CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

An ArcView® tool for computing accessibility times

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July 1999

CGIAR Consultative Group on International Agricultural Research

This work relates to the PE-3 project Methodologies for integrating data across geographic scales in a data rich environment Examples from Honduras PIs Ron Knapp and Gregoire Leclerc

Activity 2 5 Compose a comprehensive transport map showing all communications for sample sites, including time to market

Summary

Accessibility has social, economic and environmental dimensions and can be seen both as a pressure on existing natural resources and as a key factor in the development process

This report shows how we have created an accessibility extension to a common GIS package This extension allows users to create and explore a variety of accessibility indicators using a grid based cost-distance algorithm The users will be able to use their own data but will be guided as to the most appropriate data sources for the cost-distance process

Following the cost-distance calculation the users will be able to analyse not only the travel cost maps but also the allocation of services and least cost paths to services

The extension allows users to explore accessibility to any type of point type target, e g agricultural market, viable ports for export, or seed distribution centres They will also have the flexibility to explore different scenarios such as the season (and its implications on ease of travel) and disaster type events (such as loss of infrastructure due to flooding, earthquakes or landslides)

Introduction

Transportation is a critical function for an economy as it affects the movement of people, goods and services, and development In countries such as Honduras a complex transportation network permeates the countryside with paths for walking, paths for horses and donkeys, single lane seasonal roads that take *chivas* (buses that often take regional and nationall farmers and their produce to market), one and two lane all-weather gravel roads, local surfaced roads, regional and national surfaced roads, and motorways or freeways with dividers separating the carriageways In all there are more than six transport classes Each of these has typical speed of travel associated with it, which can be adjusted to take into account slope the type of vehicle traversing it rainfall over a 2 3 or 7 day period or an adjustment for congestion In the end it is possible to work out how long it takes to get from anywhere on the map to the nearest market town or hospital or school using a particular vehicle class The time taken to reach a desired location can be generally refered to as its accessibility

Accessibility can be defined as the ability for interaction or contact with sites of economic or social opportunity, (Deichmann 1998), however there are a multitude of ways in which this intuitive concept has been expressed in the literature Goodall (1987) defines accessibility as the ease with which a location may be reached from other locations, and Geertman (1995) states that the concept of accessibility can be used in rural development policy as an indicator or rural deprivation and as a variable on location analysis

Over the last ten years there has been a growing awareness that rural accessibility concernsmore than just roads, (Barwell 1996) Reports and surveys carried out in developing regions paint a picture of rural isolation and unproductive use of limited resources, in which the farmer largely inhabits a walking world In his introduction to *Transport and the Village,* Cleaver states that

> *It is clear that the extremely poor state of off the road transport system in Africa acts as a powerful brake on agricultural productivity and growth Improved accessibility will reduce the economic costs of moving goods from local markets and ease the barriers to social facilities This will contribute to economic growth and enhance social well-being*

But before national governments can provide environments conducive to the development of local infrastructure, there is a need for a model which can incoroporate the local envirnomental factors which define rural *inaccessibility* Also any model should be flexible enough not only to quantify time and cost of travel but also infrastructure improvement (or degredation) scenarios to be created and evaluated

Clearly there are different levels of infrastructure availability, transport availability, and many different environmental effects, and economic considerations For example it would be impossible to apply the same model of rural accessibility to Sub Saharan West Africa and Central American Hillsides, but any model should be capable of incorporating all of these factors in a way which is not only sensible and geographically sensitive but also educational and explanatory

Background and Justification

Spatial accessibility is determined by geographic location in relation to target locations, and by the transportation facilities that are available to reach those destinations Accessibility is also influenced by social factors such as knowledge and information and by economic factors since the use of transport and communication facilities is usually associated with some monetary cost Although it is difficult to incorporate these economic factors explicitly in formal models, the selective weighting of one market can imply the social and economic dimensions over another

In public planning, an important objective is the equal provision of services for all people and in all parts of a country For example, the population of a country or region should have similar access to public services, independent from their location of residence Poor infrastructure and consequently limited accessibility implies fewer opportunities for improving economic status, health or social standing Ravallion (1996), for example, speaks of a spatial poverty trap that may prevent the poor from breaking out of local level constraints

Operational quantitative measures of accessibility are therefore useful in policy analysis where the focus is on service provision, for example, in the health sector Other areas in which accessibility is important are economic applications, and, in fact, many of the operational measures of accessibility have first been developed for labor market research and retail analysis

Geographical information systems (GIS) lend themselves naturally to the computation of accessibility indicators GIS can represent networks, villages or facilities and provide functions to compute distances and to define relationships among spatial objects Consequently, certain accessibility measures can be computed using commercial packages such ArcView®

However, there is a distinct lack of any step by step, or easy to use models to develop transport maps, accessibility surfaces and the economic catchment areas of towns and markets This is a strange omission from the planners toolbox, when accessibility is considered such a fundamental indicator of economic potential and an undeniable pressure on ecological systems One possible explanation is that accessibility is so poorly defined, may people talk about accessibility and there are many differing opinions as to what it actually is With so many differing definitions prehaps we should not be so suprised that there are few tools and methods available

Methodology

To begin with, it is necessary to clarify some of the terminology that will be used in this model Accessibility is calculated on a *friction surface* A friction surface consists of a regular two dimensional grid where each cell in the grid represents either a transport route such as roads, railway lines, tracks, or navigable rivers, or relatively inaccessible land and water bodies

Different types of transport infrastructure have different characteristics A surfaced road, for example, allows faster travel speed than a dirt road In practice, it is therefore not enough to measure the *distance* of a road connection between two points Instead, a measure of travel *cost* is preferable This cost can be measured in monetary terms or as *travel time* As will be discussed later in this section the cost to travel across different types of land can be easily estimated

Sources (points of interest) such as villages, hospitals, or schools are usually located on the transport network and can therefore be represented in another grid as cells that have a certain characteristic. This characteristic could be the village's population, the hospital's number of doctors or beds, or the number of teachers at a school. If we are simply interested in is the presence or absence of a point of interest, then all points can have the same value.

The underlying theory is outlined in Figure 1, adapted from the Arc Info® and ArcView® 3.0a Help Documents.

Function
COSTDISTANCE - Calculates for each cell the least-accumulative-cost distance over a cost surface to a source cell or a set of source cells

Usage
Output_grid = COSTDISTANCE(markets,friction,backlink,catchment)

Arguments
Markets - A grid that identifies those cells which represent markets, to which a least accumulated cost distance for every cell is calculated

friction - A grid defining the impedance or cost to move through each cell. The value at each cell location represents the cost per unit distance for moving through the cell. Each cell location value is multiplied by the cell resolution (while also compensating for diagonal movement) to obtain the total cost of passing through the cell. You cannot have a negative cost

Backlink - The back link grid contains values from 0 through 8, which defines the direction along the least accumulative cost path to reach a market. If the path is to pass into the right neighbor, the cell will be assigned the value 1', 2' for the lower right diagonal cell and continuing clockwise. The value 0' is reserved for source cells

catchment - the name of the output cost allocation grid. The cost allocation grid identifies for each cell, which market would require the least accumulative cost to reach, i.e. the catchment area of each market

Figure 1 The COSTDISTANCE function, as stated in the ArcInfo® Help-Documents

From the cell perspective, the objective of the cost functions is for each cell location in the analysis window, to determine the least costly path to reach a source. Each cell will need to determine the least accumulative cost path to a source, the source that allows for the least cost path and the least cost path itself. Cost distance functions apply distance in cost units, not in geographic units.

The cost grid can be a single grid which is generally the result from the composite of multiple grids The units that are assigned to the cost grid can be any type of cost desired The dollar cost, time, energy expended, or a unitless system which derives its meaning relative to the cost assigned to other cells
The cost values assigned to each cell are per-unit distance measures for the cell That is, if the cell size is expressed in meters, the cost assigned to the cell is the cost necessary to travel one meter within the cell If the resolution is 50 meters, the total cost to travel either horizontally or vertically through the cell would be the cost assigned to the cell times the resolution

$$total\ cost = cost \times 50$$

To travel diagonally through the cell, the total cost would be 1 414 times the cost of the cell times the cell resolution

$$total\ diagonal\ cost = 1\ 414 \times cost \times 50$$

A cost path consists of sequentially connected links that provide the route for each cell location to reach a source A cost path distance (or cost distance) from any cell to a source is the accumulative cost of all links along the path for the cell to reach the source cells There are many possible paths to reach each source cell and there are many paths to reach the many source cells There is on one least cost path The least cost path distance from a cell to a source cell is the smallest (or least) cost distance among all cost path distances from the cell to the source cells Figure 2 graphically describes the input and outputs of the model

All that is needed to create an accessibility map, and the two optional outputs are

- A point coverage of markets or points of interest
- A grid where each cells value represents the cost of traversing that particular cell

So far the problem seems trivial, them costdistance function is simple in concept and the data requirements are minimal In fact these are two of the reasons for selecting this type of analysis
However there are several points to note

1 You need geographic data that is in an Equal Area Projection, to preserve areal qualities
2 You are unlikely to have such a friction surface ready to hand
3 The friction surface is totally dependent on the user and purpose, and will possibly change for each differing scenarios, i e foot based or vehicle based travel
4 The huge amount of preprocessing required to create the two equal area projected grids

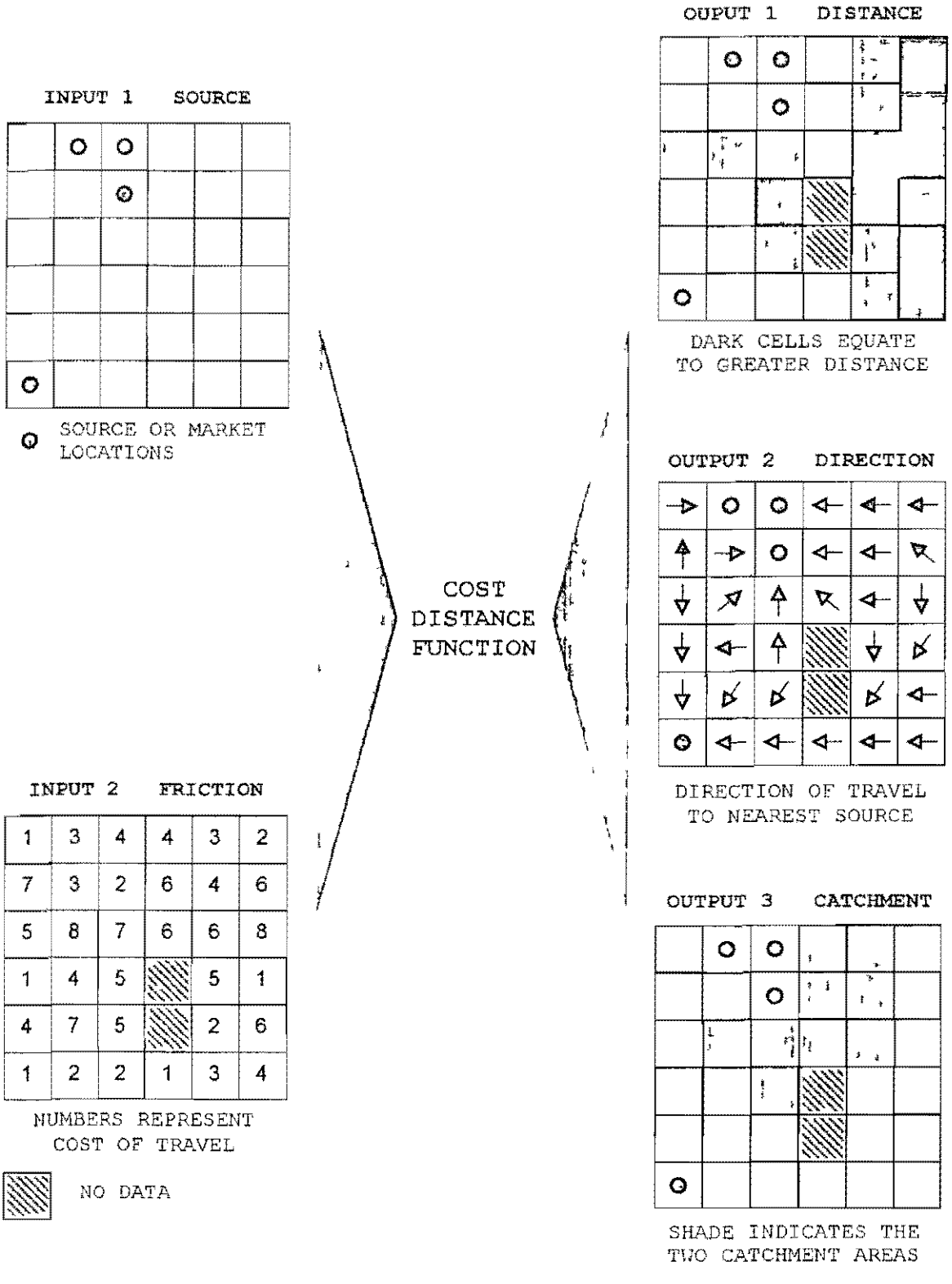


Figure 2 Inputs and Outputs of the COSTDISTANCE function in Arcview® 3.0

Interface design

The GIS ArcView® 3, was chosen as the working environment for this activity Previous work in CIAT had used ArcInfo® and its associated macro language AML® to produce accessibility surfaces, but by version 3, ArcView® had become mature enough to allow development of the interface using its Avenue® scripting language

The ArcView® extension and accompanying user interface address all of these issues, with a simple definition or concept of accessibility

What is the cost of getting from any location to the nearest point of interest?

This is a fairly general question, where *cost* can be

- Real cost (cost of transport)
- Perceived cost (cost of transport with other factors)
- Time (simply time taken to get there)
- Perceived time (travel time plus factors introduced by the nature of the transport)
- Any other concept of cost that the user is able to express

A *point of interest* can be

- A market where goods can be bought or sold (large towns)
- A service industry (so called enterprise zones)
- An attraction (tourist attractions)
- A transport exchange node (ie between road and rail, rail and sea)

The *location* can be anywhere in the area of study

This model uses purely geographic data to create accessibility models There is no explicit accounting for social or economic factors, although it is very easy to include such factors in the model The following section is a step by step introduction to the accessibility interface The appendix contains step by step snapshots of the interface in action

Step by step guide through the interface

1 Set your work directory

The process of creating an accessibility surface is not only computer memory intensive, but can also use a lot of disk space with temporary files Make sure you set a work directory on a disk with plenty of space

2 Create a view

Open a new view within ArcView where the input datasets will be visualised

3 Add friction coverages to the view

Here you will start to add coverages and grids that will eventually combine to make a friction surface

4 Add a Road map

There are two essential coverages you will need to build a friction surface The first one is a land transport network, usually road a road map but it could also be rail or a combination or both

5 Add a Boundary map

A boundary coverage is required to act as a barrier to the Costdistance function This prevents the algorithm calculating costs in area outside the are of interest

6 Option to add a river, land-cover, urban-area, slope or barrier map

Additionally, if it is relevant to your study you can include any and all of these coverages and incorporate them into your friction surface

7 Add point of interest coverage

When the friction components are complete a point coverage needs to be included to define markets and locations of interest

8 Sub select points, (select manually, select by database query, or select by spatial query)

Very often this point coverage is not ideal and may contain too many points or prehaps too few The interface includes the option to select only the points which are relevant to your study, and to manually create others Points can be selected by any combination of these three common ArcView select tools, *SQL Query, Spatial selection and Table querty*

9 Reclass grid coverages into useful classes

The grid components of the friction surface, may contain hundred of values This stage involves the classification of the grids into useful ranges and is a purely techical stage reflecting the limitations of the software The reclassification step is strongly recommended, as ArcView will convert the grids to shapefiles, and the fewer the classes contained within each grid, the smaller the shapefile will be

10 Convert grids to shapefiles

As stated in the previous stage, all grids must to be converted to shapefiles, as ArcView cannot project grids

11 Clip all themes to a desired area of interest

Here you have the option to clip all the coverages simultaneously to an area of interest It is quite possible that each map is from a different source and hence will cover a different extent Using the data view, you can define an area of interest and the coverages will be clipped accordingly

12 Project data to Lambert Azimuthal Equal Area Projection

As mentioned earlier, the Costdistance function will only give sensible results if all the data exists in an Equal Area projection This function will simultaneously reproject all your coverages, and place them in a new view As mentioned in Appendix B, your dataset must be less than one hemisphere in extent, otherwise the projection will not work If you want to create an accessibility surface that is greater than one hemisphere, then you are evidently into accessibility in far bigger way than we are!

13 Convert shapefiles to grids

Again this is a purely technical stage where we convert the shapefiles back to grids in order to build the friction surface

14 Reclass grids to reflect their friction components

This is possible the most important (certainly the most subjective) part of the model where we need to decide how to define the friction surface If the friction cost is time, we will need to estimate the time required to traverse 1 cell of each class of road that exists in the road coverage

For example a 2km resolution road coverage might have 3 classes of road,

Class	Description
1	Highway
2	Road
3	Track

We estimate the speed by truck,assuming we a e carrying carrying goods to market, to be

Class	*Description*	*Speed*
1	Highway	120 km/hr
2	Road	60 km/hr
3	Track	30 km/hr

On a 2km resolution grid we have to reclassify this by converting km/hr into metres per minute (1 km/hr equals 16 667 m/min) The new classes represent the time taken (in minutes) to cross 2km of each road type at the given speed

Old class	*Description*	*Speed*	*New class*
1	Highway	120 km/hr	1
2	Road	60 km/hr	2
3	Track	30 km/hr	4

This estimation has to be repeated for all other optional coverage to For example are rivers barriers (high cost per unit cell) or potential routes (low cost per unit cell) If there is a slope grid, then this acts as a multiplying factor over all other grids For example getle slopes hardly effect speed of travel, but steep slopes will heavily impede travel over any surface For example

Old class	*Description*	*New class*
1	Slopes of 0 – 5 degrees	1
2	Slopes of 5 – 10 degrees	3
3	Slopes greater than 10 degrees	5

These reclassified grids will be placed in a new view

15 Combine grids to create friction surface

This step automatically combines the friction components into one grid, with the following logic

$$Friction = Slope \times [Precidence(Barrier, Road, River\ Urban, LandCover)]$$

Where, on a cell by cell basis Barriers have precedence over Roads, Roads have precedence over Rivers, etc etc

16 Run cost distance function, with two optional outputs

Here we can select the optional outputs of

- Direction to nearest point of interest
- Allocation zones for each area of interest

17 Reproject outputs back to original format

When the CostDistance function is complete, the outputs will be projected back into the original projection (this step also includes the hidden functions of making all the grids integer grids, converting them the shapefiles before the projection, and reconverting them to grids after projection[1])

Finally we have created an accessibility surface containing information on

- Time/distance to market
- Direction of travel to reach nearest market
- The catchment area (the economic equivalent of a watershed) or each market

It is a relatively simple task to calibrate the time to market ouput by questioning local farmers for small sites and by general concensus when determining travel times across countries or continents The model has been run on sites as small as the three Honduran test sites (10km by 10km) up to Latin America from Mexico to Argentina (excluding the Caribbean), and calibration has proved easy, and in most cases the original estimates input into the model proved to be accurate enough without rerunning the model So it was seen that the model was not only simple in it's concept but also applicable across a huge range of scales, although there are issues of border crossings and international trade and tax considerations

Examples

Travel time and communication links for sample sites

Please see the accompanying poster presentation Mapping Accessibility

Mitch before and after, and applications in resource managment

Please see the accompanying poster presentation 'Mapping the effects of natural diasters

Accessibility to services within Honduras

From the examples on the following pages we see that over 80% (over one million) of the rural child population is more than one hour away from the nearest school, and over 50% (700,000) are more than two hours away For health care the figures for the entire rural population are one hour, 90% (two million) and two hours, 70% (one and a half million)[1]

Accessibility to the 44 hospitals in Honduras (recorded in the 1988 population census)

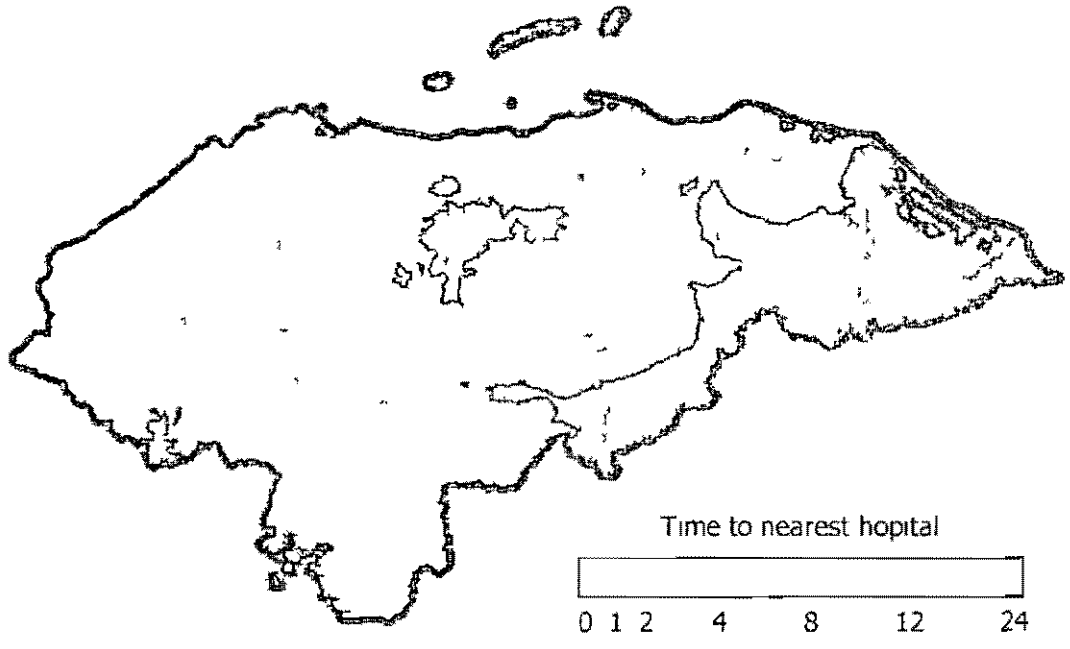


Figure 3 Accessibility Time to nearest hospital or health centre
Figure 5 Accessibility Time to nearest hospital or health centre, and population centres ***Next page***

