display Selection' ?

2. For the filter YOU prepared, which 'Structure of One Dataset' option will you select and why ?

3. Which settings do you define before editing data belonging to only one project and one province ?

Task 11: Group discussion; What is Land Use?

To stimulate you to read Chapter-2 once more, test yourself by answering the following questions. Do not mail the answers to me, but try to discuss the answers with your colleagues (of course through E-Mails!!). Please copy your 'internal' discussions to Esther.

1. How do you suggest to store in The Land Use Database the 'bio-physical circumstances' of a plot (land) as perceived by a farmer?

2. Why can you not store the goals of the farmer in The Land Use Database?

3. Is the 'tenancy arrangement' of a parcel a land use aspect?

MODULE 3: LAND USE CLASSES

This week there are less tasks (only 2), however they take quite some efforts if you encounter problems to understand the underlying concepts (which are very strict!). Various routines are earlier practiced and presently not explained again.

Objectives

After this module you will be able to:
- specify / define Land Use Classes, using proper concepts;
- enter Land Use Classes in the database;
- indicate the links between the Glossary, Data Entry Filters and Land Use Classes.

Aims

- understanding the concepts how Land Use Classes must be specified;
- acquire skills in defining and entering Land Use Classes in the Land Use Database;
- acquire skills to interactively upgrade the Glossary and your Data Entry Filter, while in the process of specifying Land Use Classes.

Task 12: Demo on Land Use Classes

a)   Run Demo 4 called "Land Use Classes";
b)   Read (once more) sections 2.3 and 6.8.
Note: No reply to the above is required; just forward your questions if any.

Task 13:

a)   In the Data Entry Filter that you prepared last week, specify under the heading 'A-Priori Land Use Classes' a '*Yes* ' for both available types of classifiers;
b)   then select in Settings your filter, and move onwards in the Data Entry Module to Land Use Classes (when you prepare land use class descriptions, **all** possible classifiers will now be available; **no** pre-selection is made).
Note: When you run the software as a stand alone application, and when you are located at any point in the Data Entry Module, you can switch to the Glossary module by pressing **F2**. Then edit the Glossary or a Data Entry Filter and return to the Data Entry module by using the **Esc** key. Switching is thus made easy!

c)   Make a print of the "**FAO Test**" classification tree, and re-enter the following class numbers into a hierarchical classification system: 1, 2, 3, 4, 7, 9, and 13. Give this new classification system 'your' name. (Note: only the use of one single classifier-branch is required!!).

Hint: use the following sequence :

1. Agriculture: Yes, Temporary Cropping
   1.1   Single Cropping
          1.1.x   Crop specific list (2x)
   1.2   Multiple Cropping, Sequential Cropping
          1.2.1   Double Cropping
                      1.2.1.x   Crop specific list (3x)
          1.2.2   Other... (be careful here!) (1x)
   1.3   Multiple Cropping, Inter-cropping, Mixed
          1.3.x   Crop specific list (1x)

I refer now to the filter that you prepared for Module-2 (State Univ. Soil Management project). It focused on 'annual cropping'. Please upgrade the just prepared Land Use Classification system for usage by the State Univ. Soil Management project.

Finally, also the following class definitions are required and must thus be added:
1.   Potatoes (grown once a year) are either grown for own consumption or commercially (2 sub-classes!);
2.   To grow potatoes for own consumption always human labor is used as main power source for tillage, while for commercial use always tractors are used (mechanical power source);
3.   Control of both pests and diseases is always done for commercial potato cultivation, while for own consumption it is either done or totally not done (2 sub-classes).

d)   Print the specified classification system including **all** entered specifications and forward it to me by E-Mail for a check.

MODULE 4: LAND USE DATASETS

Objectives

After this module you will be able to:

- describe the possible structures of Land Use Datasets;
- enter and edit interview data into The Land Use Database.

Aims

- use of the (updated) glossary, prepared land use classes, and (updated) data entry filter;
- adjustment of the software settings;
- data entry of a number of land use datasets (up to level-4: Operations & Observations);
- experiment with the possible structures of land use datasets.