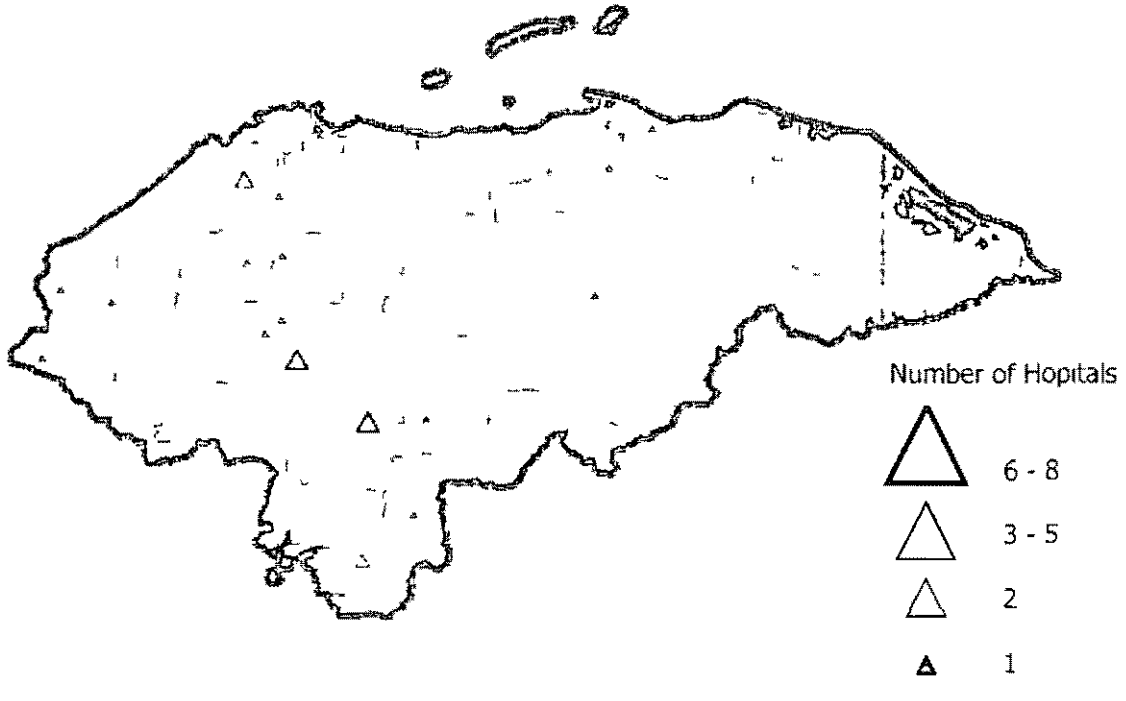
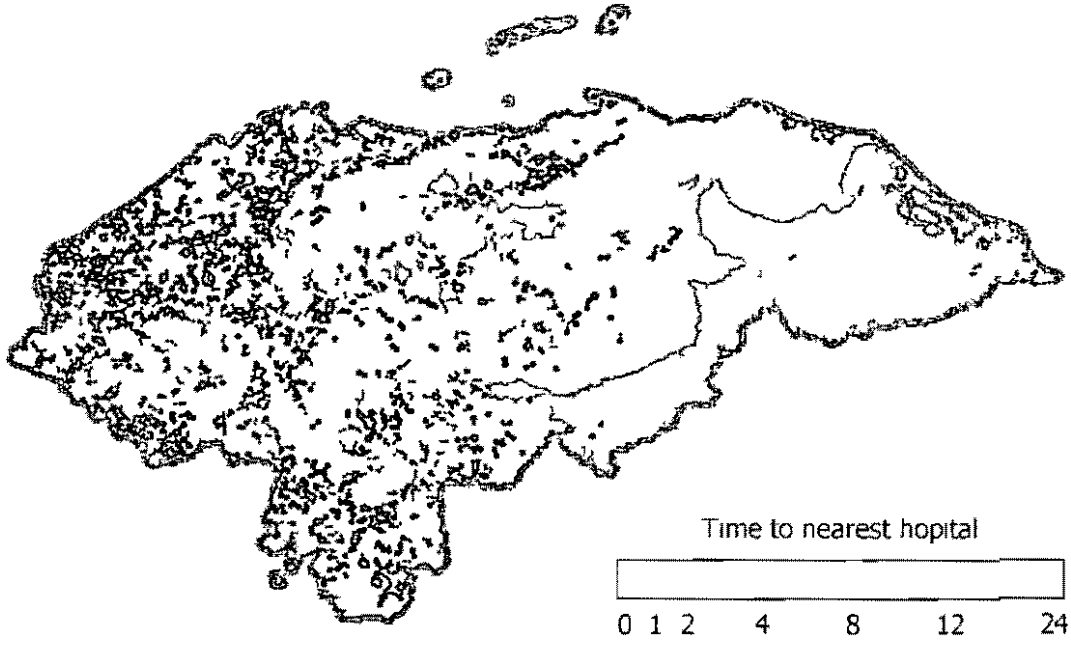
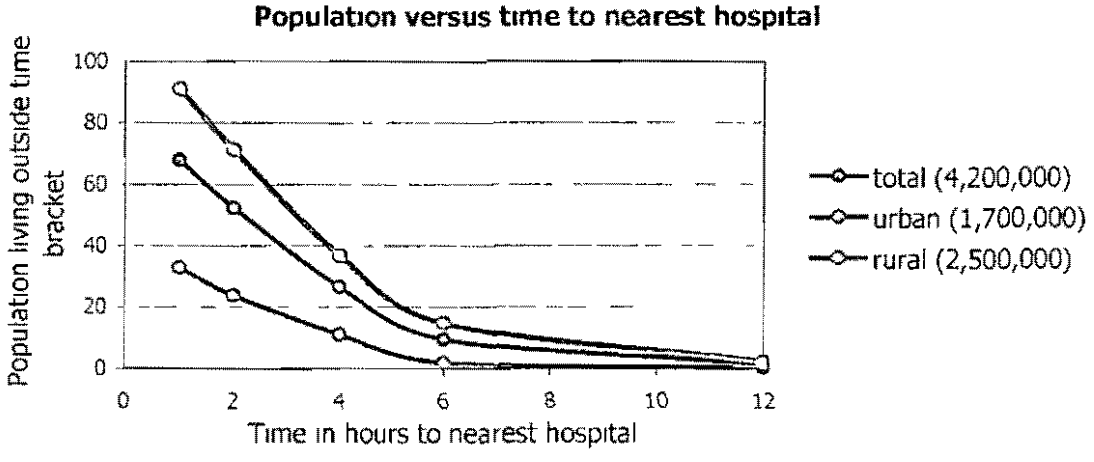
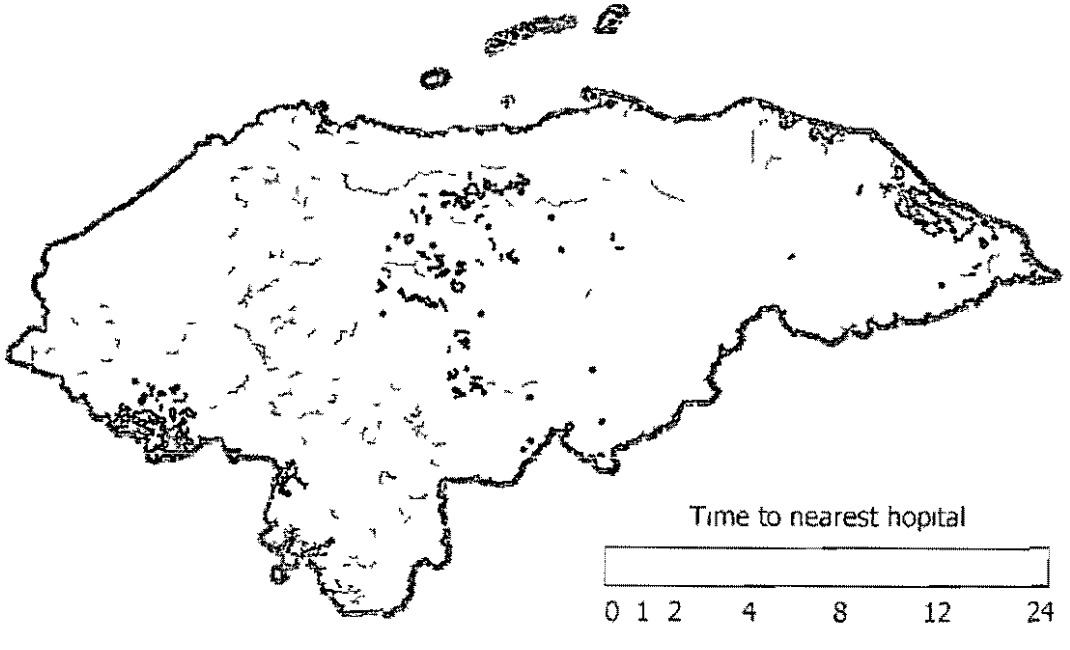


Figure 4 Accessibility Distribution of hopitals in Honduras, and their catchment areas
Figure 6 Accessibility Population within time bands to nearest hospital ***Next page***


Time to nearest hopital
0 1 2 4 8 12 24


Population versus time to nearest hospital
Population living outside time bracket
100
80
60
40
20
0
0 2 4 6 8 10 12
Time in hours to nearest hospital
total (4,200,000)
urban (1,700,000)
rural (2,500,000)


Time to nearest hopital
0 1 2 4 8 12 24

Accessibility to the 115 schools on Honduras (recorded in the 1988 poulation census)

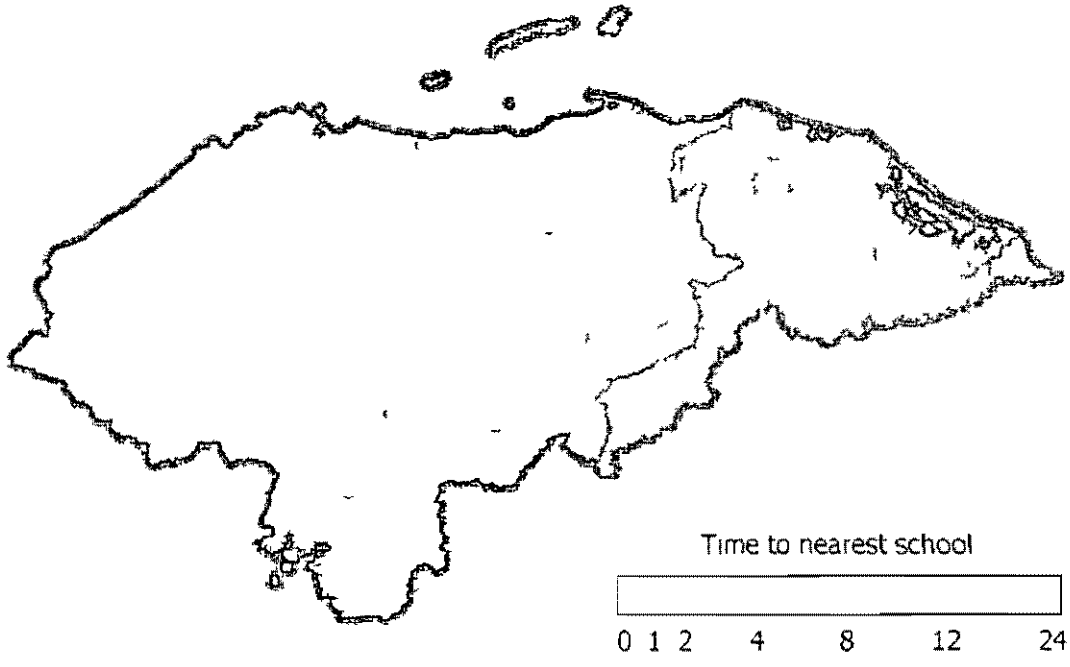


Figure 7 Accessibility Time to nearest school or university
Figure 9 Accessibility Time to nearest school or university, and population centres ***Next page***

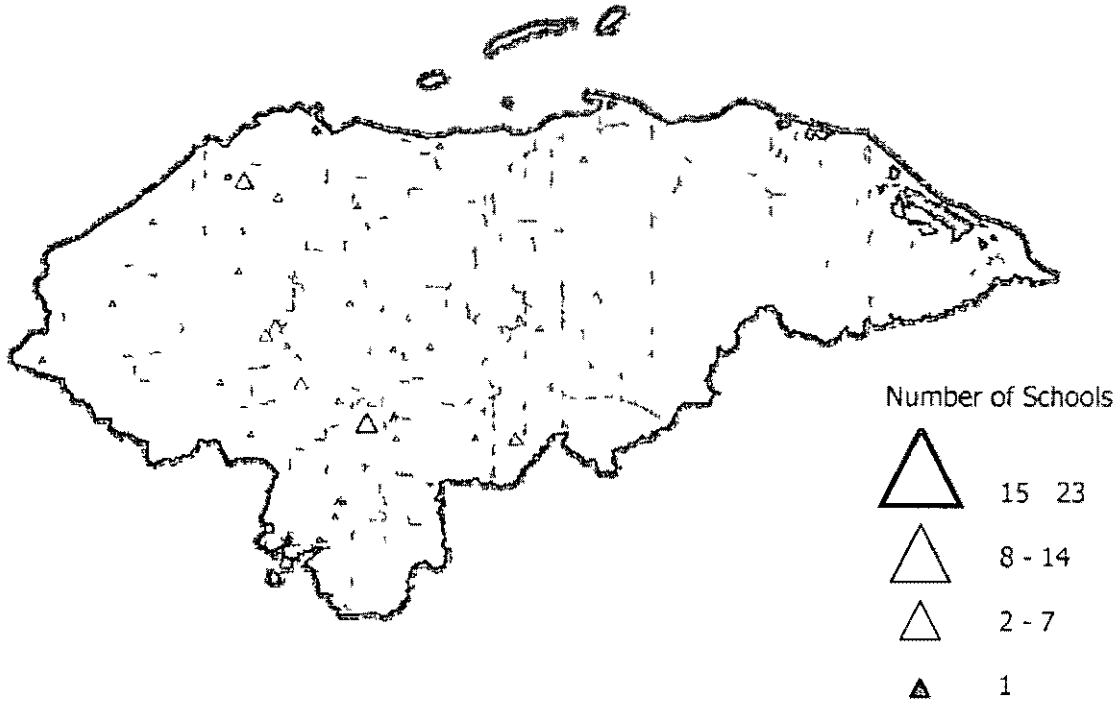
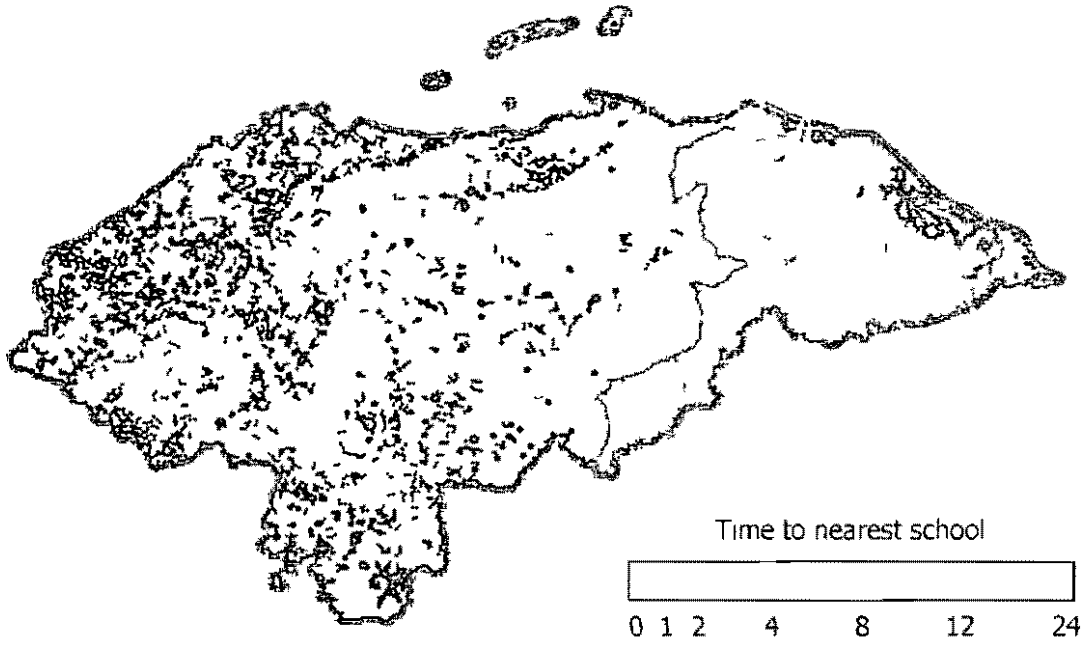
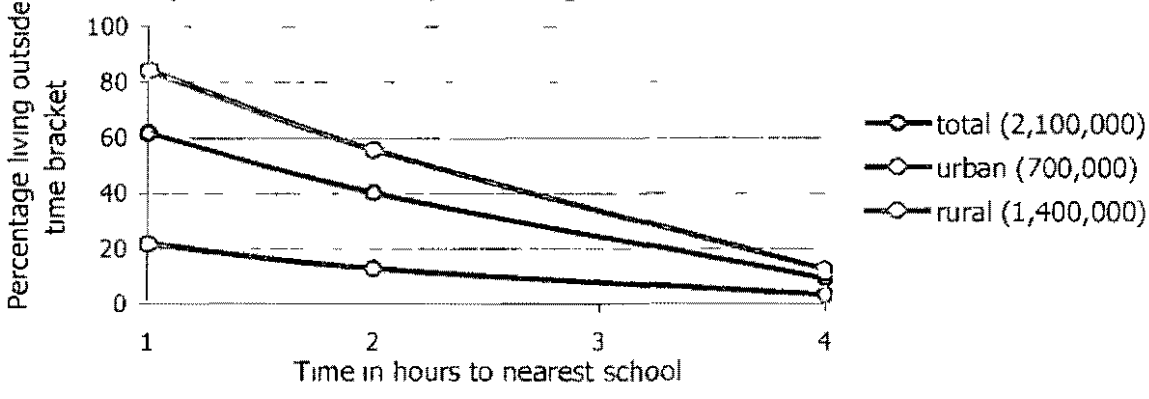
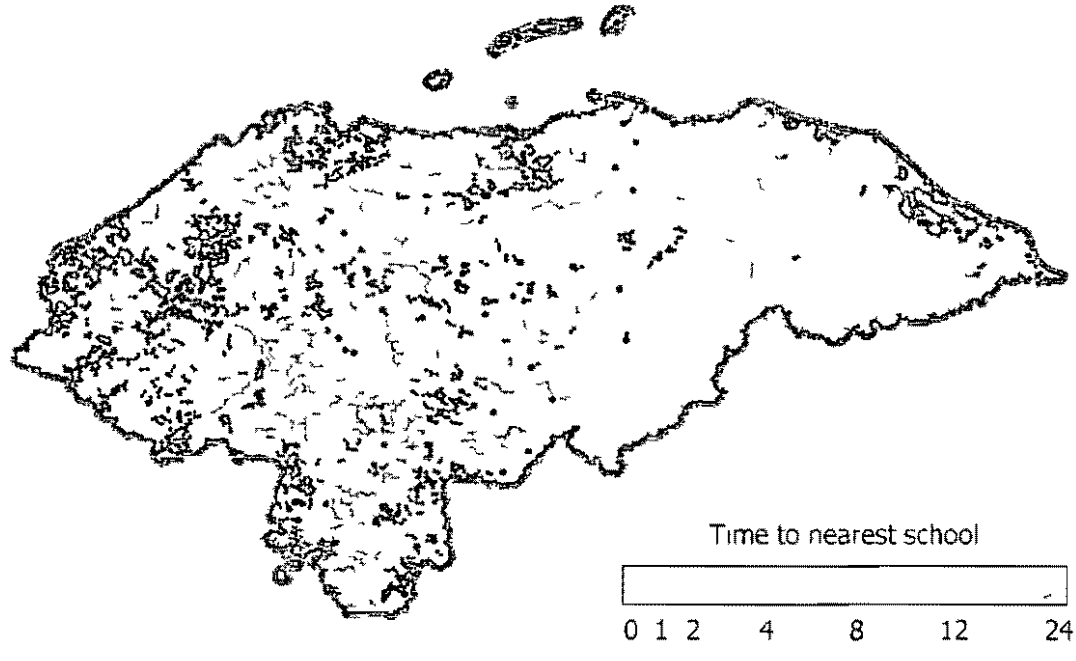


Figure 8 Accessibility Distribution of schools in Honduras, and their catchment areas
Figure 10 Accessibility Population under 16 within time bands to nearest school ***Next page***



Population under 16 years of age versus time to nearest school





Discussion & Conclusions

- **Assessment of population pressure on limited resources**

The examples of health-care and educational catchment areas paint a stark picture of the pressure upon Honduran social and educational resources Both are seen as strong indicators of general welfare of the population The ability to quickly assess and map these phenomena is unquestionable Admittedly, the reliance here on census records over 10 years old is suspect, but the reasoning is valid, simply update the data and repeat the process This concept leads to other possibilities in the realm of resource allocation

- **Resource Allocation Potential**

The location allocation and management of facilities such as schools, hopitals and industies is globally a multi billion dollar industry This model offers a simple method for assessing a range of socio economic impacts of one site location over another

- **Potential for visualisation and psuedoquantitative assessment of policies**

As highlighted in the simplistic scenarios pre and post mitch, there is great potential for the mapping of the effects of natural disaters and policy decisions, before they occur It is only with hindsight after Hurricane Mitch that this potential of the model was realised, but the results generted from this analysis have been put to good use and were included in the CIAT CD-ROM Atlas of Honduras for distribution to aid agencies, governments and other interested parties in the wake of this national disater

Further more it is possible to incorporate farming practises into the analysis to estimate impact of one infrastucture devleopment policy over another based on the change on accessibility to local farmers and their produce Such policies could influence the choice of one market crop over another or the movement from one market to another

- **Economic catchment areas and areas of economic influence**

It is worth paying attention to one of the optional outputs of of the model, but potentially one of the most interestng and powerful coverages it is possible to generate within a GIS environment

The delienation of the catchment potential of each market is of unquestionable value to decision makers and planners In the previous example it was shown how the impact of bridge destruction could force a farmer to move to a new unknown market, and how the option of bridge reconstruction (under differing policies) could be visualised and impact of the construction policies assessed Considering the impact that GIS watershed delienation has had on hydrology, it is possible to see a very bright future indeed for economic cathcment areas since they have the added flexibility to be generated on demand for differing scenarios, different scales Indeed they promise to be a partial solution to the Modifiable Areal Unit Problem (discussed in part 1 of this report) as they allow the user to predefine areas based on economic and physcial criteria and to then aggregate data accordingly using user-defned units more suitable to the

purpose than other pre-concieved administrative boudaries Part 2 of this report contains an example of using hierarchical market definitions to aggregate census data

- **User friendly interface development**

Producing the interface required about 6 months of work, from conception, design, construction, testing and finally documenation Accessibility is being used more and more frequently as an input to other models in CIAT that the time and effort spent constructing the interface was deemed worthwhile

Impact assessment

Through ESRI s web site http //www esri com it is possible to distribute the interface to a wider audience and to gauge the impact of the work, from the number of times the interface is downloaded, and the feedback which is received

We also plan to make the interface (complete with documentation) available via CIAT s web site http //www ciat cgiar org , again requesting information from the visitors who wish to download

Another aspect of this work, is the learning experience gained from building an interface such as this From meetings last year with other CSI (Consortium for Spatial Information) of which CIAT is the co-ordinating member, the interface will be made available to all consortium members and a personal report from the two developers will be included, describing the difficulties encountered and obstacles overcome on the way to creating the final product It is hoped that such experinces can be shared and learned from by other consortium members, leading to improved understanding, improved co-operation and sharing of ideas and products in the future

References

Archondo-Callao, R and Faiz, A , (1994) *Estimating vehicle operating costs* World Bank technical paper No 234 pp 82

Barwell, I , (1996) *Transport and the village Findings from Africa-level travel and transport surveys and related studies* World Bank Discussion Paper No 344 pp 66

CIAT , (1998b) *Project PE-4 Land use studies reconciling the dynamics of agriculture with the environment Annual Report, 1998* CIAT, Cali, Colombia 146 pp

Chesher, A and Harrison, R , (1987) *Vehicle Operating Costs Evidence from developing countries* The Highway design and maintenance standards series World Bank Publication pp 374

Deichmann, U , (1997) *Accessibility indicators in GIS* Department for Economic and Social Information and Policy Analysis United Nations Statistics Division pp 24

Eade, J , (1997) The accessibility surface Electronic Mail from jeremy@epac norway ibm com, to afarrow@gis ciat cgiar org, (Accessed Feb 21, 1997) CIAT, Cali, Colombia

Knapp, E B , Nelson, A and Leclerc, G , (1998) *Methodologies for integrating data across geographic scales in a data rich environment Examples from Honduras* Project report available from PE 3 pp 19

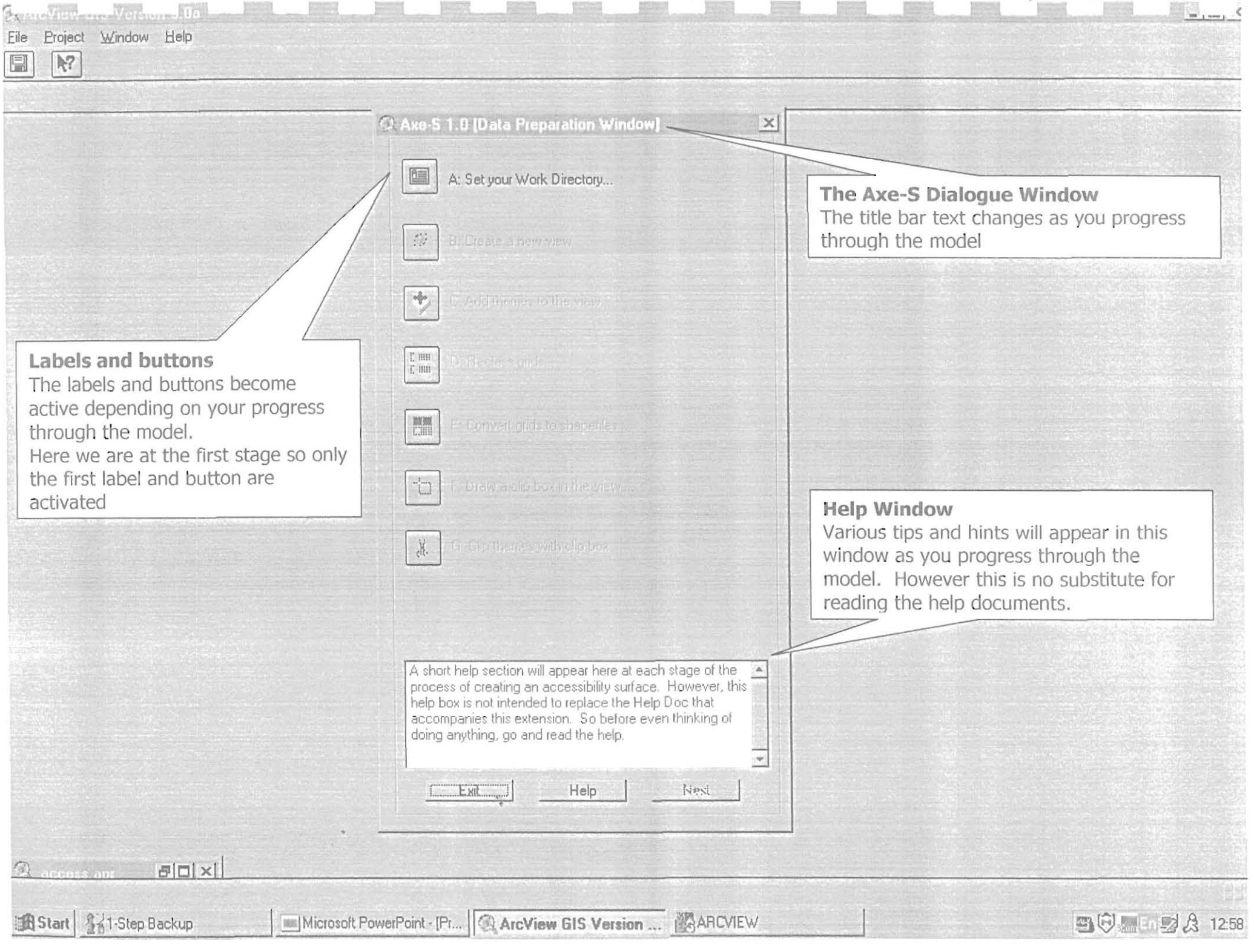
Leclerc, G , Knapp, R , Nelson, A and Hyman, G , (1998) *A brief description of the potential of Geographic Information Systems as a tool for decision making in the mitigation of the effects of Hurricane Mitch* CIAT internal concept note CIAT, Cali, Colombia pp4

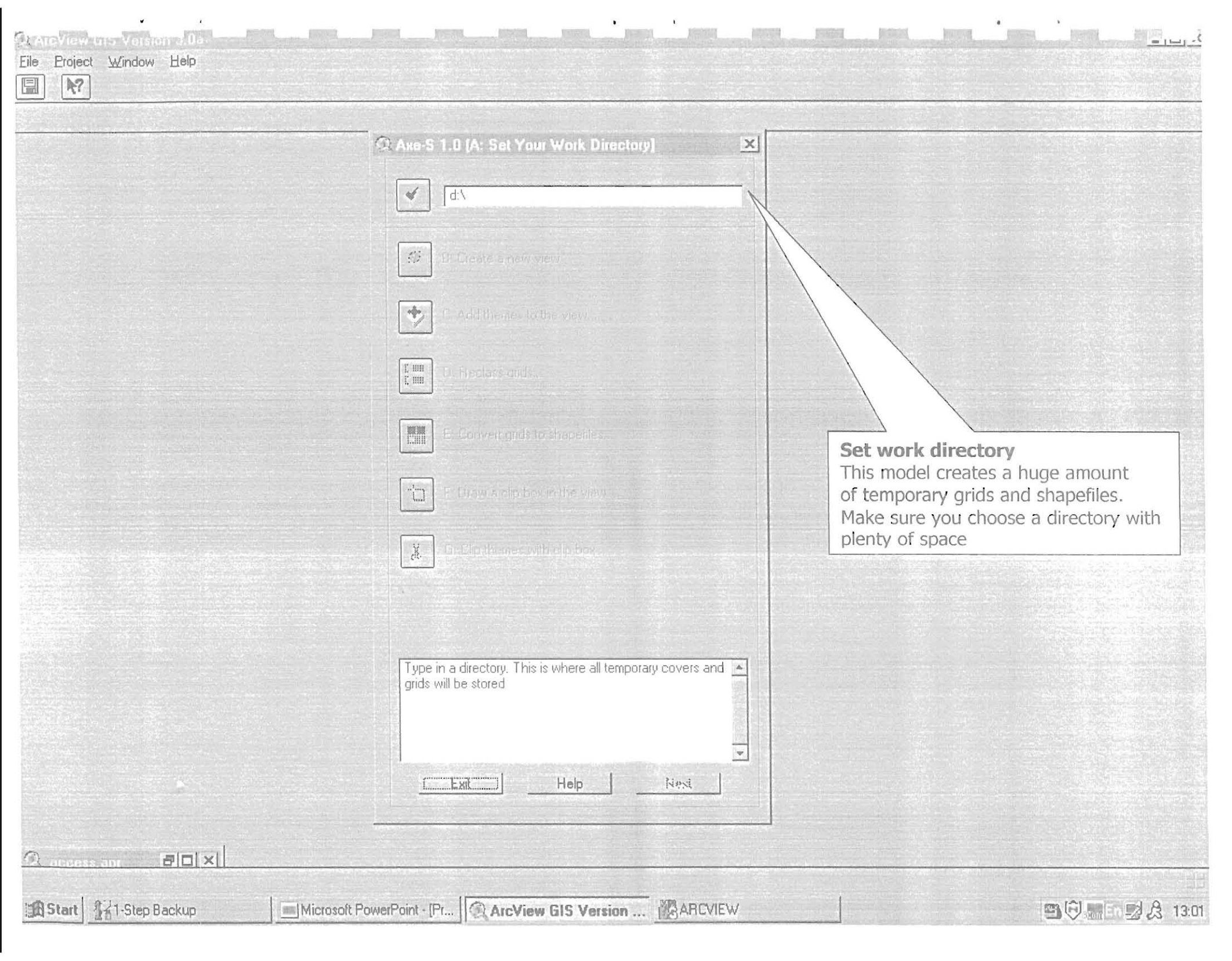
Winograd, M , Aguilar, M and Farrow, A , (1998) *Propuesta de Indicadores por Componentes y Problema para Centro America,* Proyecto CIAT-Banco Mundial- Programa de Naciones Unidas para el Medio Ambiente (PNUMA), Documento de Trabajo CIAT, Cali, Colombia

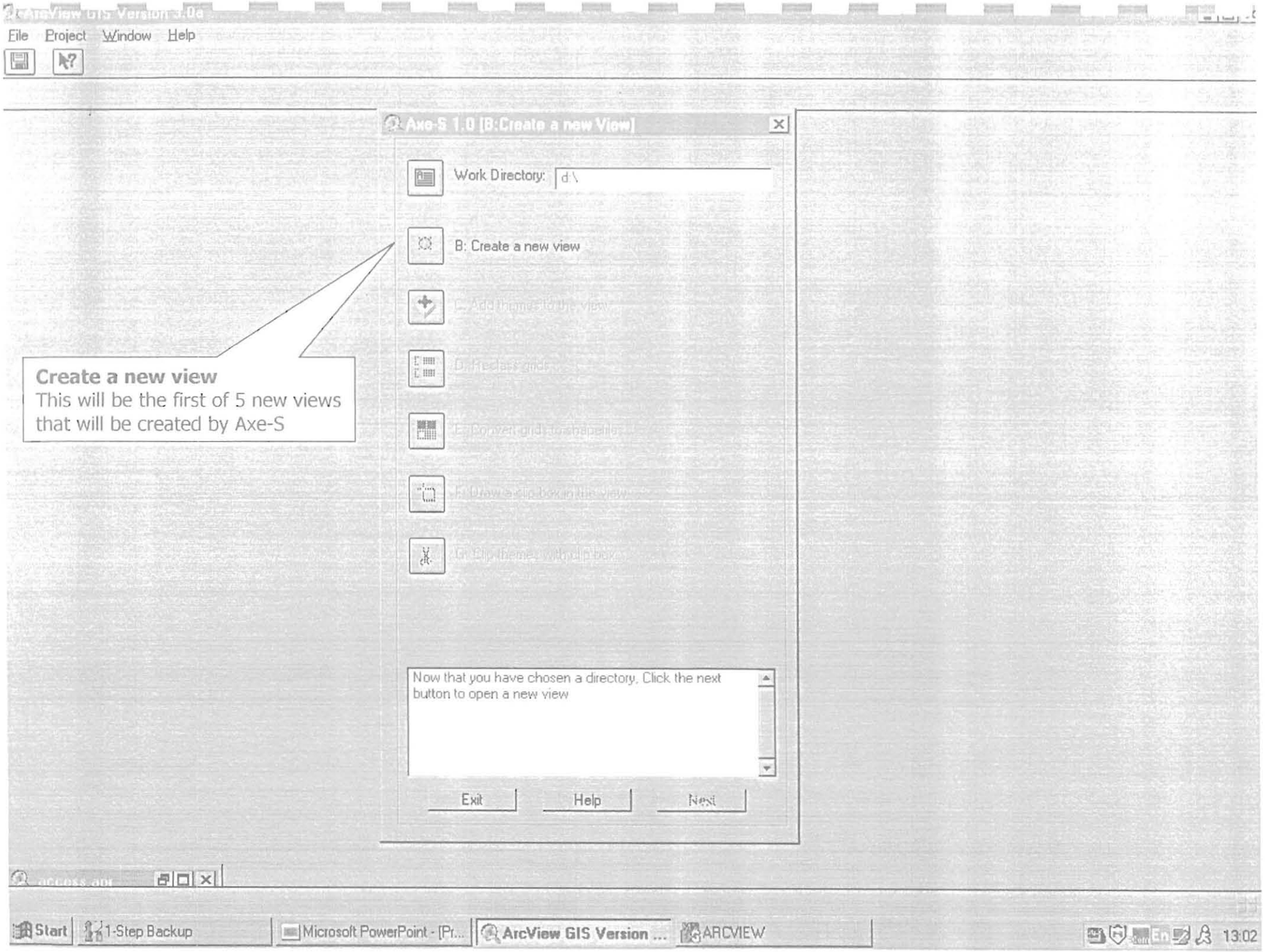
Winograd, M , Farrow, A , and Eade, J (1997) *Environmental and sustainability indicators outlook for Latin America and the Caribbean* CD-ROM with manual UNEP-CIAT, Cali, Colombia pp 27

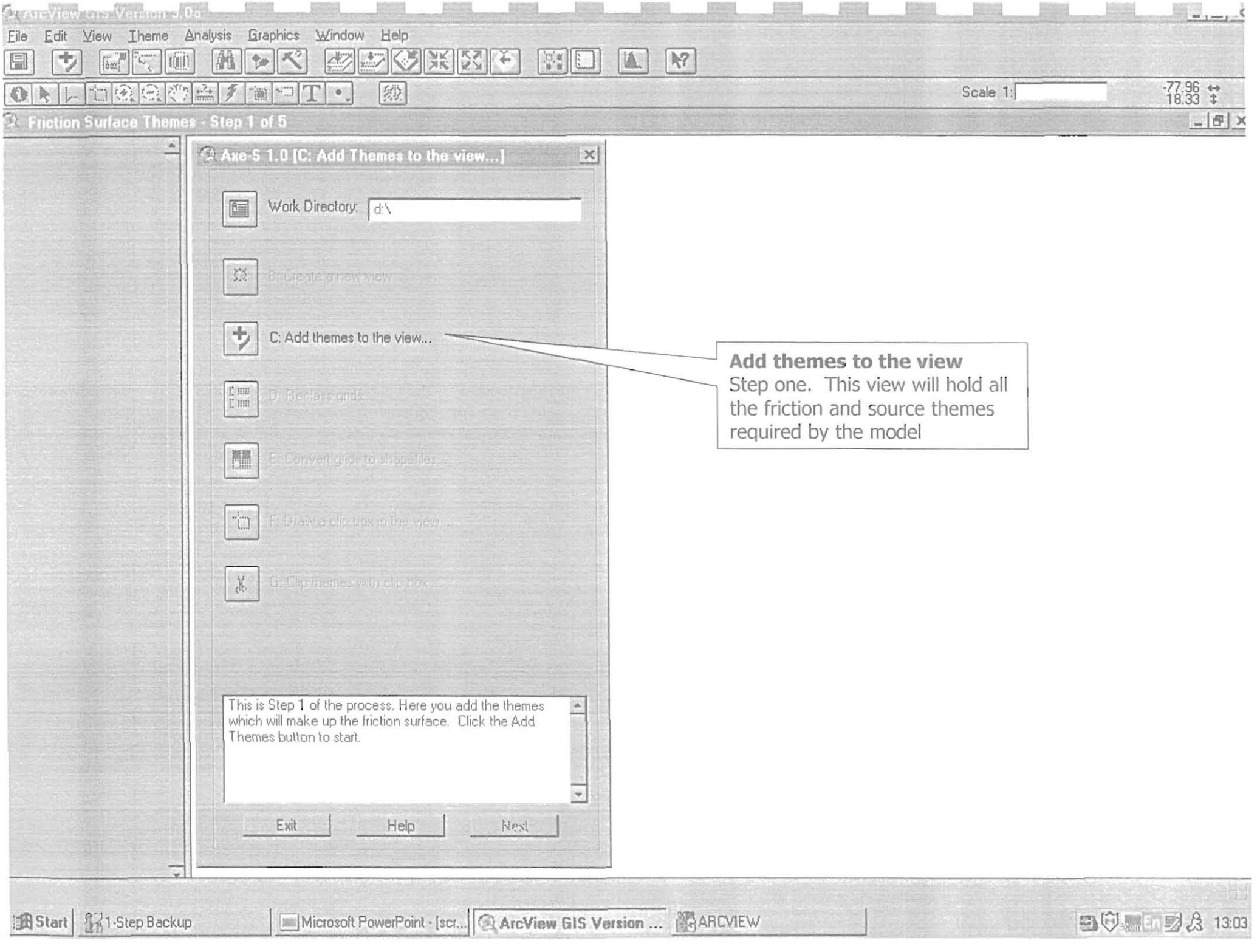
Winograd, M , Farrow, A and Eade J (1998) *Atlas de indicadores ambientales y de sustentabilidad para America Latina y el Caribe ATLAS CD* CD-ROM, version 1, CIAT/Programa de Naciones Unidas para el Medio Ambiente (PNUMA), Cali, Colombia

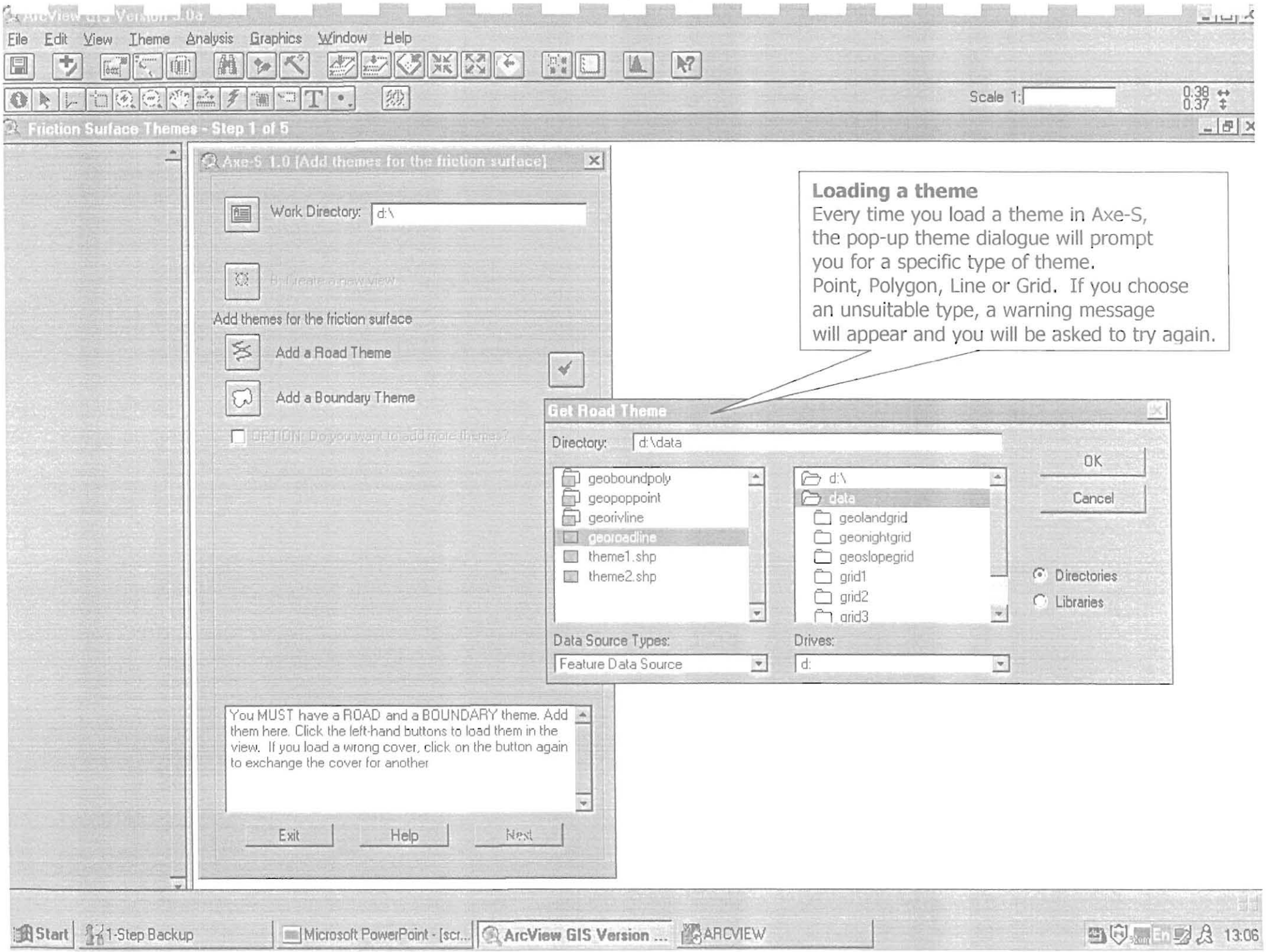
Winograd, M , Fernandez, N and Farrow, A , (1998) *Herramientas para la toma de decisiones en AmericaLatina y el Caribe indicadores ambientales y sistemas de informacion geograficos/ Tools for Making decisions in atin America and the Caribbean environmental indicators and Geographical Information Systems* CIAT and the United Nations Programa de Naciones Unidas para el Medio Ambiente (PNUMA), Cali, Colombia

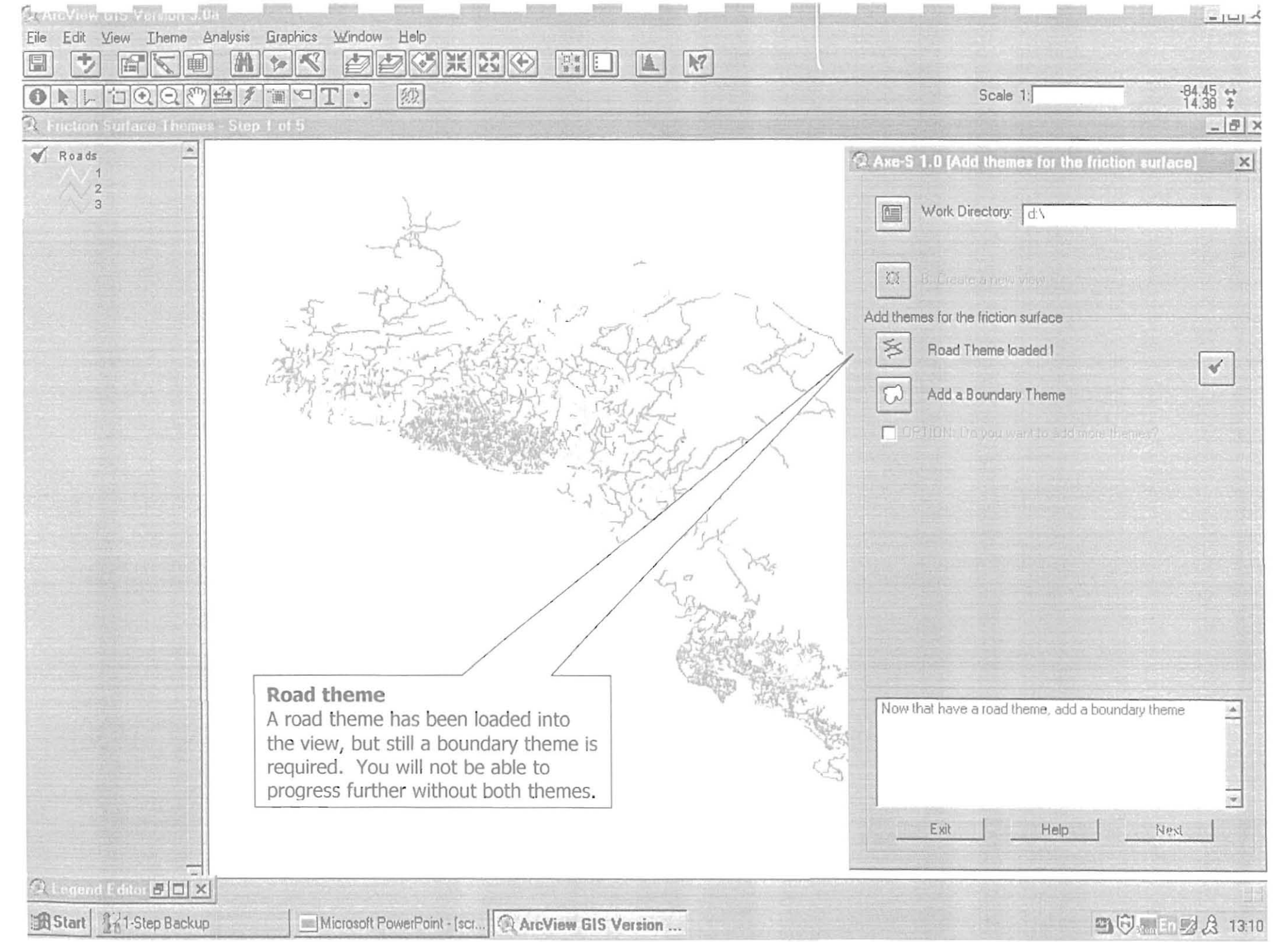

File Project Window Help
Axe-S 1.0 [Data Preparation Window]
A: Set your Work Directory...
A short help section will appear here at each stage of the process of creating an accessibility surface. However, this help box is not intended to replace the Help Doc that accompanies this extension. So before even thinking of doing anything, go and read the help.
Exit
Help
Next
Labels and buttons
The labels and buttons become active depending on your progress through the model.
Here we are at the first stage so only the first label and button are activated
The Axe-S Dialogue Window
The title bar text changes as you progress through the model
Help Window
Various tips and hints will appear in this window as you progress through the model. However this is no substitute for reading the help documents.
Start
1-Step Backup
Microsoft PowerPoint - [Pr...
ArcView GIS Version ...
ARCVIEW
12:58