Introduction

The tasks of the earlier weeks were all preparatory for the tasks of this week. That is, what matters is a proper and easy data entry procedure to enter 10, 100, or even 1000 sets of interview data efficiently, accurately and quickly. Above that each dataset should be based on one unique and well-defined set of glossary terms.

Of course the Glossary must contain all elements that emerged before or during the interviews. In Module 1 you learned how to edit and upgrade the glossary. Successively you were thought how to prepare a new Data Entry Filter; it must be tuned exactly conform the carried out interviews. Module 2 made you aware of the high level of 'thinking' that is required to prepare such a filter.

You, as 'survey manager', must be able to prepare surveys as you must be able to do research! It is a job that requires professional training; the manager must know what to collect (and why), how to collect it and what to do with the gathered information. It is rather difficult to train you within a short time span to reach the required level and become a skilled 'survey manager'. The objectives of this course relates more to use of the software, not towards obtaining the required researcher skills!

During module 3, you were confronted with defining land use classes and a land use classification system. This again concerned work that should be done before the actual survey is carried out. For each interview, i.e. each land use dataset (may be plot specific), one a-priori land use class must be defined. This must be done

while carrying out the actual survey. The defined classes must be tailored to the region and study objectives.

For the Data Entry shell (this week's exercises), the defined land use classes behave as regular glossary items. Accordingly, in the data entry filter, as you can pre-select glossary items, you must pre-select a-priori land use classes.

At this stage (module 4) you are ready to actually carry out the survey (we will not do that) and upon completion of it to enter all obtained data using the software. Work of the previous weeks was thus tedious, while work of this week should be regarded as repetitious (one loop for each interview). I however invented some funny datasets for the following tasks.

Note: The above flow is also shown in the figure on page 10 of the reference manual.

Preparation for the tasks

- pre-select in the data entry filter the a-priori land use classification system as prepared by *you*;
- pre-select in the data entry filter the name of YOUR project,;
- select in settings the data entry filter that *you* prepared;
- select in settings as display-filter *your* project code;
- select in settings as data structure the 'X site-id's' and 'X land use description' setting (see Demo-5); this setting can be changed at any time as required.

  Enter the following datasets; use only levels 1, 2, and 3. In the next module we will practice all 4 levels simultaneously.

Task 14:

  Enter the following dummy data:
- Interview number-1 (of your project), was done in Wageningen. The land user (farmer) stated that he owns one parcel, on which he practices two land uses;
- One plot (0.3 ha) he grew during 1994 one crop, which was maize, and of which he obtained 3.6 t of grain (not cleaned) per ha;
- On the other plot (0.7 ha) he grew maize inter-cropped with green beans (nicely in rows!). He got in total 3.0 t of grain per ha (not cleaned) and 7 t/ha straw plus an unknown amount of green beans (whole pods).

Task 15

Enter the following dummy data:

Mr. Janssen, residing in Ede (farm-size of 22-23 acres), owns two parcels (also in Ede). On each he grows maize (on the whole parcel), i.e.:

- from 15 Jun '95 - 17 Sep '95 on Parcel-1 (17 acres on clayey soil)
- from 21 Jun '95 - 19 Sep '95 on Parcel-2 (5 to 6 acres on sandy soil)

Parcel-1 was located in Map-Unit A3 and Parcel-2 in A4/element 13.

Task 16

Enter the following dummy data;

In Gelderland there is in total 2600 ha of maize and 100 ha of green-beans. Both are grown once a year and are not inter-cropped.

Also 25 ha of inter-cropped maize and green-beans are grown (in rows), of which maize covers 30% of the fields and green-beans 70% of the fields.

Task 17

Enter the following dummy data:

A plot is located in Wageningen (39o15'East; 53o00' North); cadaster no. 13579XYZ. The observer estimates it's size at 2.0 - 2.2 ha.

Practiced by a land user who rents the land is inter-cropping with vegetables, cereals, and pulses.

The plot is poorly maintained, and also the land user makes a shabby impression.