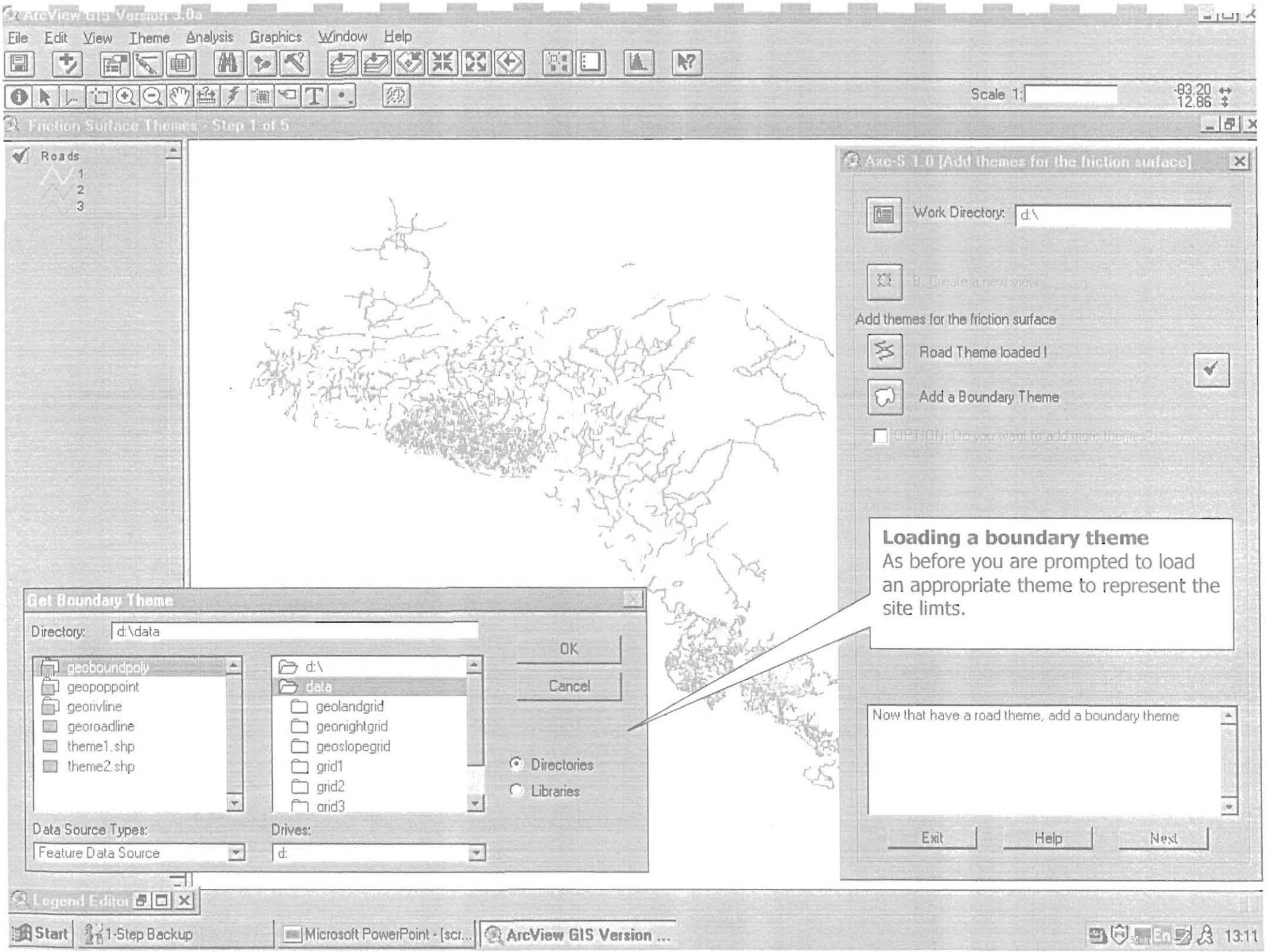

File Project Window Help
Axe-S 1.0 (A: Set Your Work Directory)
d:\
Type in a directory. This is where all temporary covers and grids will be stored
Exit
Help
Next
Set work directory
This model creates a huge amount of temporary grids and shapefiles. Make sure you choose a directory with plenty of space
Start
1-Step Backup
Microsoft PowerPoint - [Pr...
ArcView GIS Version ...
ARCVIEW
13:01

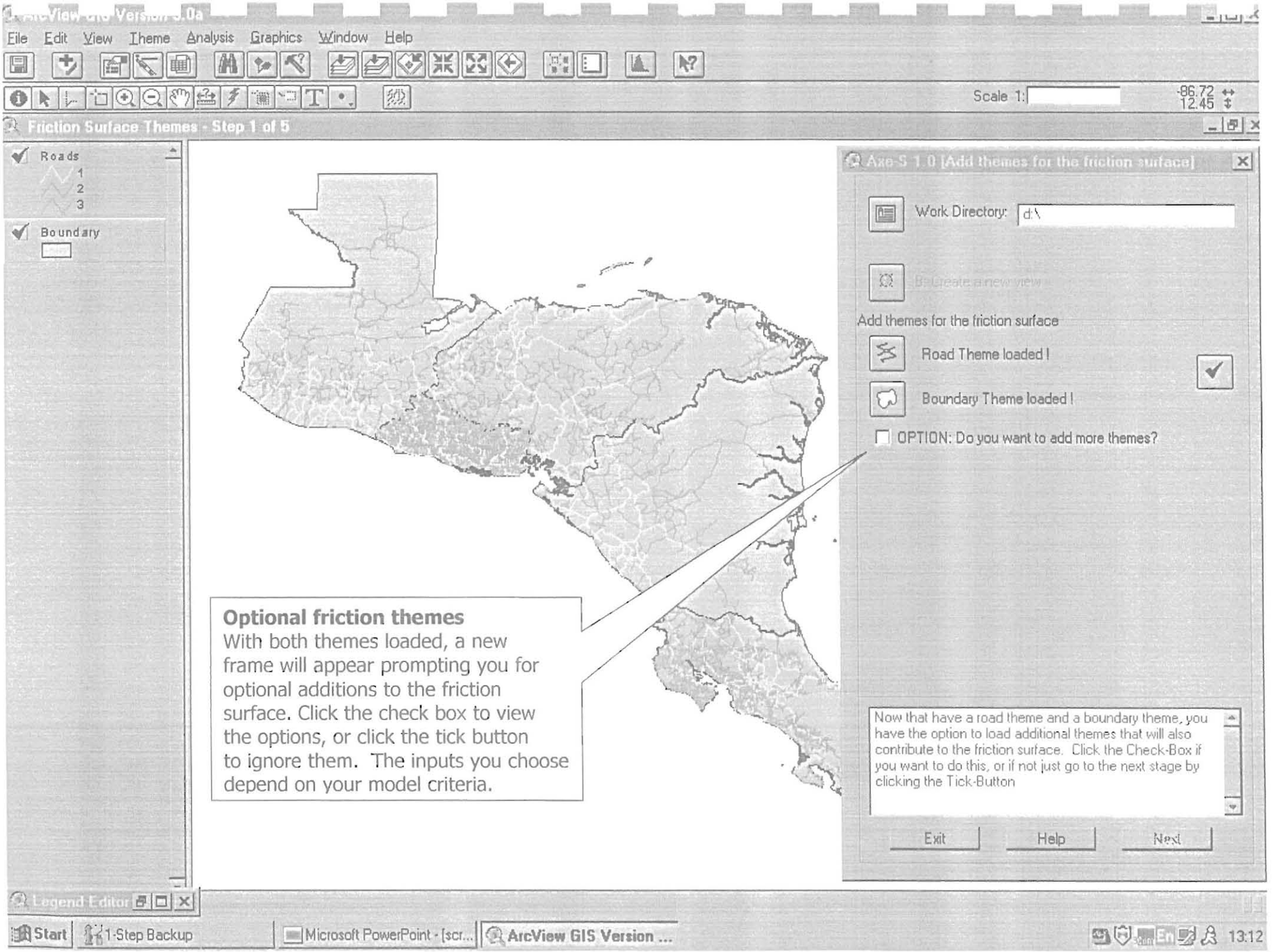

ArcView GIS Version 3.0a
File Project Window Help
Axe-S 1.0 [B:Create a new View]
Work Directory:
d:\
B: Create a new view
Create a new view
This will be the first of 5 new views that will be created by Axe-S
Now that you have chosen a directory, Click the next button to open a new view
Exit
Help
Next
Start
1-Step Backup
Microsoft PowerPoint - [Pr...
ArcView GIS Version ...
ARCVIEW
13:02

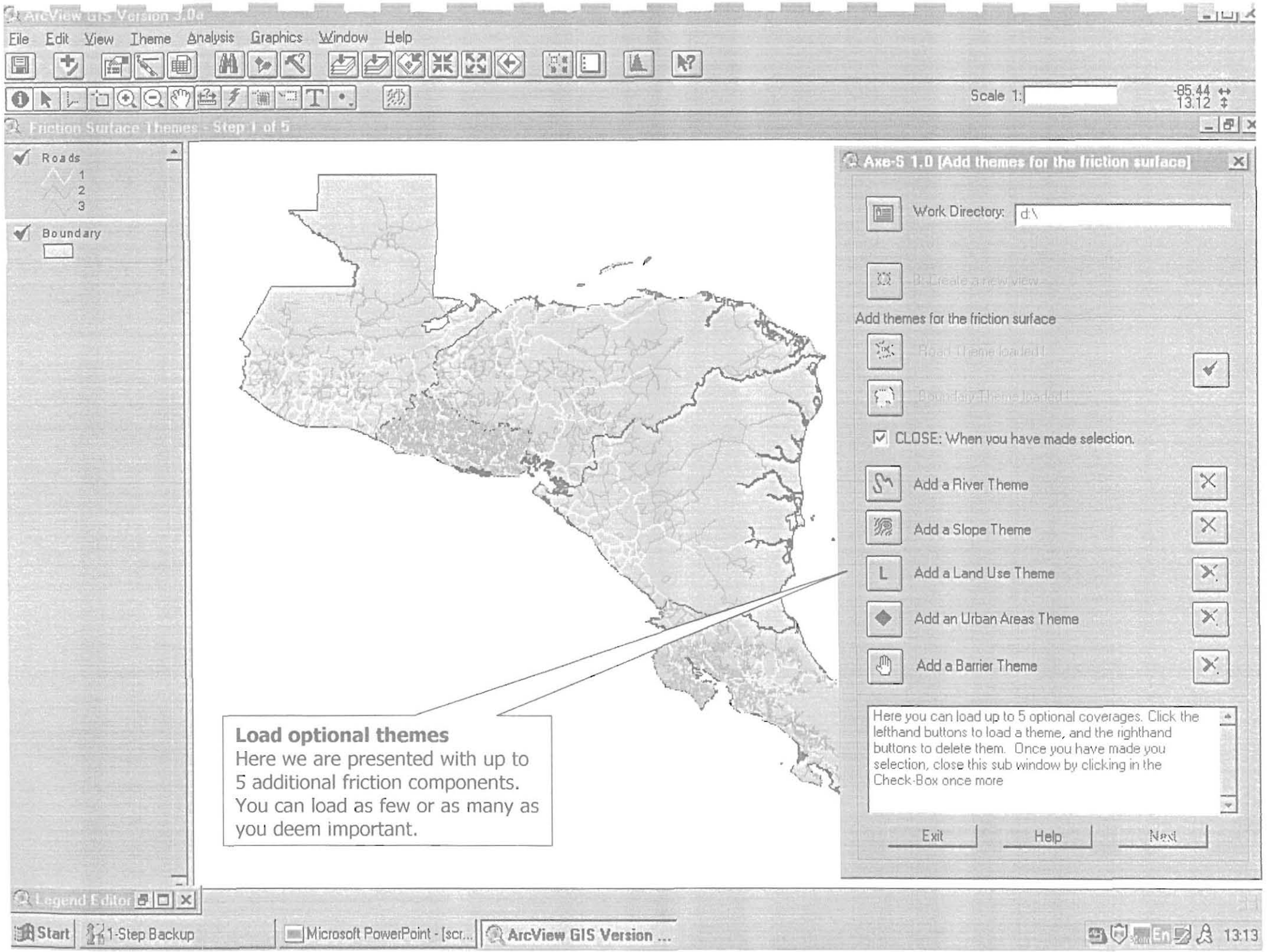

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Axe-S 1.0 [C: Add Themes to the view...]
Work Directory:
d:\
C: Add themes to the view...
This is Step 1 of the process. Here you add the themes which will make up the friction surface. Click the Add Themes button to start.
Exit
Help
Next
Add themes to the view
Step one. This view will hold all the friction and source themes required by the model
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
ARCVIEW
13:03

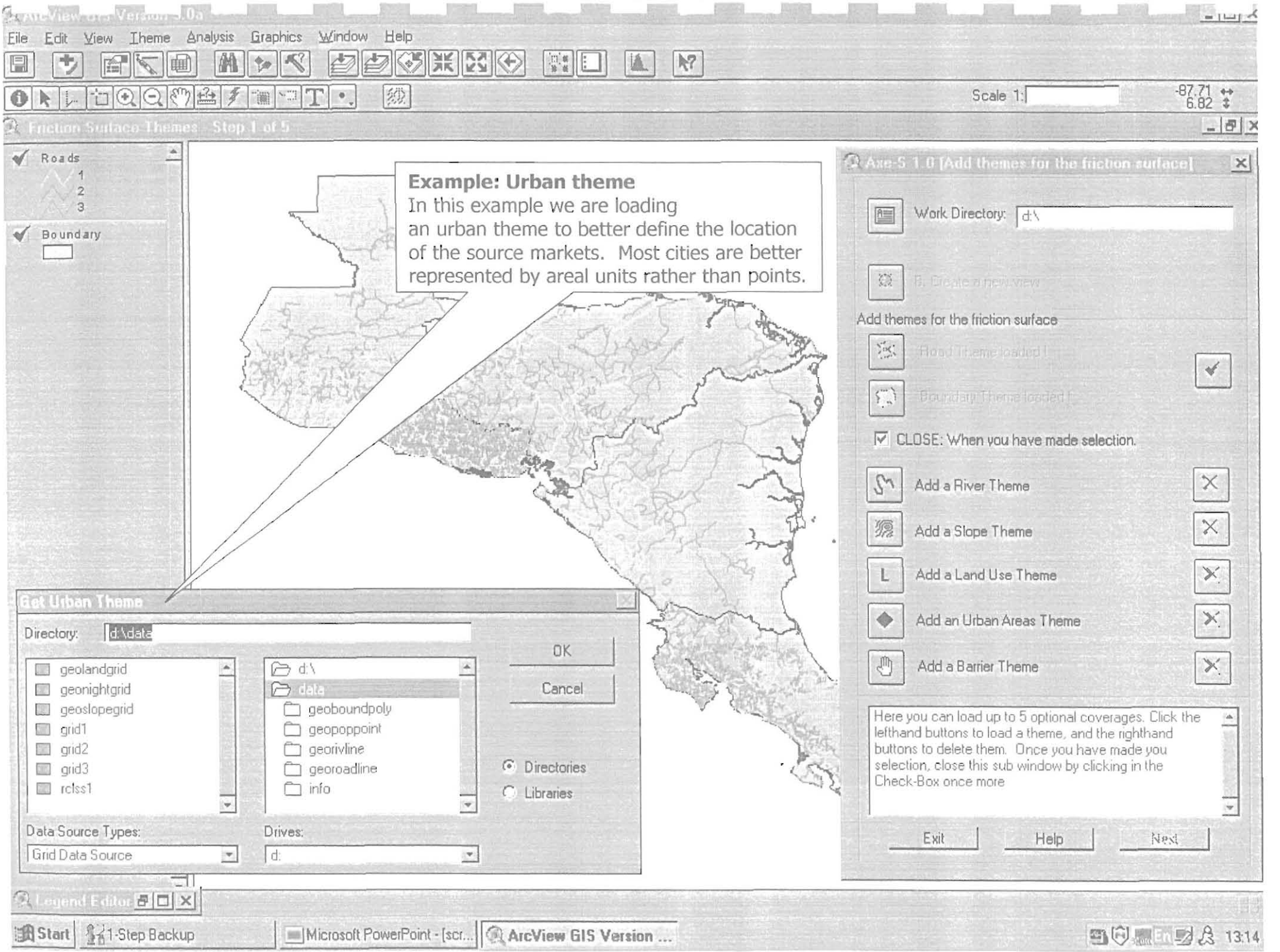

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Axe-S 1.0 [Add themes for the friction surface]
Work Directory: d:\
Add themes for the friction surface
Add a Road Theme
Add a Boundary Theme
You MUST have a ROAD and a BOUNDARY theme. Add them here. Click the left-hand buttons to load them in the view. If you load a wrong cover, click on the button again to exchange the cover for another
Exit
Help
Next
Loading a theme
Every time you load a theme in Axe-S, the pop-up theme dialogue will prompt you for a specific type of theme. Point, Polygon, Line or Grid. If you choose an unsuitable type, a warning message will appear and you will be asked to try again.
Get Road Theme
Directory: d:\data
geoboundpoly
geopoppoint
georivline
georoadline
theme1.shp
theme2.shp
d:\
data
geolandgrid
geonightgrid
geoslopegrid
grid1
grid2
grid3
OK
Cancel
Directories
Libraries
Data Source Types:
Feature Data Source
Drives:
d:
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
ARCVIEW
13:06

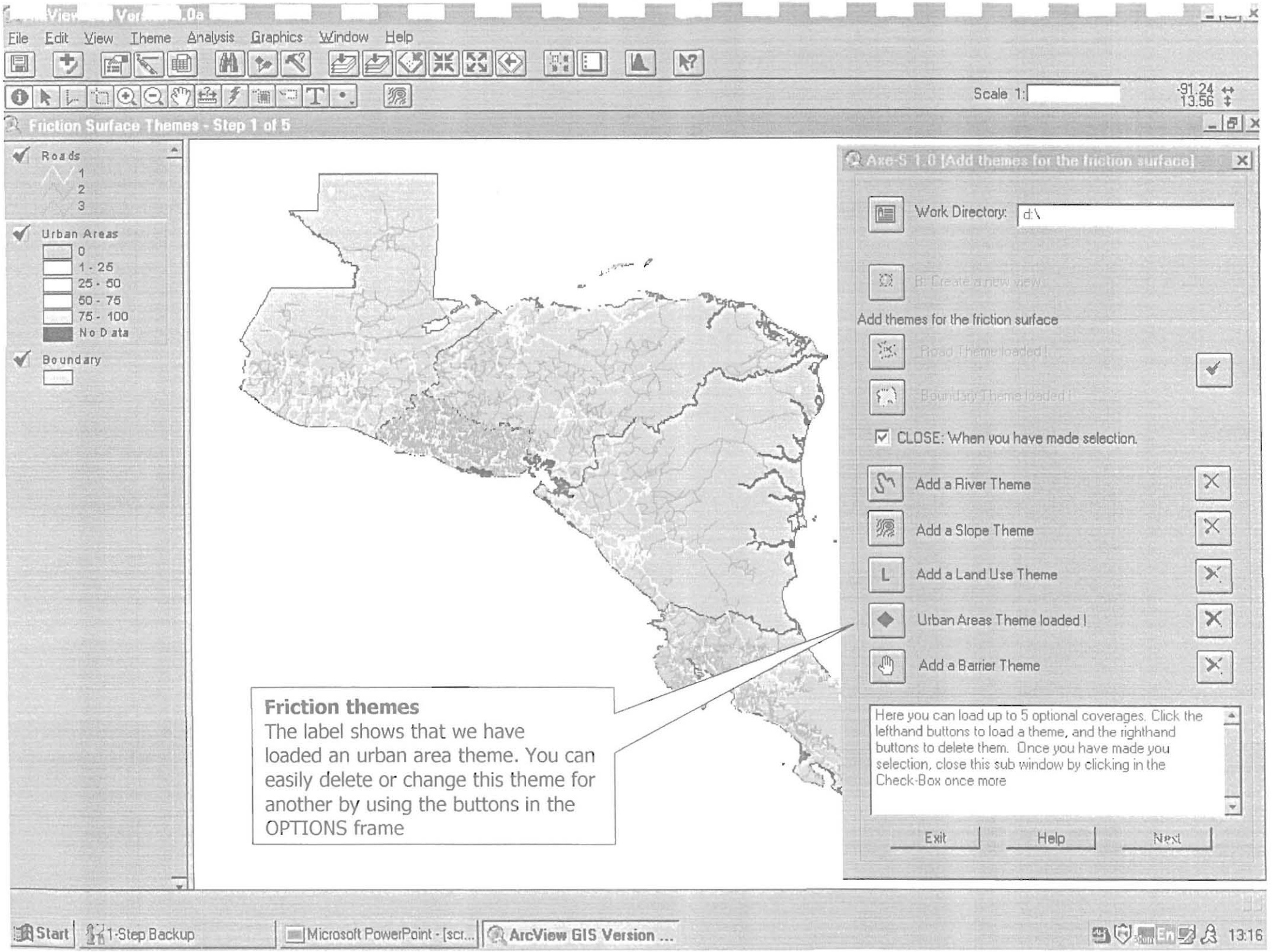

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-84.45
14.38
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Add a Boundary Theme
Now that have a road theme, add a boundary theme
Exit
Help
Next
Road theme
A road theme has been loaded into the view, but still a boundary theme is required. You will not be able to progress further without both themes.
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:10

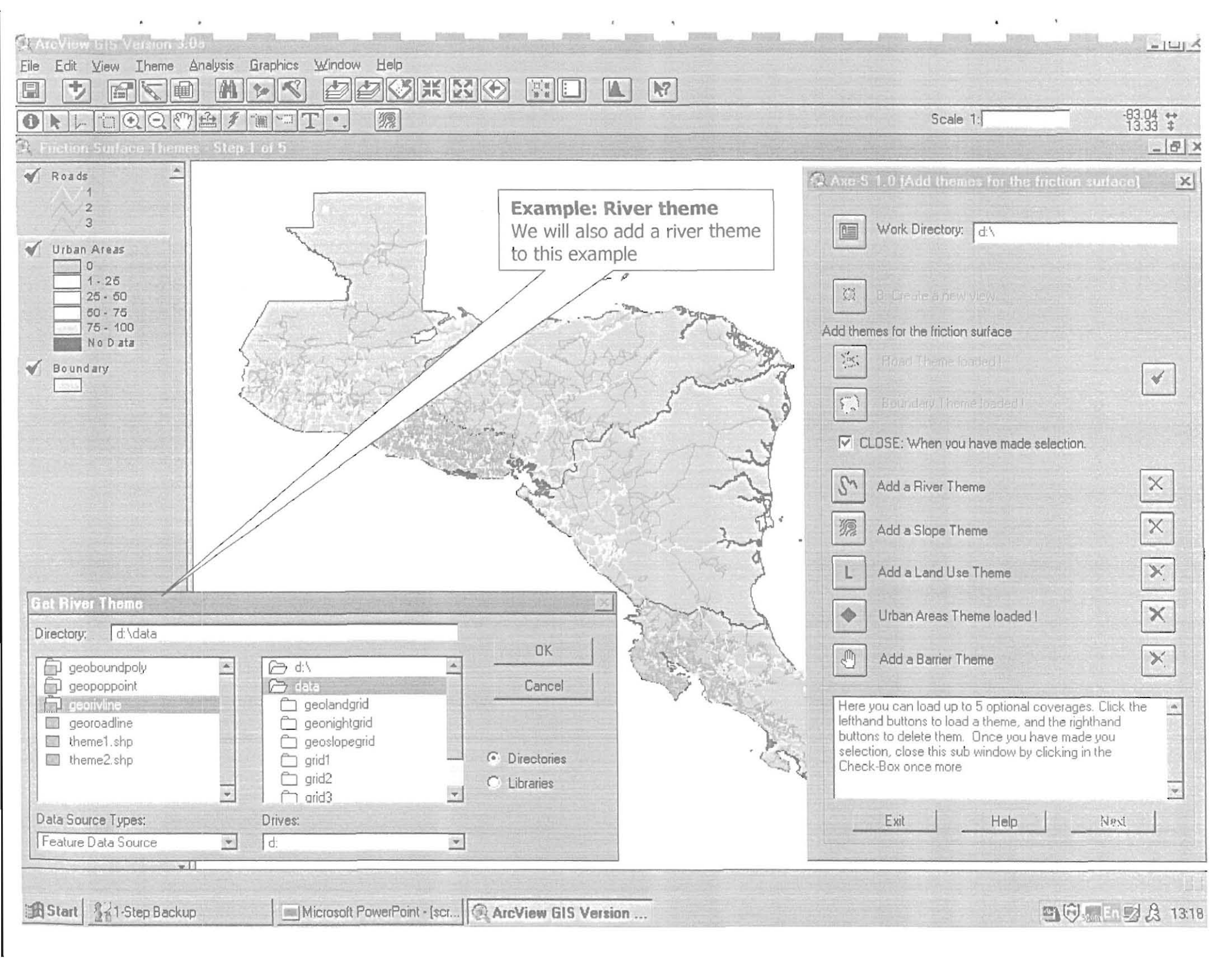

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.20
12.86
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Add a Boundary Theme
Loading a boundary theme
As before you are prompted to load an appropriate theme to represent the site limts.
Get Boundary Theme
Directory:
d:\data
geoboundpoly
geopoppoint
georivline
georoadline
theme1.shp
theme2.shp
d:\
data
geolandgrid
geonightgrid
geoslopegrid
grid1
grid2
grid3
OK
Cancel
Directories
Libraries
Data Source Types:
Feature Data Source
Drives:
d:
Now that have a road theme, add a boundary theme
Exit
Help
Next
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:11

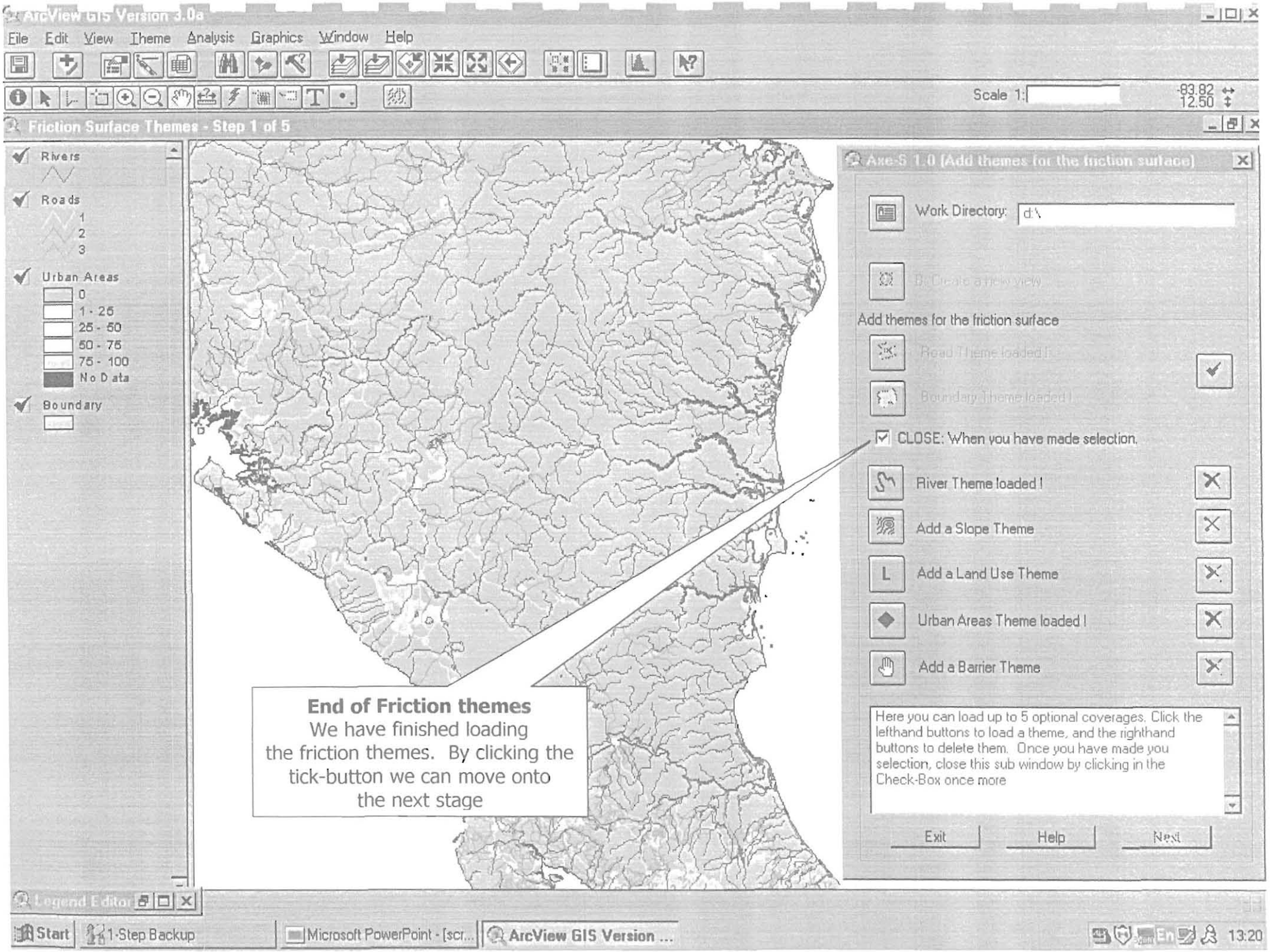

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-86.72
12.45
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Boundary
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Boundary Theme loaded !
OPTION: Do you want to add more themes?
Now that have a road theme and a boundary theme, you have the option to load additional themes that will also contribute to the friction surface. Click the Check-Box if you want to do this, or if not just go to the next stage by clicking the Tick-Button
Exit
Help
Next
Optional friction themes
With both themes loaded, a new frame will appear prompting you for optional additions to the friction surface. Click the check box to view the options, or click the tick button to ignore them. The inputs you choose depend on your model criteria.
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:12

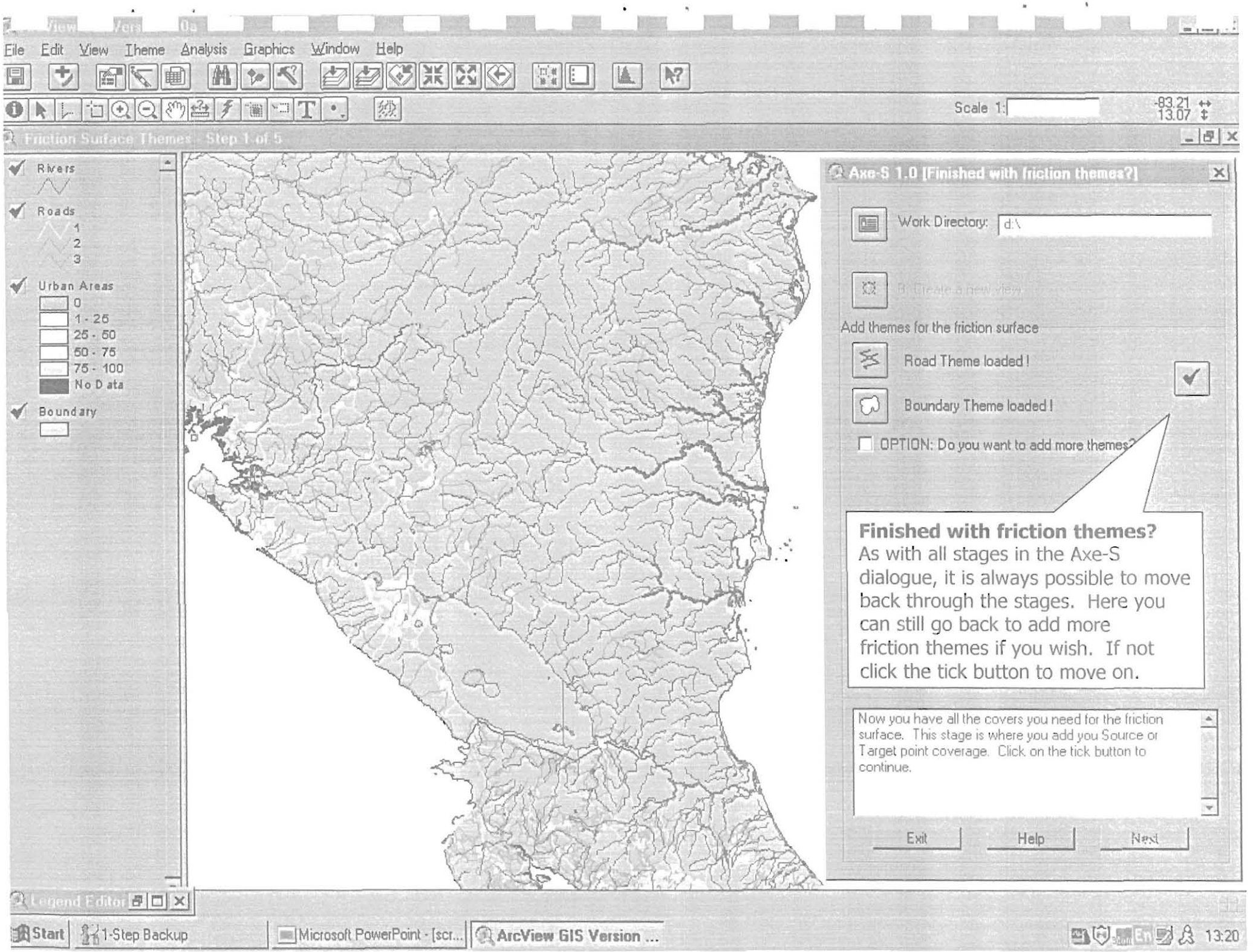

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-85.44
13.12
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Boundary
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
CLOSE: When you have made selection.
Add a River Theme
Add a Slope Theme
Add a Land Use Theme
Add an Urban Areas Theme
Add a Barrier Theme
Here you can load up to 5 optional coverages. Click the lefthand buttons to load a theme, and the righthand buttons to delete them. Once you have made you selection, close this sub window by clicking in the Check-Box once more
Exit
Help
Next
Load optional themes
Here we are presented with up to 5 additional friction components. You can load as few or as many as you deem important.
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:13

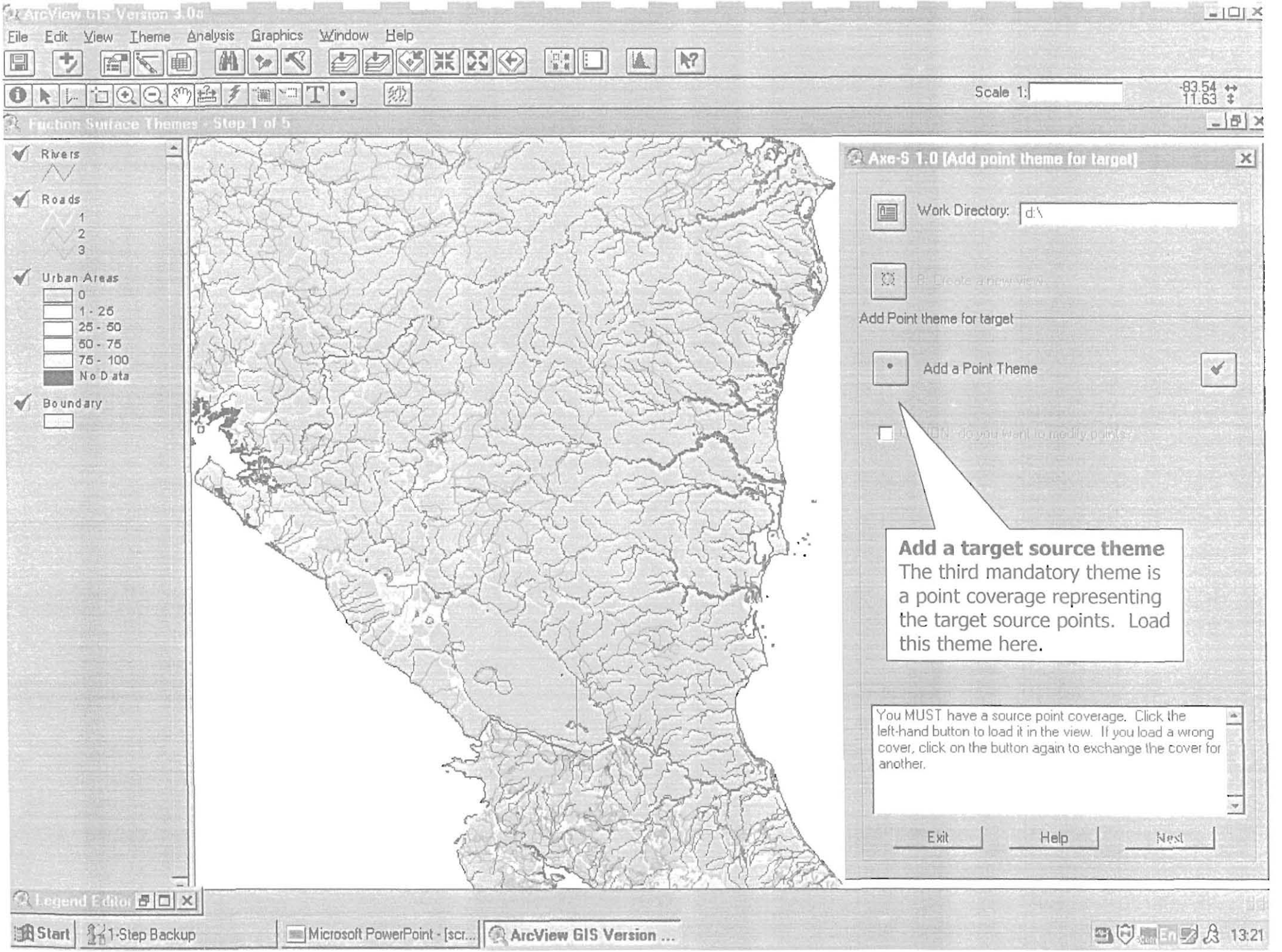

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes Step 1 of 5
Roads
1
2
3
Boundary
Example: Urban theme
In this example we are loading
an urban theme to better define the location
of the source markets. Most cities are better
represented by areal units rather than points.
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
CLOSE: When you have made selection.
Add a River Theme
Add a Slope Theme
Add a Land Use Theme
Add an Urban Areas Theme
Add a Barrier Theme
Here you can load up to 5 optional coverages. Click the lefthand buttons to load a theme, and the righthand buttons to delete them. Once you have made you selection, close this sub window by clicking in the Check-Box once more
Exit
Help
Next
Get Urban Theme
Directory:
d:\data
geolandgrid
geonightgrid
geoslopegrid
grid1
grid2
grid3
rclss1
d:\
data
geoboundpoly
geopoppoint
georivline
georoadline
info
OK
Cancel
Directories
Libraries
Data Source Types:
Grid Data Source
Drives:
d:
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:14

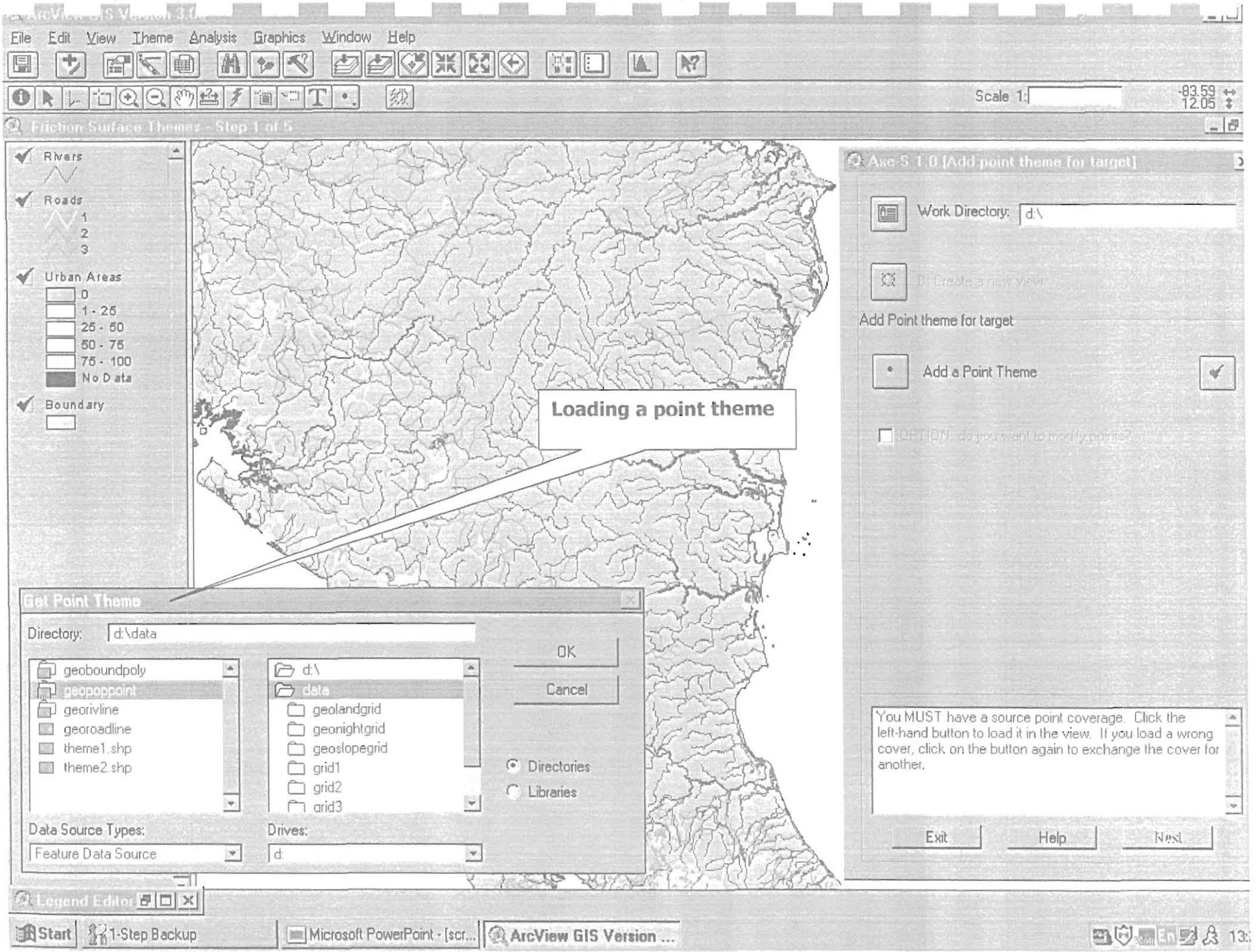

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [Add themes for the friction surface]
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Boundary Theme loaded !
CLOSE: When you have made selection.
Add a River Theme
Add a Slope Theme
Add a Land Use Theme
Urban Areas Theme loaded !
Add a Barrier Theme
Here you can load up to 5 optional coverages. Click the lefthand buttons to load a theme, and the righthand buttons to delete them. Once you have made you selection, close this sub window by clicking in the Check-Box once more
Exit
Help
Next
Friction themes
The label shows that we have loaded an urban area theme. You can easily delete or change this theme for another by using the buttons in the OPTIONS frame
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:16

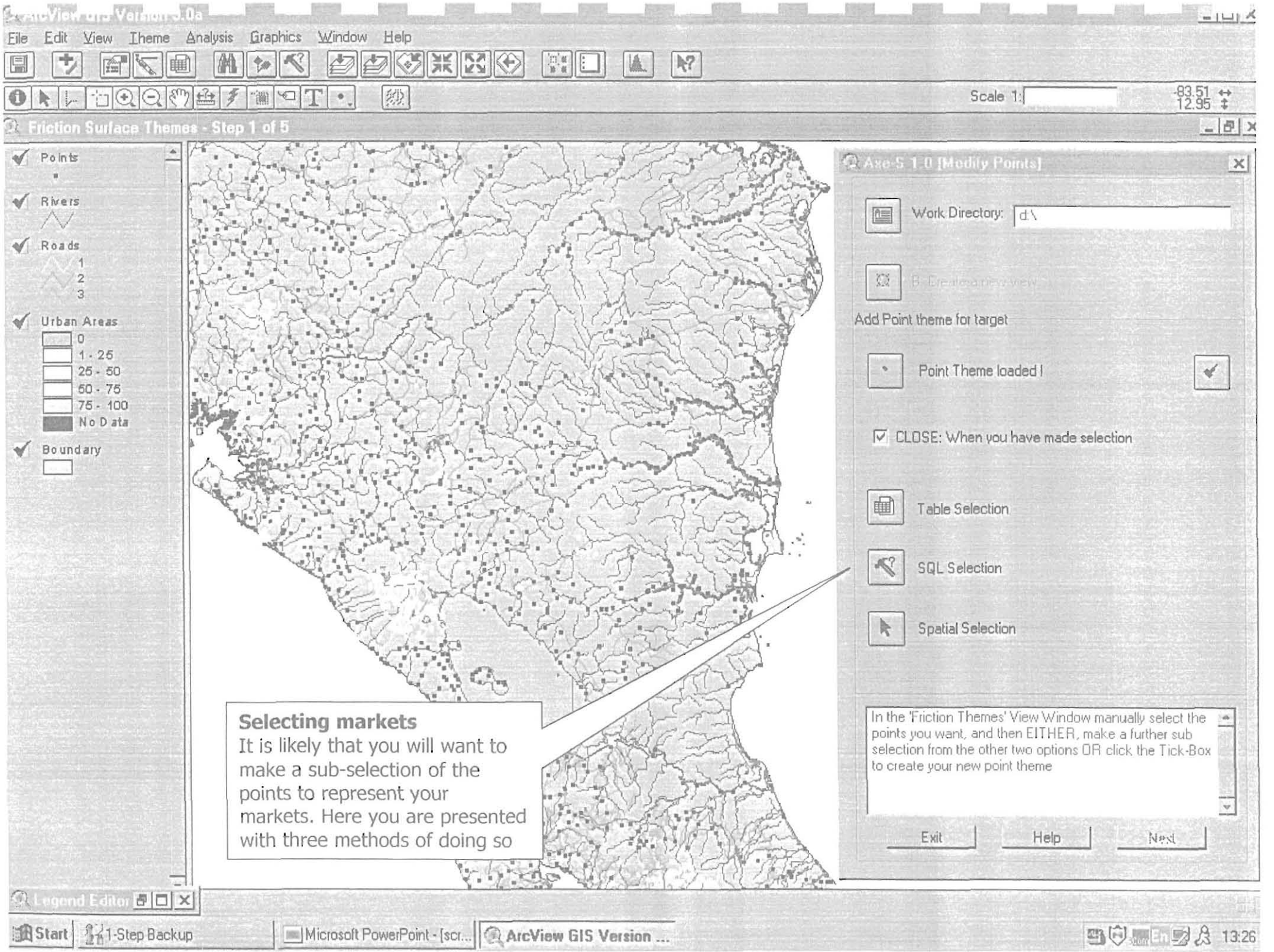

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.04
13.33
Friction Surface Themes - Step 1 of 5
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Example: River theme
We will also add a river theme to this example
Axe-S 1.0 [Add themes for the friction surface]
Work Directory: d:\
B: Create a new View
Add themes for the friction surface
Road Theme loaded !
Boundary Theme loaded !
CLOSE: When you have made selection.
Add a River Theme
Add a Slope Theme
Add a Land Use Theme
Urban Areas Theme loaded !
Add a Barrier Theme
Here you can load up to 5 optional coverages. Click the lefthand buttons to load a theme, and the righthand buttons to delete them. Once you have made you selection, close this sub window by clicking in the Check-Box once more
Exit
Help
Next
Get River Theme
Directory: d:\data
geoboundpoly
geopoppoint
georivline
georoadline
theme1.shp
theme2.shp
d:\
data
geolandgrid
geonightgrid
geoslopegrid
grid1
grid2
grid3
OK
Cancel
Directories
Libraries
Data Source Types:
Feature Data Source
Drives:
d:
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:18