The land user sells the bio-friendly products expensively to a mensa of the WAU.

Task 18:   Print

Make a print of all four entered questionnaires to a file and mail that file to me.

Note: To print all simultaneously, go to the dataset-id picklist; make sure only your questionnaires are shown (depends on the display-filter settings), and press F3. Make then the proper choice from the two shown print options.

MODULE 5: OPERATIONS AND OBSERVATIONS

Objectives

<u>After this module you will be able to:</u>

- describe operations and observations;
- handle land use operation and observation data;
- handle complete interview datasets.

Aims

- to enter in The Land Use Database specific data on the **Operation Sequence**; i.e.: names of operations, implements used, material inputs applied, labor inputs used, products/benefits obtained or achieved;
- to enter in The Land Use Database specific data on **Observations**;
- Go through Demo-6.

Introduction

In module 4 we tackled various aspects of the structure of datasets. (Note that normally a survey is based on a chosen (but fixed) data structure.) In the following exercises, the structure problem is exercised once more.

It is possible that you just classify a land use when in the field, enter data of the first three dataset levels, and then stop. However, if you want to study the surveyed land uses, i.e. study internal relations and impacts, you do want to know some more details on the carried out operations. If you want to do yield gap analysis, then you must also include made observations (by the farmer), especially on aspects which may have decreased yields (pest attacks etc.) or increased impacts on the environment. You will notice that interview data within one survey differ a lot regarding data on operations and observations.

Each operation and observation is a stand alone part within a dataset; an unlimited number of operations and observations can be entered. If you understand the details to specify one than you know how to specify all. It is comparable to activities bookkeeping.

Overall task

Now enter in the Data Entry Module the following data, print the two datasets to a file, and E-mail me the results. (**Note**: The tasks are definitely not the easiest ones!!!)

Task 19:

Enter the following actual data:

Mr. Oiboh interviewed on 4 Dec'92 Mr. Innsoun Sirithum. It was interview no. 87, carried out in tambon Samsai, of the Phrao district, Chiang Mai province, Thailand. The land use was paddy cultivation (sticky rice).

The first week of August'92, the farmer transplanted 30 day old seedlings, in clusters of 5-6 seedlings onto his plot in rows. The variety used was Sampatong.

The plot size was 8 Rai. He prepared the plot during the first two weeks of July (puddling with animal traction), and irrigated the plot before the field preparations.

He broadcasted fertilizer (100 kg of 16:20:0 NPK) 45 days after transplanting. He also applied FYM (farm yard manure) of pig origin just before land preparation. He obtained the NPK's from an agro-service center.

The farmer obtained the water to irrigate his paddy from a river/stream, and he used a diversion infrastructure to get the water onto his field. The land user did not suffer any flooding problems, but he did remark on water shortages during the establishment and tillering crop growth stages.

Weed control was done through use of chemicals (7-10 days after transplanting) by broadcasting 30 kg of 'Cable 5G ' on his plot. He stated the chemical was effective.

The farmer suffered from the following diseases: False Smut, Stem Borers, Army-worms, and Rice Blast. The last almost devastated his crop (normally he would have obtained 350 kg of rice per rai. He did not control the mentioned diseases. He did not suffer a bird or rat problem.

He harvested his crop (manually) during the second week of December. His crop did not suffer from lodging (wind flattens the field; often happens with local, tall rice varieties). The yield he still got was 104 tang/rai, which the farmer considered as very poor (the rice blast reduced his yield by 40-50 %).

Mr. Oiboh assessed the disease damage of the standing crop, and noted that 40-50% of rice shows rice blast damage, 5-10% false smut damage.

Task 20:

Enter the following actual data:

In your home town, Mr. Pietersen is interviewed by you on the plot in which you are interested. He grows only maize, once a year, on the 1.3 ha plot.

Note: I really invented the following data not knowing how the farmers at your place grow their maize!!

Mr. Pietersen prepared his land early April by mouldboard plow. It took him about 4-5 hours to finish that job.