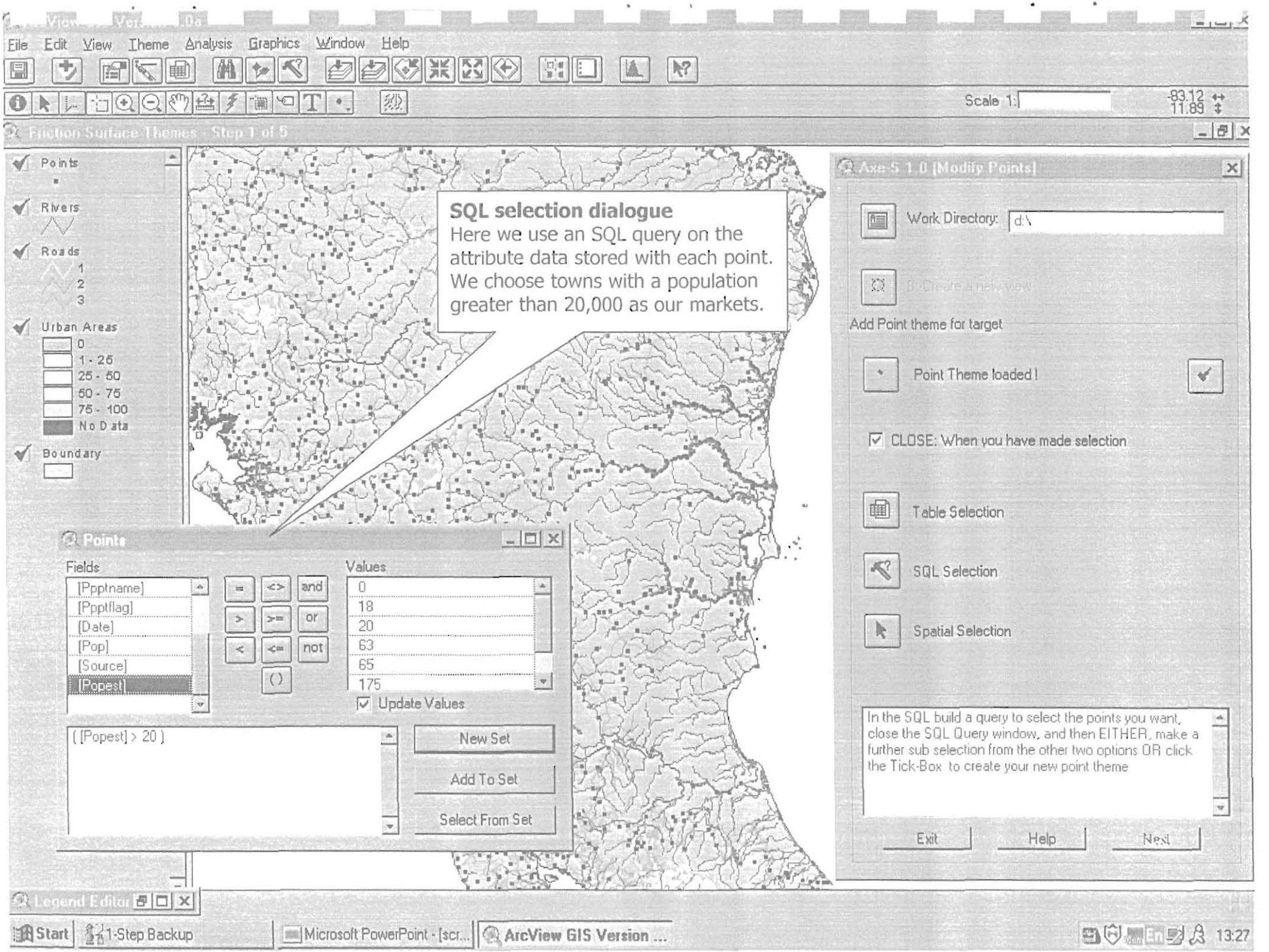

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.82
12.50
Friction Surface Themes - Step 1 of 5
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 (Add themes for the friction surface)
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Boundary Theme loaded !
CLOSE: When you have made selection.
River Theme loaded !
Add a Slope Theme
Add a Land Use Theme
Urban Areas Theme loaded !
Add a Barrier Theme
Here you can load up to 5 optional coverages. Click the lefthand buttons to load a theme, and the righthand buttons to delete them. Once you have made you selection, close this sub window by clicking in the Check-Box once more
Exit
Help
Next
End of Friction themes
We have finished loading the friction themes. By clicking the tick-button we can move onto the next stage
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:20

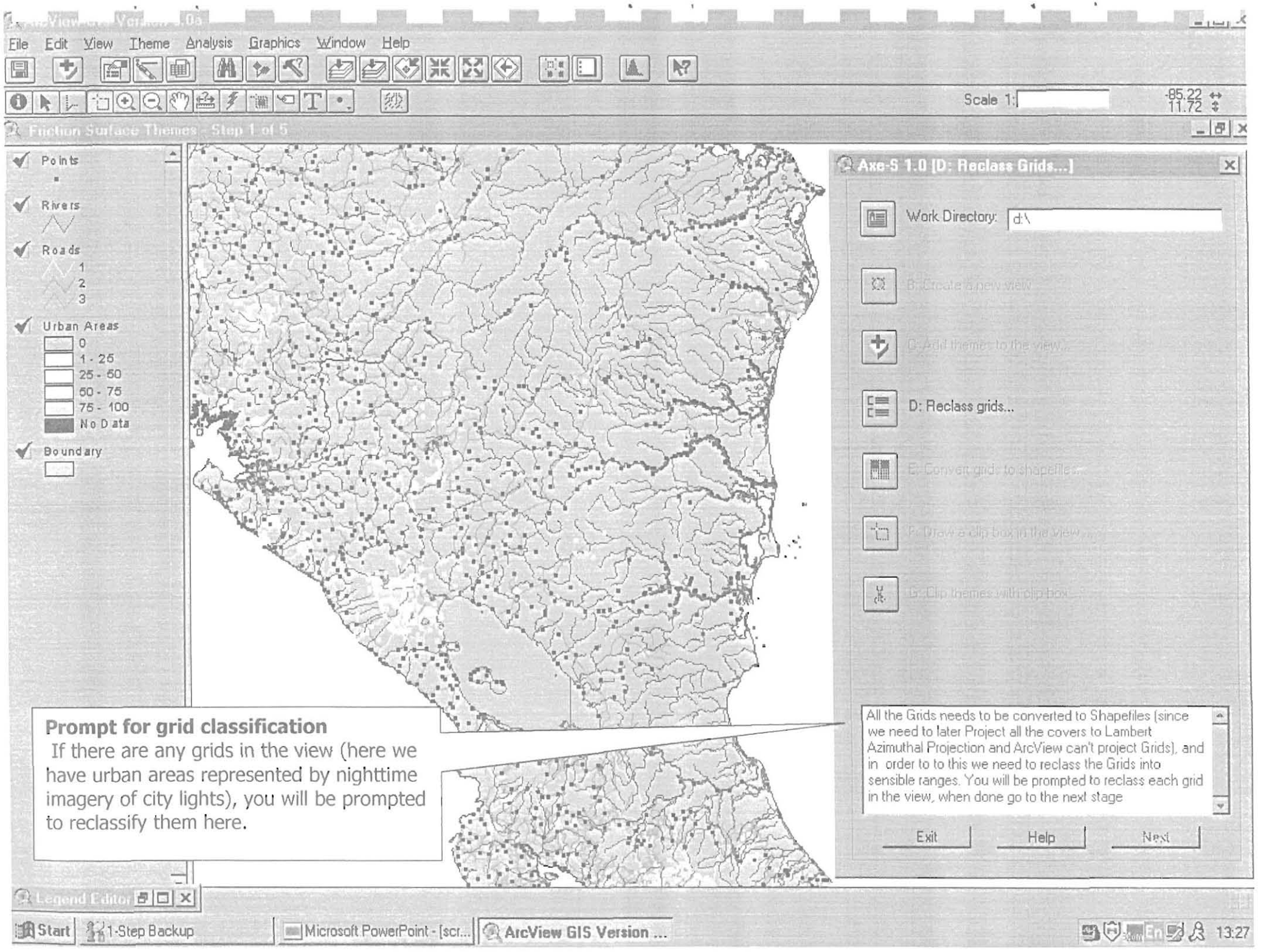

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.21
13.07
Friction Surface Themes - Step 1 of 5
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [Finished with friction themes?]
Work Directory:
d:\
Add themes for the friction surface
Road Theme loaded !
Boundary Theme loaded !
OPTION: Do you want to add more themes?
Finished with friction themes?
As with all stages in the Axe-S dialogue, it is always possible to move back through the stages. Here you can still go back to add more friction themes if you wish. If not click the tick button to move on.
Now you have all the covers you need for the friction surface. This stage is where you add you Source or Target point coverage. Click on the tick button to continue.
Exit
Help
Next
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:20


ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.54
11.63
Friction Surface Themes - Step 1 of 5
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [Add point theme for target]
Work Directory:
d:\
Add Point theme for target
Add a Point Theme
Add a target source theme
The third mandatory theme is a point coverage representing the target source points. Load this theme here.
You MUST have a source point coverage. Click the left-hand button to load it in the view. If you load a wrong cover, click on the button again to exchange the cover for another.
Exit
Help
Next
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:21


File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Loading a point theme
Ake 5.1.0 [Add point theme for target]
Work Directory:
d:\
Add Point theme for target
Add a Point Theme
You MUST have a source point coverage. Click the left-hand button to load it in the view. If you load a wrong cover, click on the button again to exchange the cover for another.
Exit
Help
Next
Get Point Theme
Directory:
d:\data
geoboundpoly
geopoppoint
georivline
georoadline
theme1.shp
theme2.shp
d:\
data
geolandgrid
geonightgrid
geoslopegrid
grid1
grid2
grid3
OK
Cancel
Directories
Libraries
Data Source Types:
Feature Data Source
Drives:
d:
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...

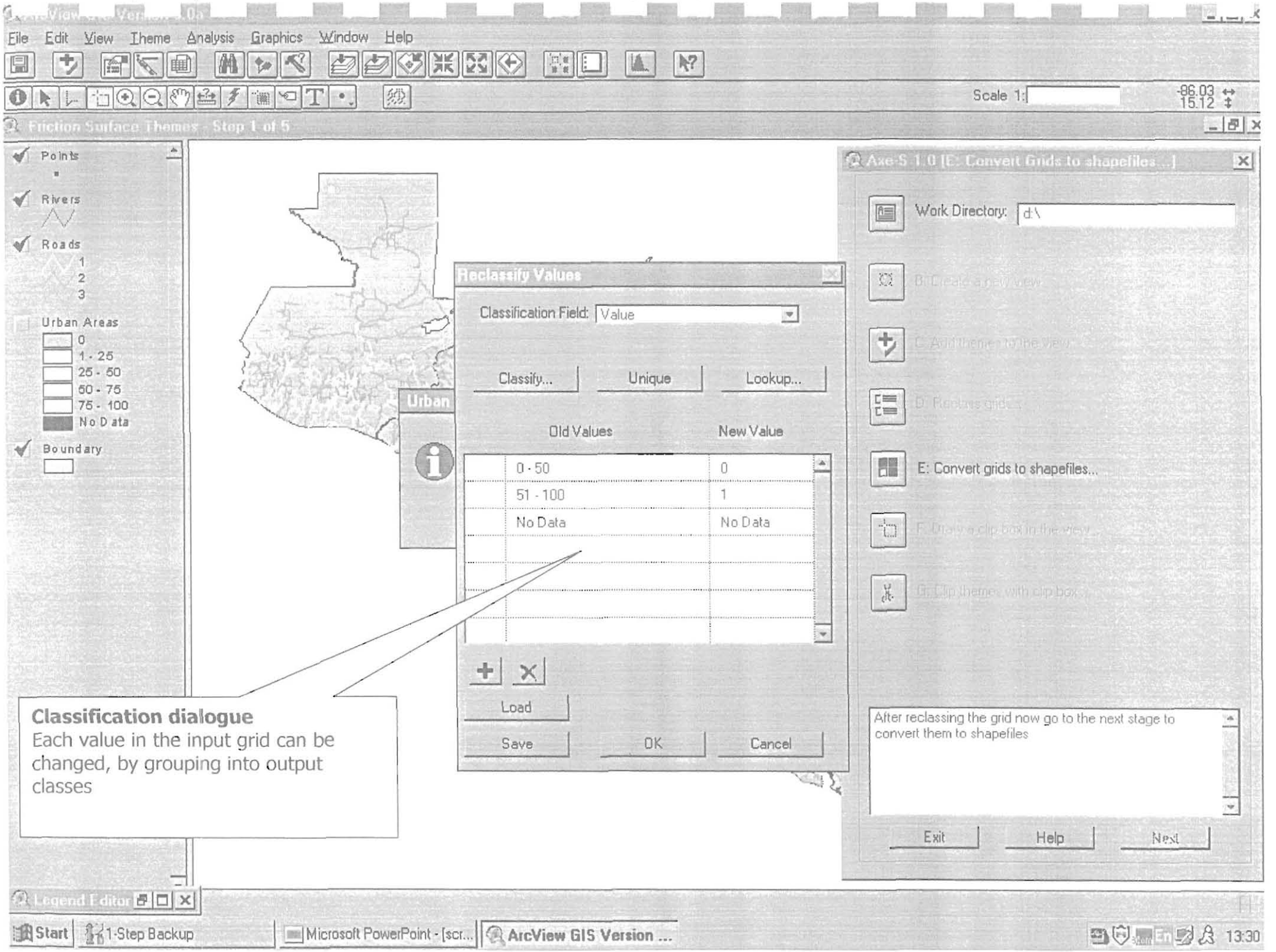

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.51
12.95
Friction Surface Themes - Step 1 of 5
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [Modify Points]
Work Directory:
d:\
Add Point theme for target
Point Theme loaded !
CLOSE: When you have made selection
Table Selection
SQL Selection
Spatial Selection
In the 'Friction Themes' View Window manually select the points you want, and then EITHER, make a further sub selection from the other two options OR click the Tick-Box to create your new point theme
Exit
Help
Next
Selecting markets
It is likely that you will want to make a sub-selection of the points to represent your markets. Here you are presented with three methods of doing so
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:26


File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.12
11.89
Friction Surface Themes - Step 1 of 5
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
SQL selection dialogue
Here we use an SQL query on the attribute data stored with each point. We choose towns with a population greater than 20,000 as our markets.
Axe-S 1.0 [Modify Points]
Work Directory:
d:\
Add Point theme for target
Point Theme loaded !
CLOSE: When you have made selection
Table Selection
SQL Selection
Spatial Selection
In the SQL build a query to select the points you want, close the SQL Query window, and then EITHER, make a further sub selection from the other two options OR click the Tick-Box to create your new point theme
Exit
Help
Next
Points
Fields
[Ppptname]
[Ppptflag]
[Date]
[Pop]
[Source]
[Popest]
=
<>
and
>
>=
or
<
<=
not
( )
Values
0
18
20
63
65
175
Update Values
([Popest] > 20)
New Set
Add To Set
Select From Set
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:27

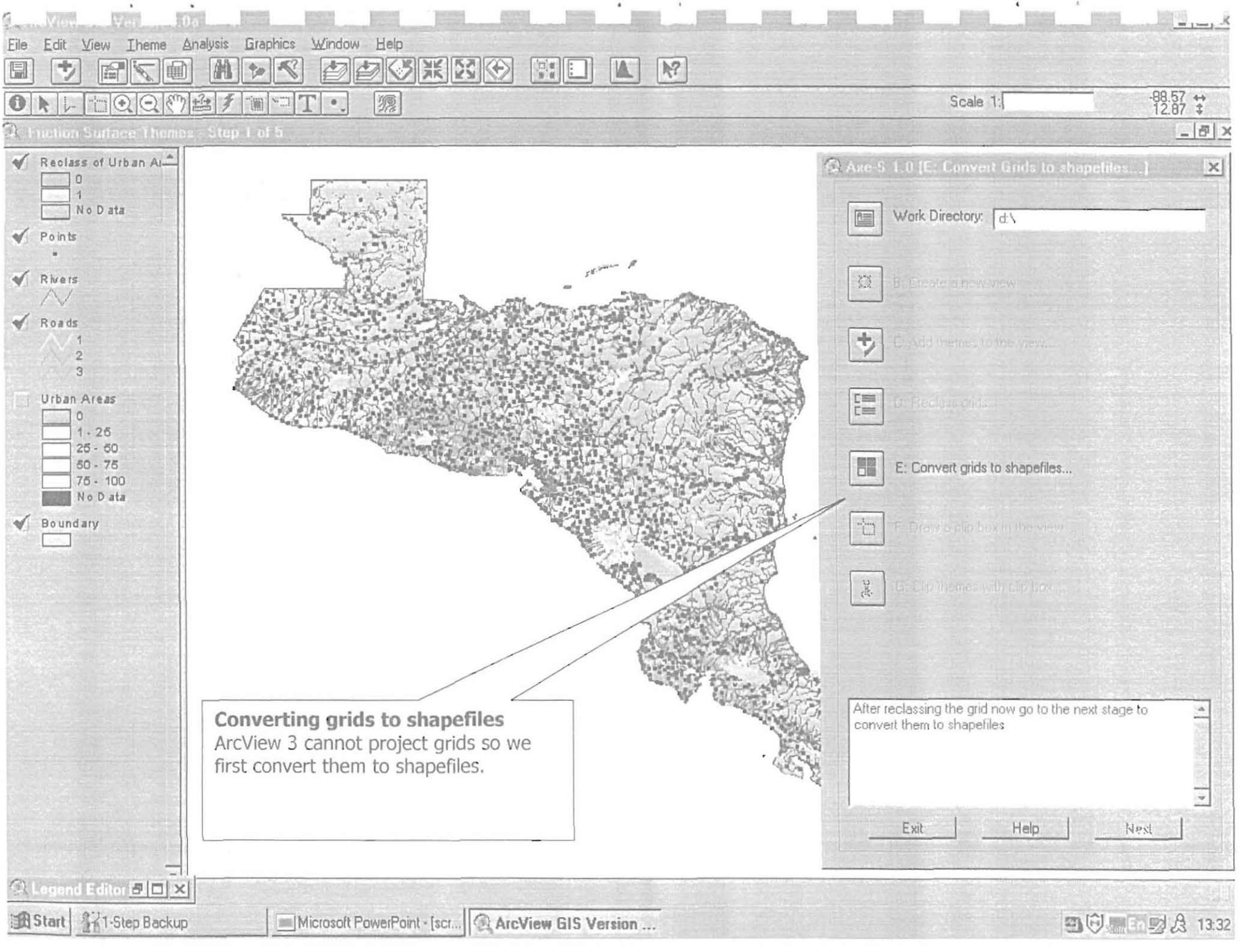


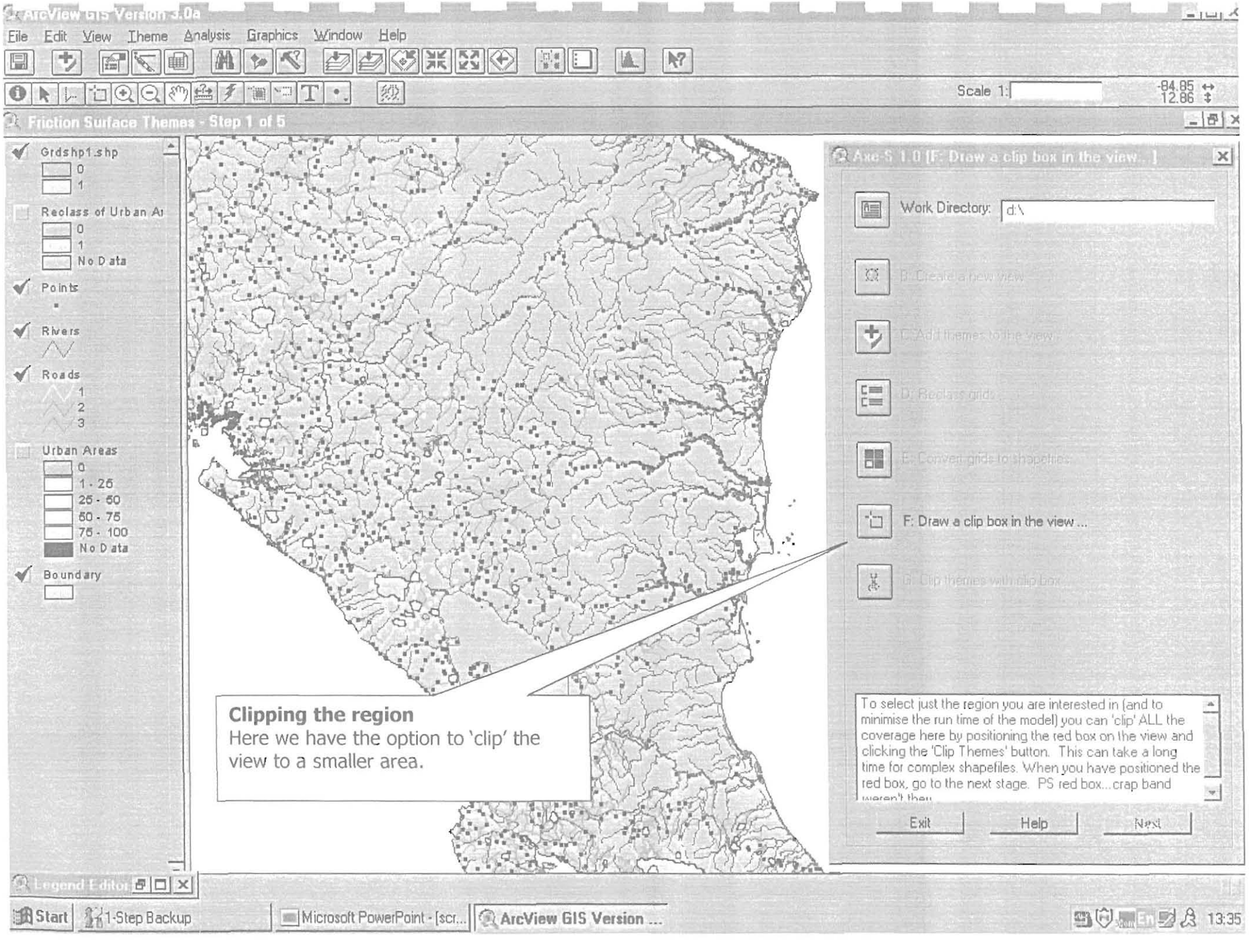
Prompt for grid classification

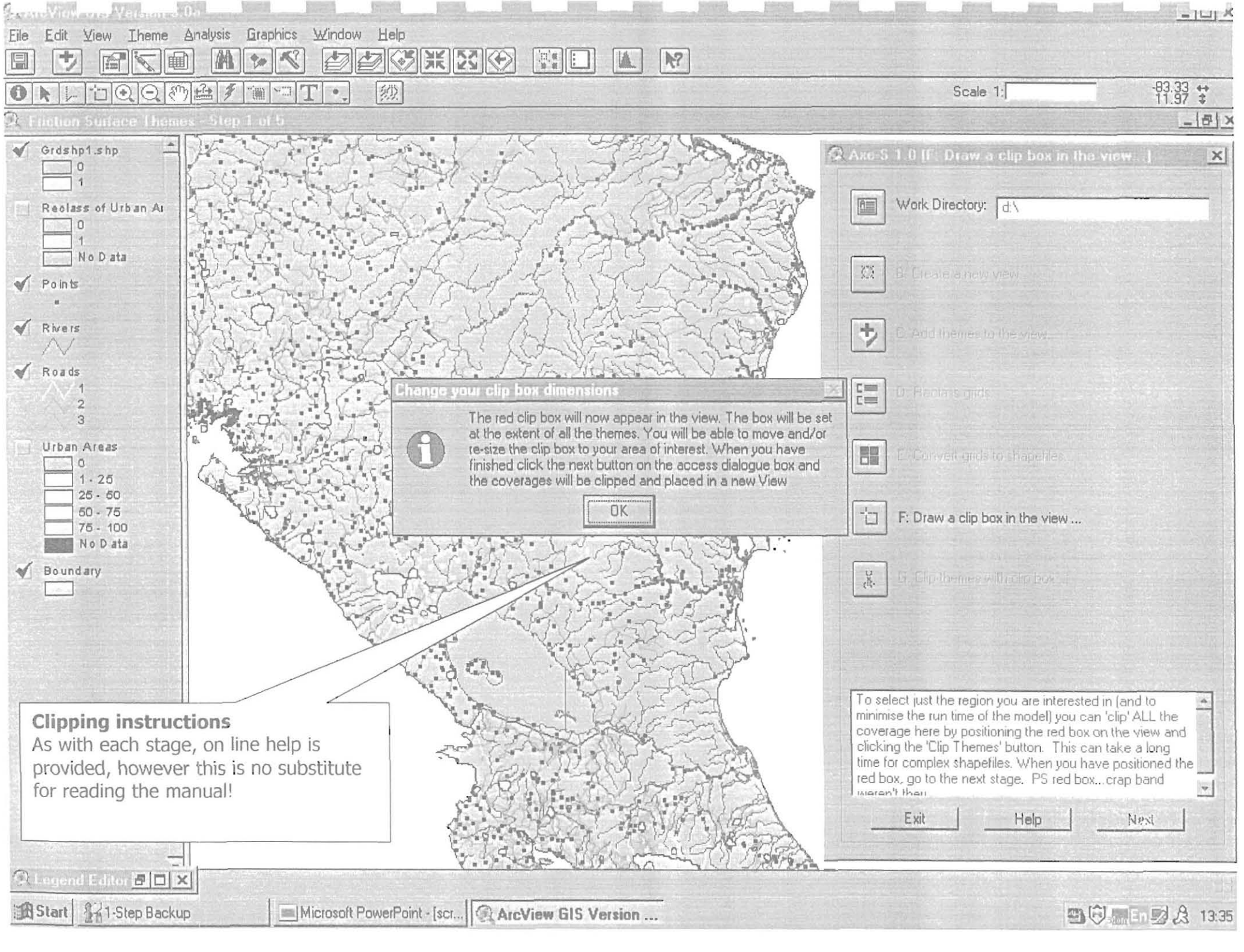
If there are any grids in the view (here we have urban areas represented by nighttime imagery of city lights), you will be prompted to reclassify them here.

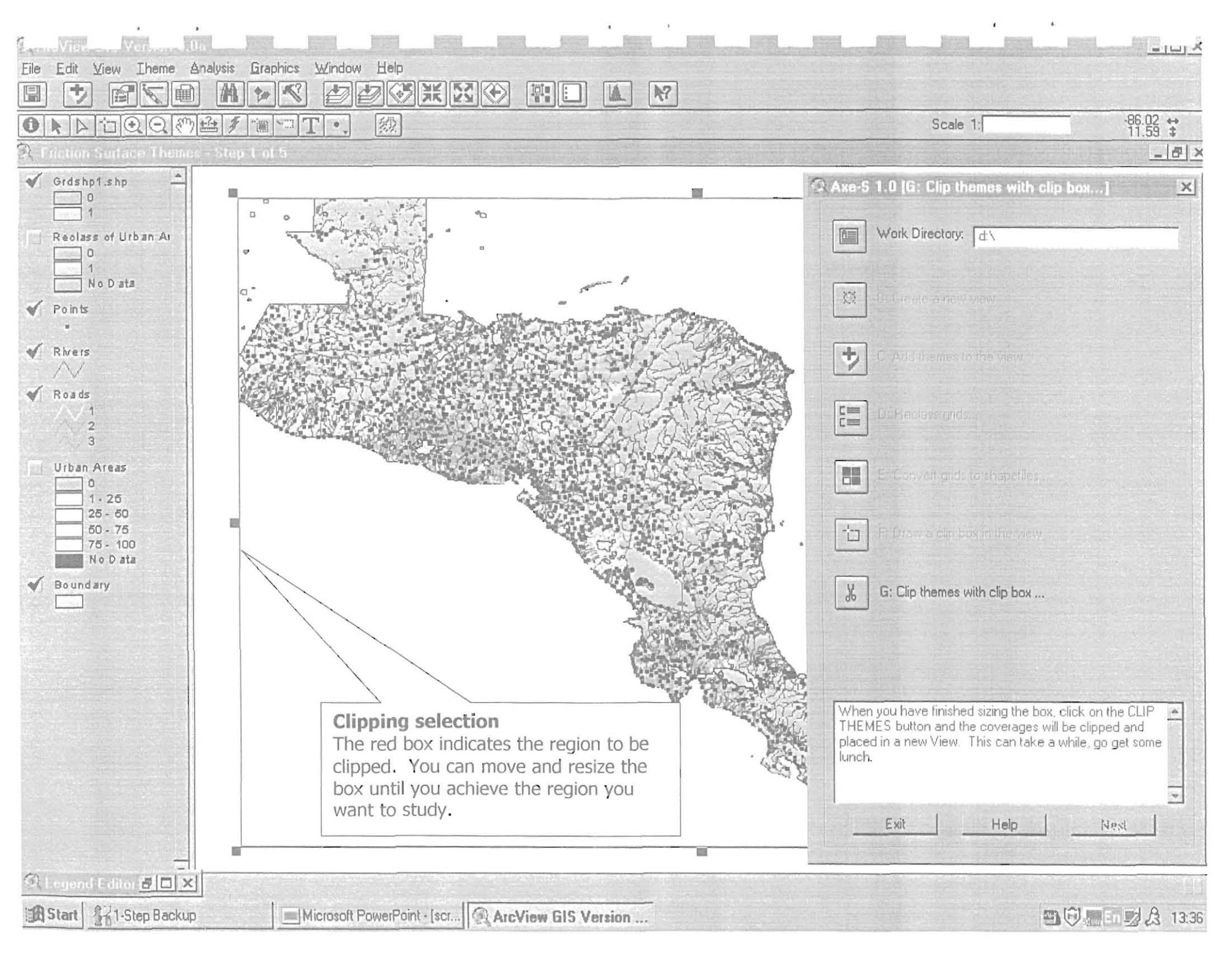


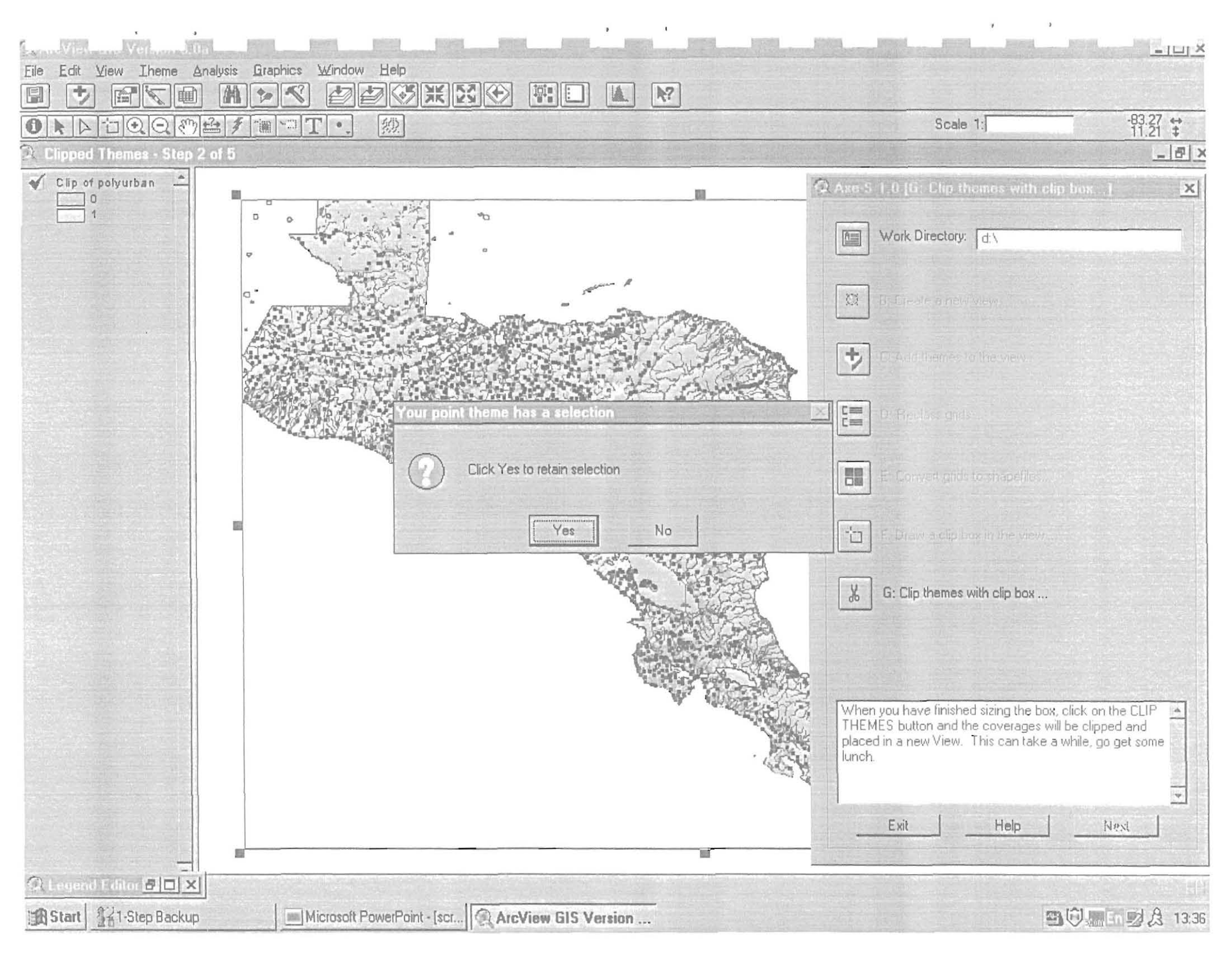
Classification dialogue
Each value in the input grid can be changed, by grouping into output classes

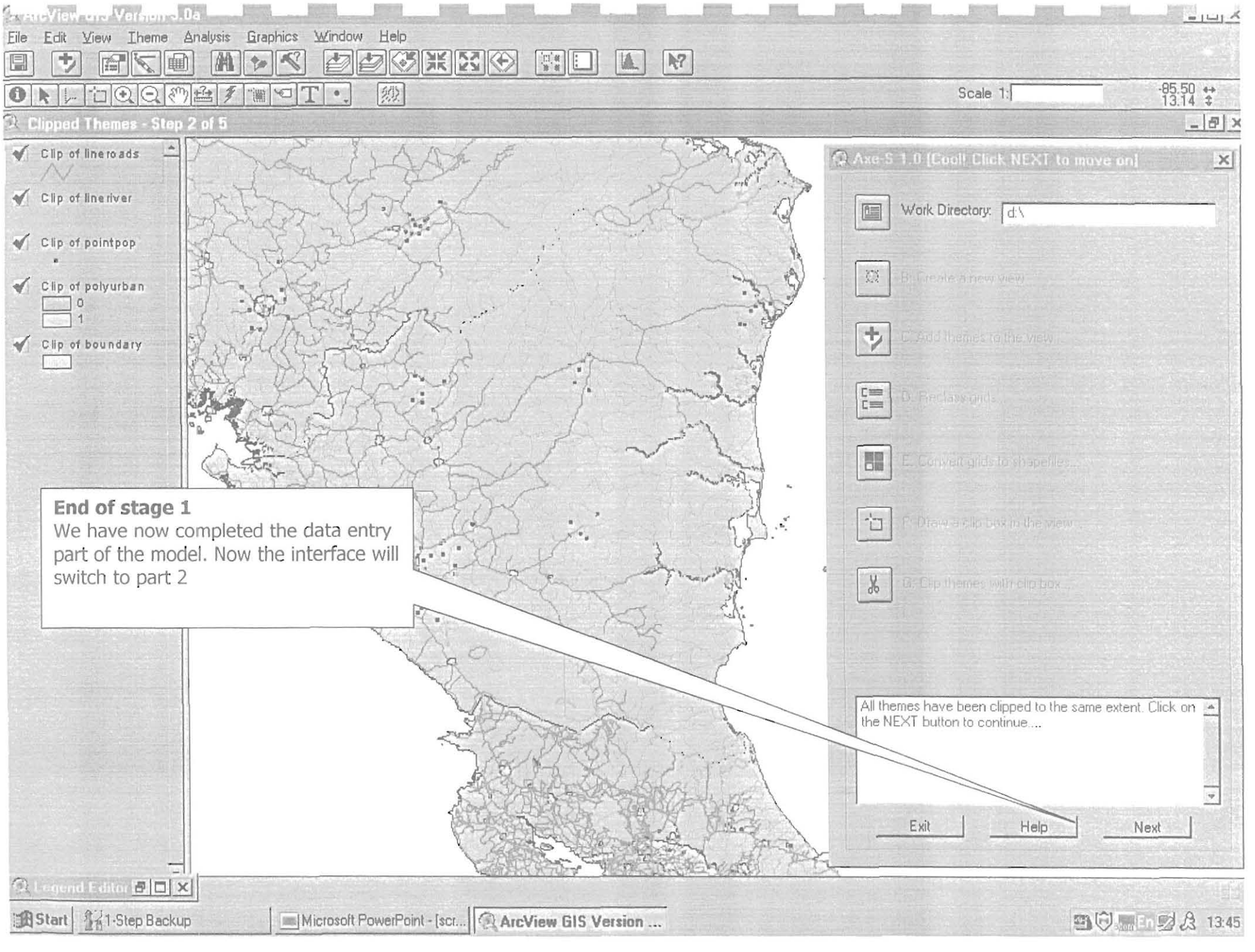

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Reclass of Urban Ar
0
1
No Data
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [E: Convert Grids to shapefiles...]
Work Directory:
d:\
E: Convert grids to shapefiles...
After reclassing the grid now go to the next stage to convert them to shapefiles
Exit
Help
Next
Converting grids to shapefiles
ArcView 3 cannot project grids so we first convert them to shapefiles.
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:32

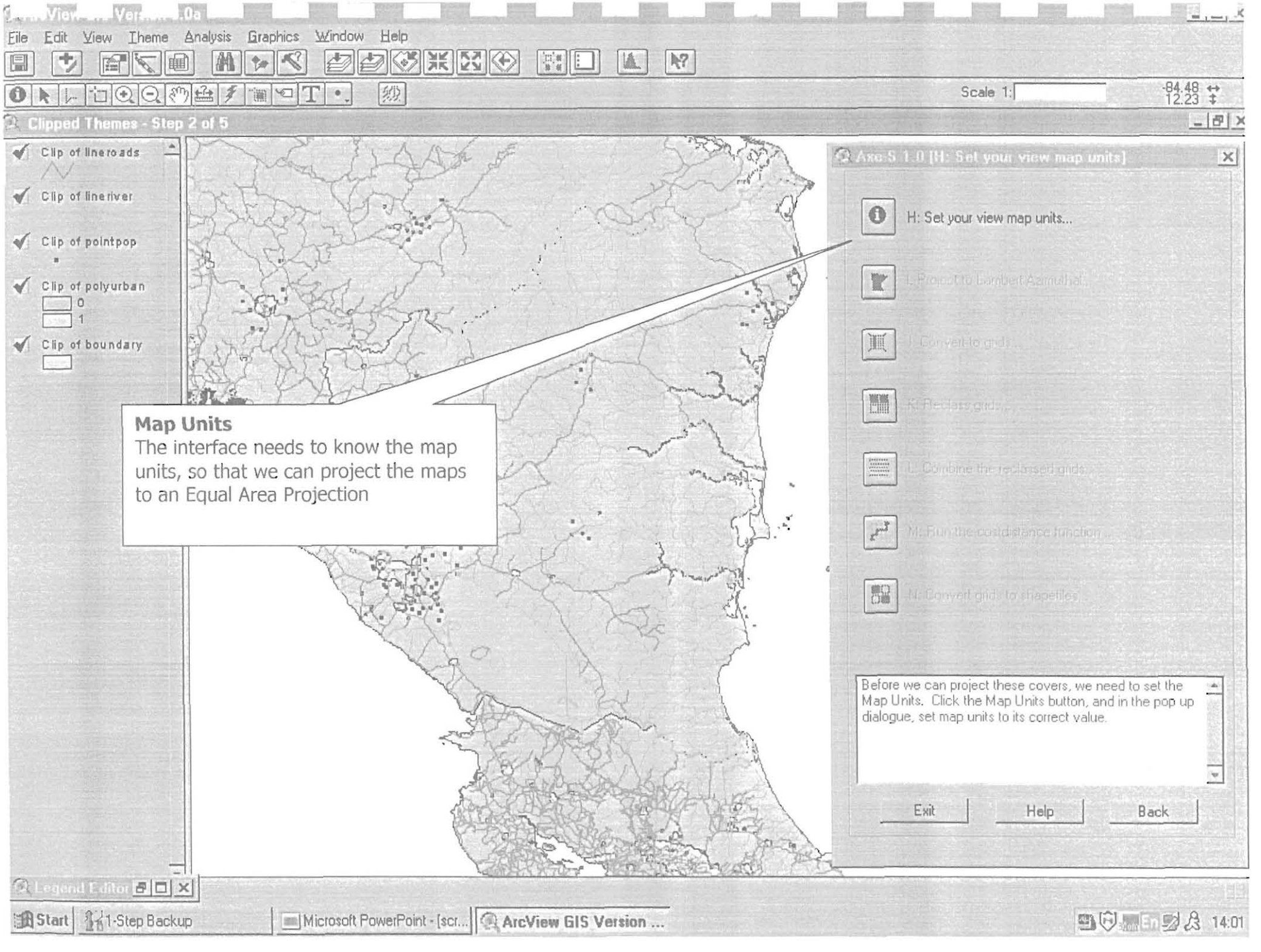

ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-84.85
12.86
Friction Surface Themes - Step 1 of 5
Grdshp1.shp
0
1
Reclass of Urban Ar
0
1
No Data
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Axe-S 1.0 [F: Draw a clip box in the view...]
Work Directory:
d:\
B: Create a new view
C: Add themes to the view
D: Reclass grids
E: Convert grids to shapefiles
F: Draw a clip box in the view ...
G: Clip themes with clip box
To select just the region you are interested in (and to minimise the run time of the model) you can 'clip' ALL the coverage here by positioning the red box on the view and clicking the 'Clip Themes' button. This can take a long time for complex shapefiles. When you have positioned the red box, go to the next stage. PS red box...crap band
Exit
Help
Next
Clipping the region
Here we have the option to 'clip' the view to a smaller area.
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:35