Mid April, using a planting machine, he put maize seeds in rows, which took him approximately 3 hours. Two weeks later he applied NPK's along the planted maize, just beside the plants (in the soil). The actual quantities used were 120 kg Urea, and 150 kg 15-30-15, which he all obtained from a wholesale dealer.

Late May, he decided to weed the plot manually. Because he is environmentally aware, he did not apply Grammoxone, but decided to pay 5 WAU-students to do the job. His wife assisted and worked along. The students spent each 4 days in the field, his wife only two. The students were however inclined to take a few days off in between, so that the whole operation took from 21 May to 29 May. They used hows to clear the weeds.

Early august the farmer observed that the maize started flowering: the first week tasseling started and the second week silking (male-female flowers!). During silking maize happens to be very sensitive to water stress, and Mr. Pietersen did not want to risk his crop and started watering his crop using a sprinkling installation. The water was pumped up using his tractor from a nearby drainage channel. The required sprinklers he got from a lease company; the pump was his own.

The crop was harvested by a nearby cattle farmer to whom Mr. Pietersen sold his crop as fodder (for silage). The harvesting was done by forage harvester (specifically for maize), and the yield was 17-19 t fodder per ha.

This operation took about 3 hours and was carried out by laborers of the cattle farmer.

Just after harvesting, Mr. Pietersen noted that the harvester created deep wheel-tracks on his land, and decided to level by harrower.

MODULE 6: THE QUERY

Objectives

After this module you will be able to:

- describe the functionality of the Query;
- extract data from The Land Use Database.

or in more specific terms:

- understand the **relational model** of The Land Use Database;
- understand the functionality of the **Query Settings**;
- understand the concept of **Approval Files**;
- understand the construction of a **Query Condition**, that is the use of: rules (field names + a criterion), criterion (operator + value), and booleans;
- understand the workings of **Sub-queries**;
- understand the definition of **Output Fields**.

Aims

- to prepare and number of queries and extract the required data;
- Go through Demo-7.

Introduction

This module is the last one of this course. Through querying, as required, entered data can be extracted from the database. Extracted data can be used in other software for detailed analysis or for data presentation.

Demo-7 is available at the ITC web site. It prepares you for the set tasks. Please go through the demo, because it shows you in an comprehensive way all important software and conceptual aspects of the Query Module.

The tasks of this week are simple to carry out, but difficult in terms of understanding required. They will give you plenty of background in 'structured query language' techniques.

The software attempts to make querying as easy as possible since it is fully menu guided, loaded with checks, and completely tailored towards the relational model of the database.

Notes for all tasks:

First analyze which part of the task relates to the condition, then see which part refers to the required output parameters. Break down the condition in several rules (if applicable). Then define which file within the relational database structure MUST function as the approval file. Only then start entering the query into The Land Use Database.

Display achieved query outputs first on the screen to verify it's contents. If it is as required, then change the relevant query setting and send the data to a file (Quattro or Lotus), which in turn you can E-mail to me.

Task 21:

Get the questionnaire number, the administrative areas and the coordinates of all datasets from Zimbabwe where biocides were used as inputs. List also the name of the a-priori land use class.
Hint: 6 datasets fulfill the condition.

Task 22:

Edit (or copy and then edit) the above query, but now extract also the names all inputs used. List these inputs only for the cereal-based land use systems.
Note: the additional rule given must be added as a sub-query (use: "having").
Hint: 4 datasets fulfill the condition.

Task 23:

Re-enter the above query with a different approval-file selection, now listing also the period (start-end dates) of only those operations when the biocides were actually used. Do not list the start-end dates of any other operation!!
Note-1:   defining the approval file is really essential for this task.
Hint: 5 operations fulfill the condition.

```
REQUESTED QUERY TASK-21


Query Settings
--------------
Name              : task1
Approval File     : Dataset Identifications
Output Format     : Screen/Printer
Output Path       :
Log File          :
Print Field Names? : Descriptive with Line
Date Format       : dd/mm/yyyy
UTM Ellipsoid     : Clarke 1880
Query Type        : Without Formulas and Subqueries
Used Items only?  : No

Query Condition
---------------
Administrative Area is equal to Africa, Zimbabwe
  and
Material Input is equal to Biocides

Output Fields
-------------
Column            : Dataset Number
                    QUESTION->Quest_Nr
Display Format    : As entered
Column Width      :    4

Column            : Administrative Area
                    QUESTION->Ctry_ID
Display Format    : Item Name of Last Specified Level
Column Width      :   15

Column            : Plot Latitude
                    SEQUENCE->Latitude
Display Format    : Coordinate, Negative for Western or Southern Hemisphere
Column Width      :    9    Number of Decimals: 5

Column            : Plot Longitude
                    SEQUENCE->Longitude
Display Format    : Coordinate, Negative for Western or Southern Hemisphere
Column Width      :   10    Number of Decimals: 5

Column            : A-Priori LU Class
                    SEQUENCE->View_ID
Display Format    : Item Name of Last Specified Level
Column Width      :   50
```

Results of Task-21:

No.	Admin.Area	Latitude	Longitude	A-Priori LU Class
	omas	- .	.	e uential ou le Cro ing Cereals- egeta les
	atengan i a	- .	.	ingle ro ing o Cotton
	atare	- .	.	ingle ro ing o Cotton
	a aman a	- .	.	ingle Cro ing o Cereals
	a aman a	- .	.	ingle ro ing o Cotton
	C in ama	- .	.	e uential ou le Cro ing Pulses- egeta les
	un u	- .	.	e uential ou le Cro ing Cereals- egeta les
	C atsa a	- .	.	ingle Cro ing o egeta les or Potatoes
	C atsa a	- .	.	e uential ou le Cro ing Cereals- egeta les

REQUESTED QUERY TASK-22

```
Query Settings
--------------
Name                 : task2
Approval File        : Dataset Identifications
Output Format        : Screen/Printer
Output Path          :
Log File             :
Print Field Names?   : Descriptive with Line
Date Format          : dd/mm/yyyy
UTM Ellipsoid        : Clarke 1880
Query Type           : Without Formulas and Subqueries
Used Items only?     : No

Query Condition
---------------
A-Priori LU Class having (Species/Service is equal to Plants, Cereals)
 and
Administrative Area is equal to Africa, Zimbabwe
 and
Material Input is equal to Biocides

Output Fields
-------------
Column               : Dataset Number
                       QUESTION->Quest_Nr
Display Format       : As entered
Column Width         :   4

Column               : Administrative Area
                       QUESTION->Ctry_ID
Display Format       : Item Name of Last Specified Level
Column Width         :  30

Column               : Plot Latitude
                       SEQUENCE->Latitude
Display Format       : Coordinate, Negative for Western or Southern Hemisphere
Column Width         :   9    Number of Decimals: 5

Column               : Plot Longitude
                       SEQUENCE->Longitude
Display Format       : Coordinate, Negative for Western or Southern Hemisphere
Column Width         :  10    Number of Decimals: 5

Column               : A-Priori LU Class  (NOT PRINTED BELOW)
                       SEQUENCE->View_ID
Display Format       : Item Name of Last Specified Level
Column Width         :  50

Column               : Material Input
                       INPUT->SInp_ID
Display Format       : Item Names of all Levels
Column Width         : 100
```

Results of Task-22:

No.	Admin.Area	Latitude	Longitude	aterial n ut
	omas	- .	.	Planting aterials eed
	omas	- .	.	Planting aterials eedlings -
	omas	- .	.	ul ing Co er aterials Plant material i ed
	omas	- .	.	io ides Pesti ides Car ar l etta le o der
	omas	- .	.	io ides Pesti ides imet oate emulsion on .
	omas	- .	.	ineral ertili ers N-P - - Produ ts Com ound - - - .
	omas	- .	.	rgani t er anures o Animal uman rigin anure
	omas	- .	.	rgani t er anures o Animal uman rigin anure
	omas	- .	.	ineral ertili ers N Produ ts No P g AN Ammonium Nitrate ranules
	omas	- .	.	ineral ertili ers N Produ ts No P g AN Ammonium Nitrate ranules
	omas	- .	.	ater -
	a aman a	- .	.	Planting aterials eed
	a aman a	- .	.	io ides Pesti ides alat ion etta le o der
	a aman a	- .	.	rgani t er anures o Animal uman rigin anure
	a aman a	- .	.	ineral ertili ers N Produ ts No P g AN Ammonium Nitrate ranules
	un u	- .	.	Planting aterials eed
	un u	- .	.	Planting aterials eedlings -
	un u	- .	.	Planting aterials eedlings -
	un u	- .	.	io ides Pesti ides ogor C
	un u	- .	.	rgani t er anures o Animal uman rigin anure
	un u	- .	.	ineral ertili ers N Produ ts No P g AN Ammonium Nitrate ranules
	un u	- .	.	ineral ertili ers N-P - - Produ ts Com ound - - - .
	un u	- .	.	rgani t er anures o Plant rigin -
	un u	- .	.	ater -
	C atsa a	- .	.	Planting aterials eedlings -
	C atsa a	- .	.	Planting aterials eed
	C atsa a	- .	.	io ides Pesti ides ogor C
	C atsa a	- .	.	rgani t er anures o Animal uman rigin anure
	C atsa a	- .	.	ineral ertili ers N Produ ts No P g AN Ammonium Nitrate ranules
	C atsa a	- .	.	ater -

Note: the dataset no's and coordinates are repeated as often as inputs have been specified !!

Note: a sub-query is applied (having).

REQUESTED QUERY TASK-23

```
Query Settings
--------------
Name                : task3
Approval File       : Operations
Output Format       : Screen/Printer
Output Path         :
Log File            :
Print Field Names?  : Descriptive with Line
Date Format         : dd/mm/yyyy
UTM Ellipsoid       : Clarke 1880
Query Type          : Without Formulas and Subqueries
Used Items only?    : No

Query Condition
---------------
A-Priori LU Class having (Species/Service is equal to Plants, Cereals)
 and
Administrative Area is equal to Africa, Zimbabwe
 and
Material Input is equal to Biocides

Output Fields
-------------
Column              : Dataset Number
                      QUESTION->Quest_Nr
Display Format      : As entered
Column Width        :    4

Column              : Administrative Area
                      QUESTION->Ctry_ID
Display Format      : Item Name of Last Specified Level
Column Width        :   30

Column              : Plot Latitude
                      SEQUENCE->Latitude
Display Format      : Coordinate, Negative for Western or Southern Hemisphere
Column Width        :    9    Number of Decimals: 5

Column              : Plot Longitude
                      SEQUENCE->Longitude
Display Format      : Coordinate, Negative for Western or Southern Hemisphere
Column Width        :   10    Number of Decimals: 5

Column              : A-Priori LU Class (NOT PRINTED BELOW)
                      SEQUENCE->View_ID
Display Format      : Item Name of Last Specified Level
Column Width        :   30

Column              : Start Operation Period
                      OPER->SDat
Display Format      : Text Format (dd/mm/yyyy)
Column Width        :   10

Column              : End Operation Period
                      OPER->EDat
Display Format      : Text Format (dd/mm/yyyy)
Column Width        :   10

Column              : Material Input (PRINTED BELOW IN 5th COLUMN)
                      INPUT->SInp_ID
Display Format      : Item Names of all Levels
Column Width        :  100
```

Results of Task-23:

No.	Admin.Area	Latitude	Longitude	aterial n ut			tart	nd
	omas	- .	.	io ides Pesti ides Car ar l	etta le o der			
	omas	- .	.	io ides Pesti ides imet oate	emulsion on .			
	a aman a	- .	.	io ides Pesti ides alat ion	etta le o der			
	un u	- .	.	io ides Pesti ides ogor C				
	C atsa a	- .	.	io ides Pesti ides ogor C				

Note: The approval file is put on OPERATIONS because asked was for information on only those operations during which biocides were used.