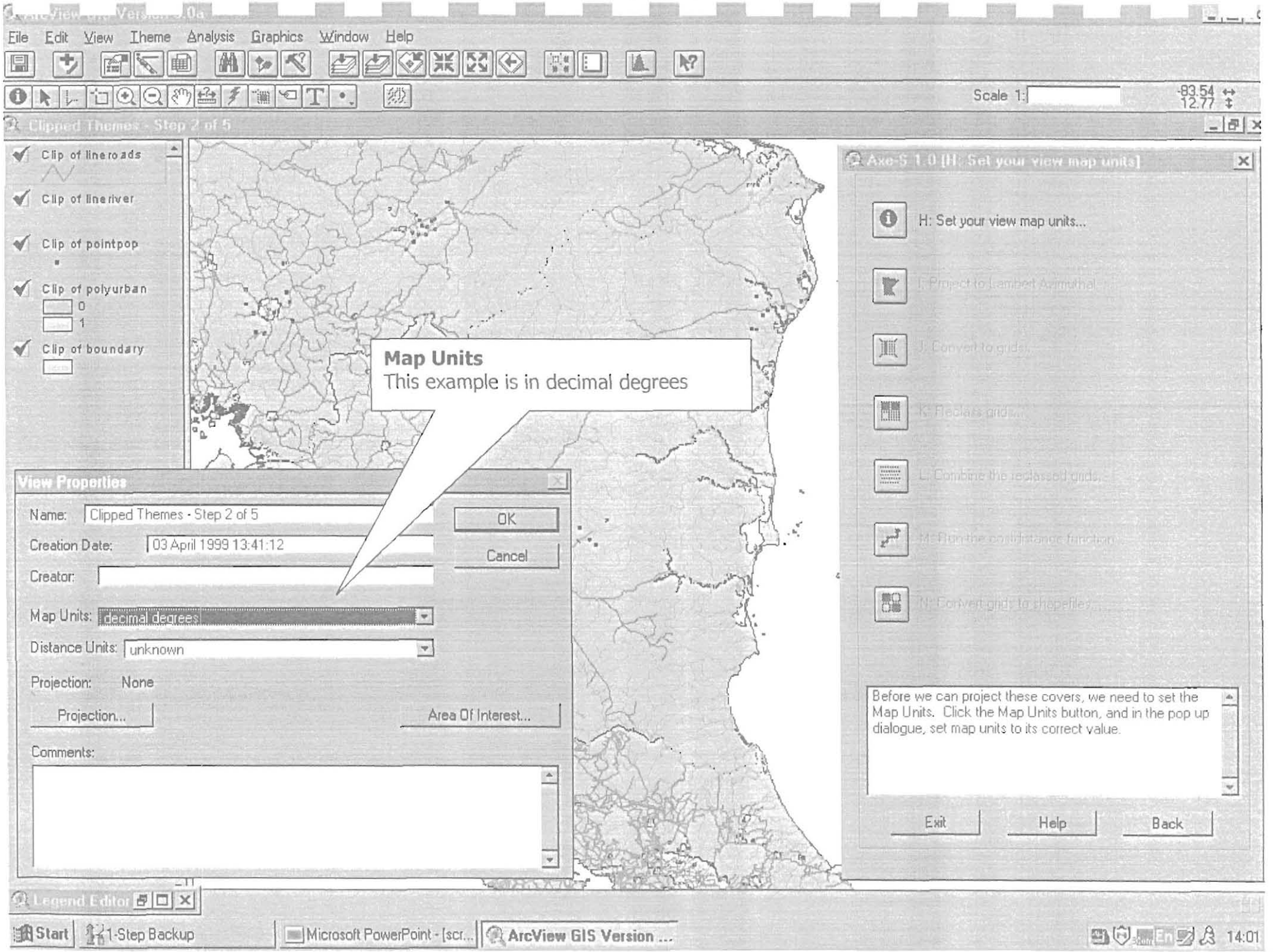

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Grdshp1.shp
0
1
Reclass of Urban Ar
0
1
No Data
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Change your clip box dimensions
The red clip box will now appear in the view. The box will be set at the extent of all the themes. You will be able to move and/or re-size the clip box to your area of interest. When you have finished click the next button on the access dialogue box and the coverages will be clipped and placed in a new View
OK
Axe-S 1.0 [F: Draw a clip box in the view...]
Work Directory:
d:\
F: Draw a clip box in the view ...
To select just the region you are interested in (and to minimise the run time of the model) you can 'clip' ALL the coverage here by positioning the red box on the view and clicking the 'Clip Themes' button. This can take a long time for complex shapefiles. When you have positioned the red box, go to the next stage. PS red box... crap band
Exit
Help
Next
Clipping instructions
As with each stage, on line help is provided, however this is no substitute for reading the manual!
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:35

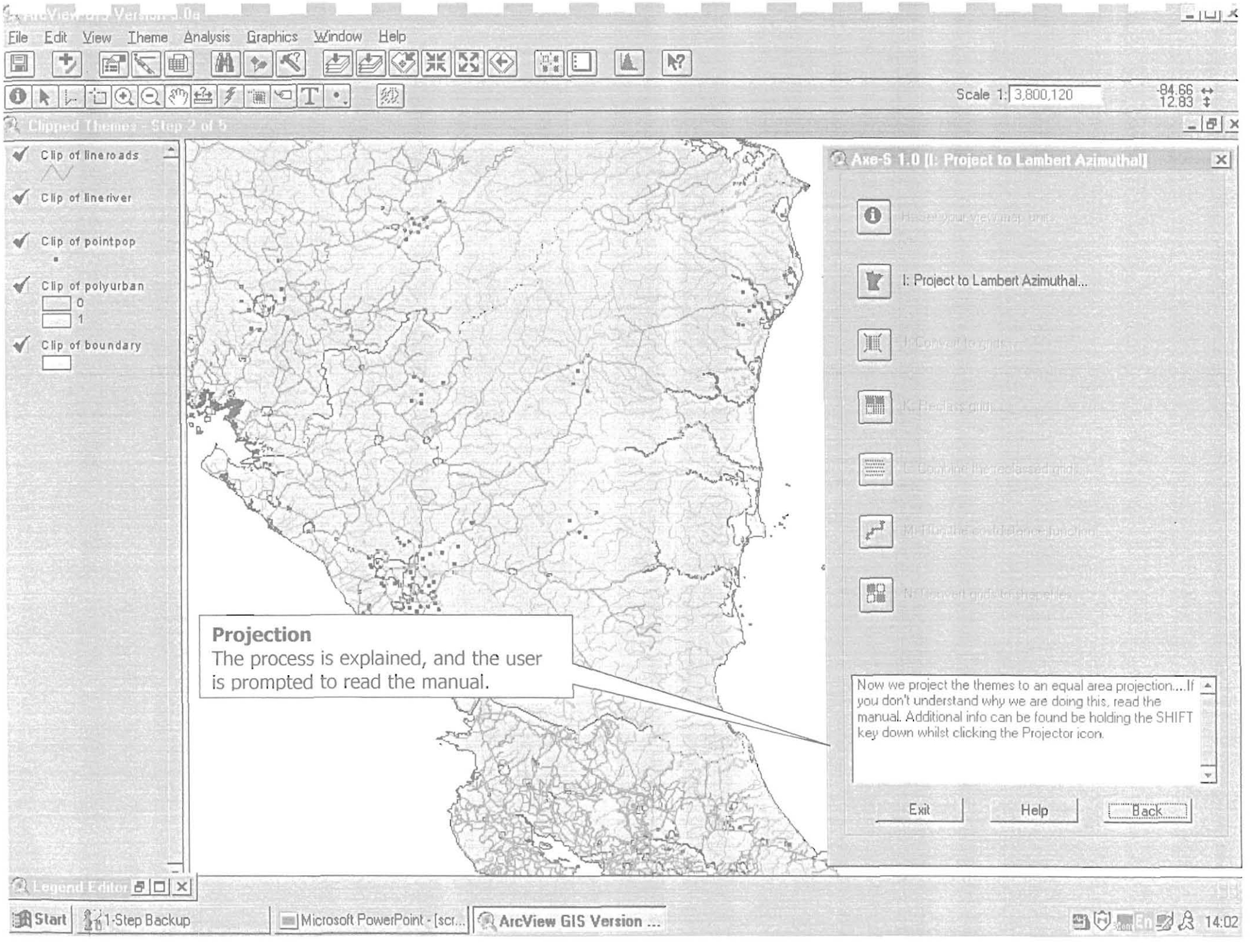

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Friction Surface Themes - Step 1 of 5
Grdshp1.shp
0
1
Reclass of Urban Ar
0
1
No Data
Points
Rivers
Roads
1
2
3
Urban Areas
0
1 - 25
25 - 50
50 - 75
75 - 100
No Data
Boundary
Clipping selection
The red box indicates the region to be clipped. You can move and resize the box until you achieve the region you want to study.
Axe-S 1.0 [G: Clip themes with clip box...]
Work Directory:
d:\
G: Clip themes with clip box ...
When you have finished sizing the box, click on the CLIP THEMES button and the coverages will be clipped and placed in a new View. This can take a while, go get some lunch.
Exit
Help
Next
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:36

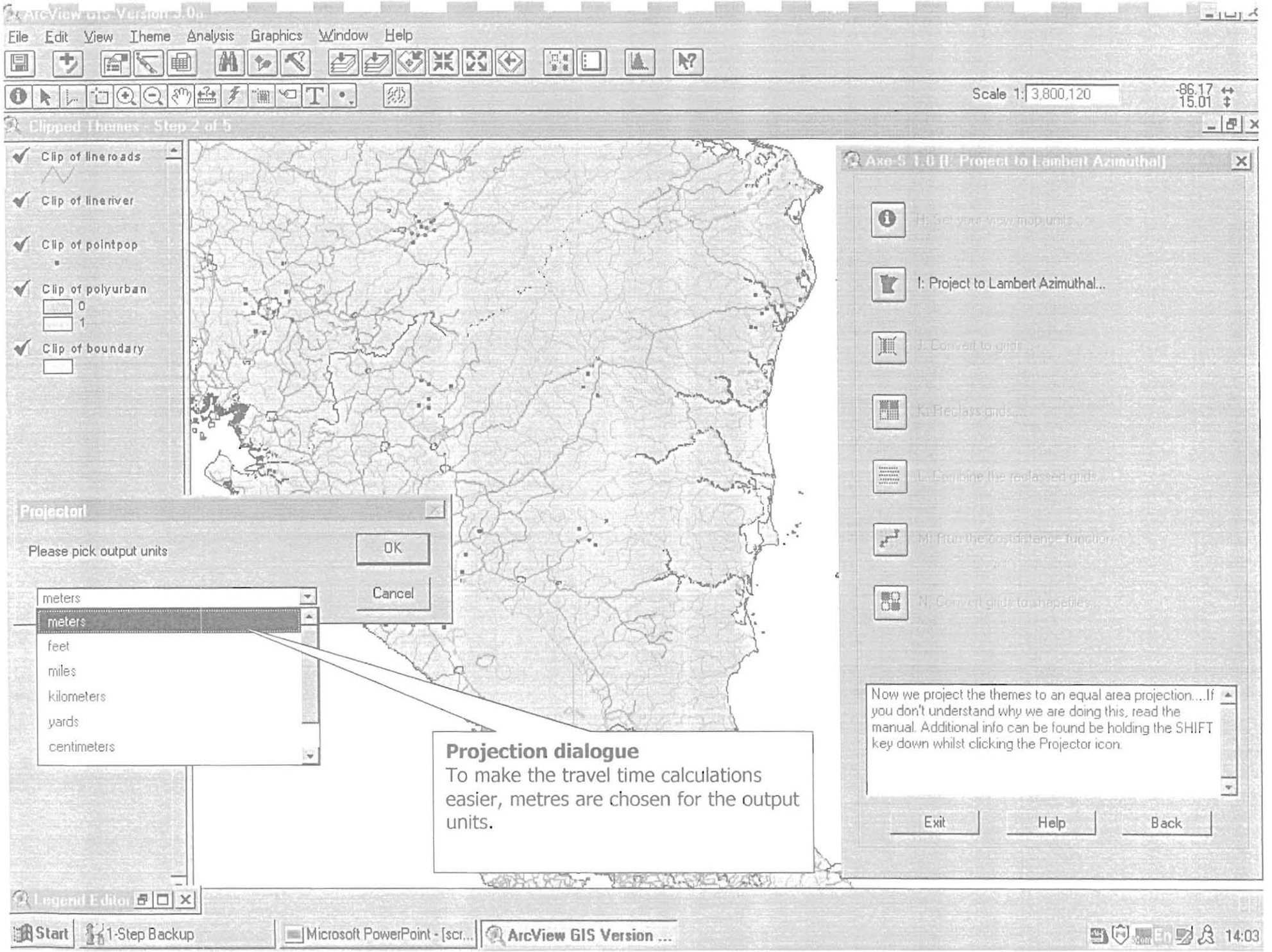

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-83.27
11.21
Clipped Themes - Step 2 of 5
Clip of polyurban
0
1
Your point theme has a selection
Click Yes to retain selection
Yes
No
Work Directory:
d:\
G: Clip themes with clip box ...
When you have finished sizing the box, click on the CLIP THEMES button and the coverages will be clipped and placed in a new View. This can take a while, go get some lunch.
Exit
Help
Next
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:36

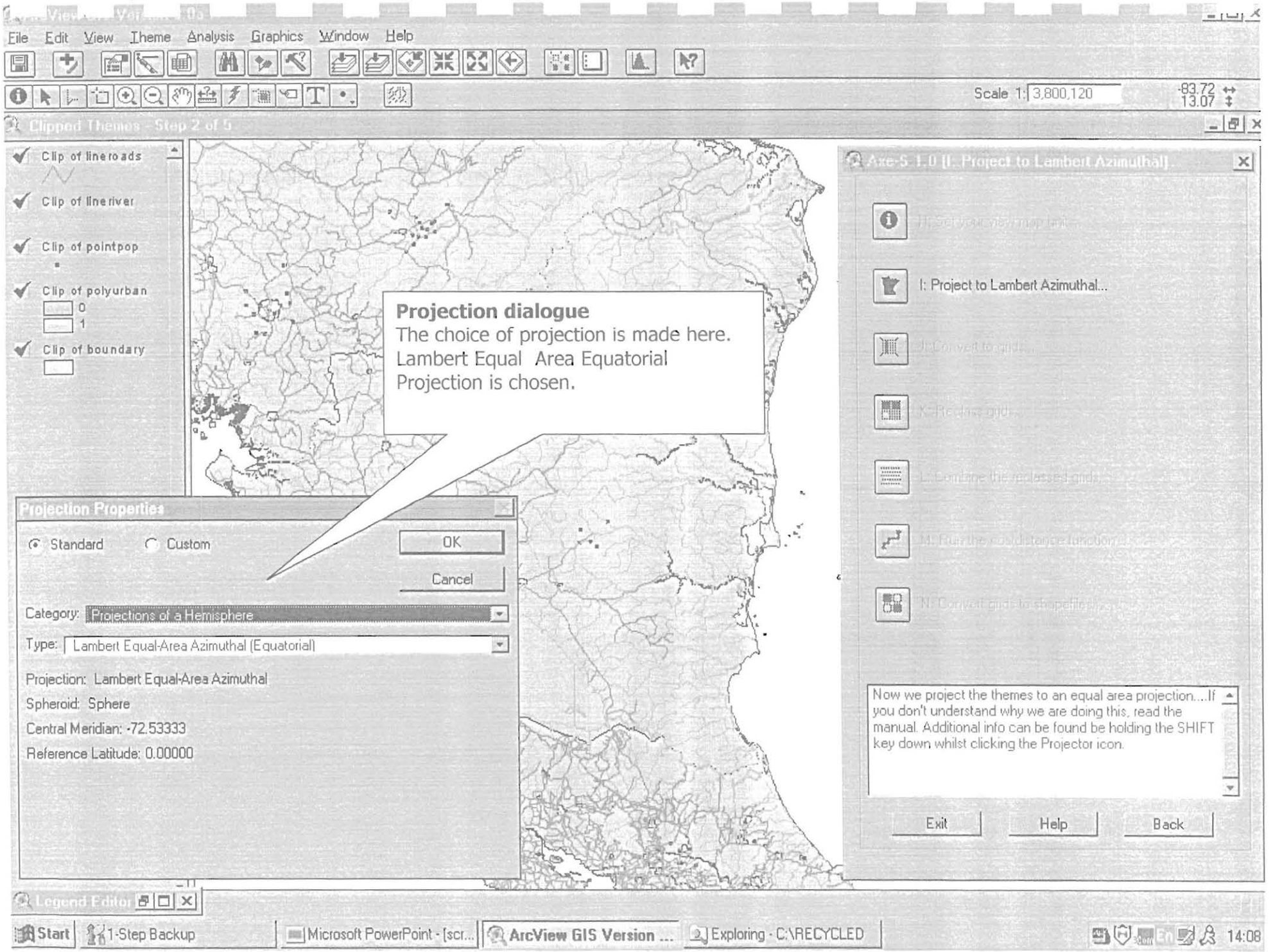

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-85.50
13.14
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
End of stage 1
We have now completed the data entry part of the model. Now the interface will switch to part 2
Axe-S 1.0 [Cool! Click NEXT to move on]
Work Directory:
d:\
All themes have been clipped to the same extent. Click on the NEXT button to continue....
Exit
Help
Next
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
13:45

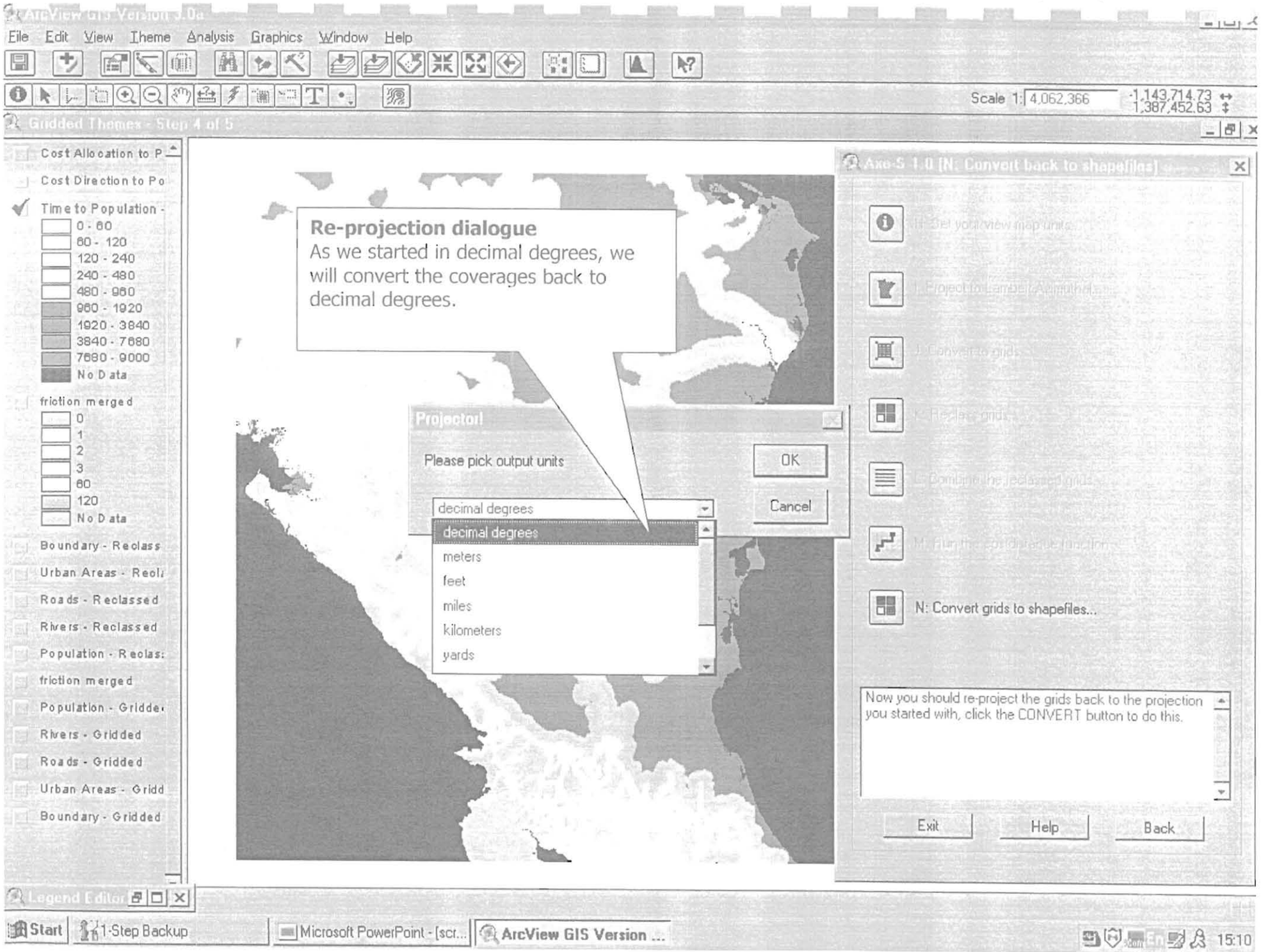

File Edit View Theme Analysis Graphics Window Help
Scale 1:
-84.48
12.23
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
Map Units
The interface needs to know the map units, so that we can project the maps to an Equal Area Projection
Arc S 1.0 [H: Set your view map units]
H: Set your view map units...
Before we can project these covers, we need to set the Map Units. Click the Map Units button, and in the pop up dialogue, set map units to its correct value.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
14:01

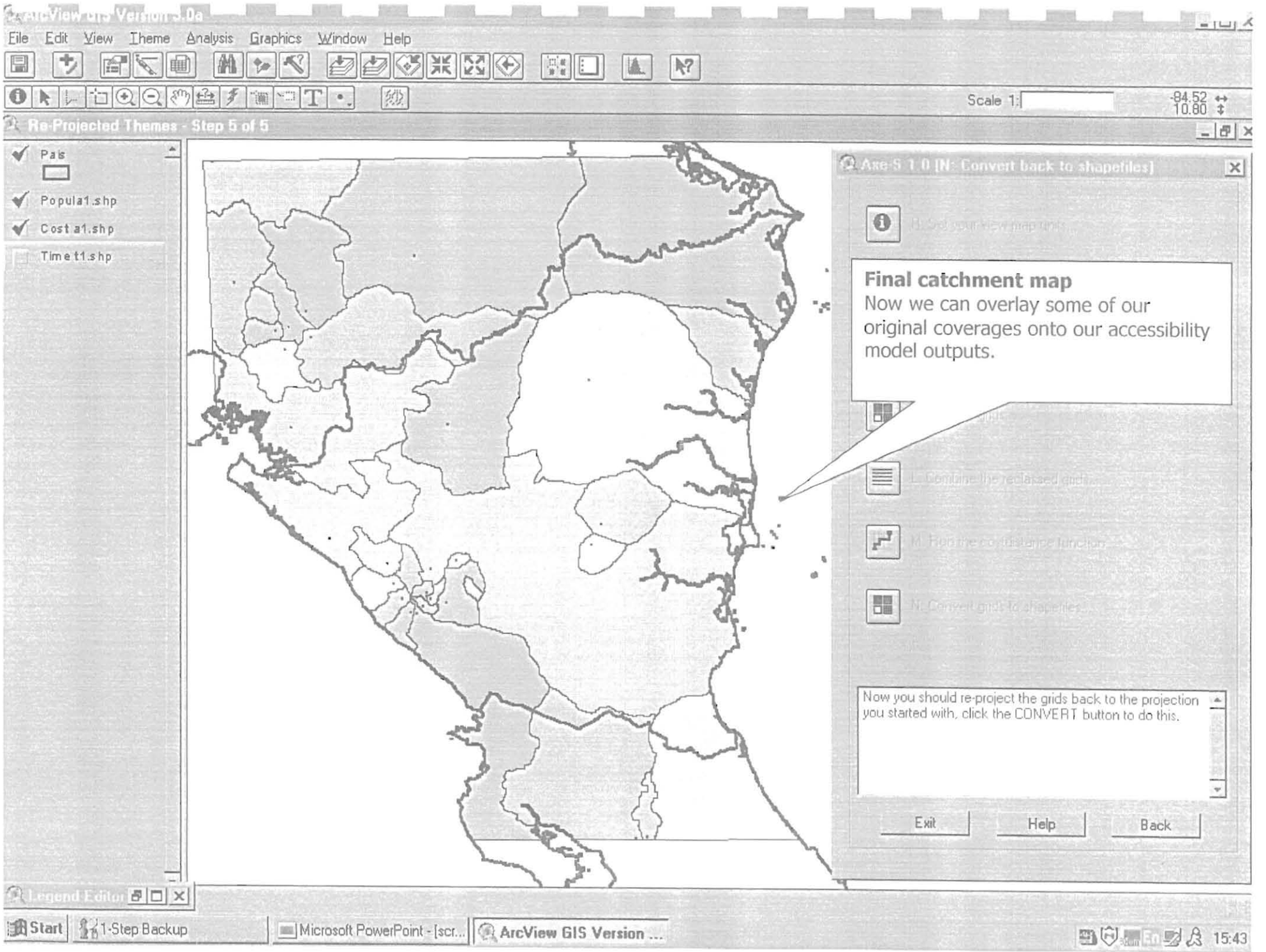

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
Map Units
This example is in decimal degrees
View Properties
Name: Clipped Themes - Step 2 of 5
Creation Date: 03 April 1999 13:41:12
Creator:
OK
Cancel
Map Units: decimal degrees
Distance Units: unknown
Projection: None
Projection...
Area Of Interest...
Comments:
Axe-S 1.0 [H: Set your view map units]
H: Set your view map units...
Before we can project these covers, we need to set the Map Units. Click the Map Units button, and in the pop up dialogue, set map units to its correct value.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
14:01

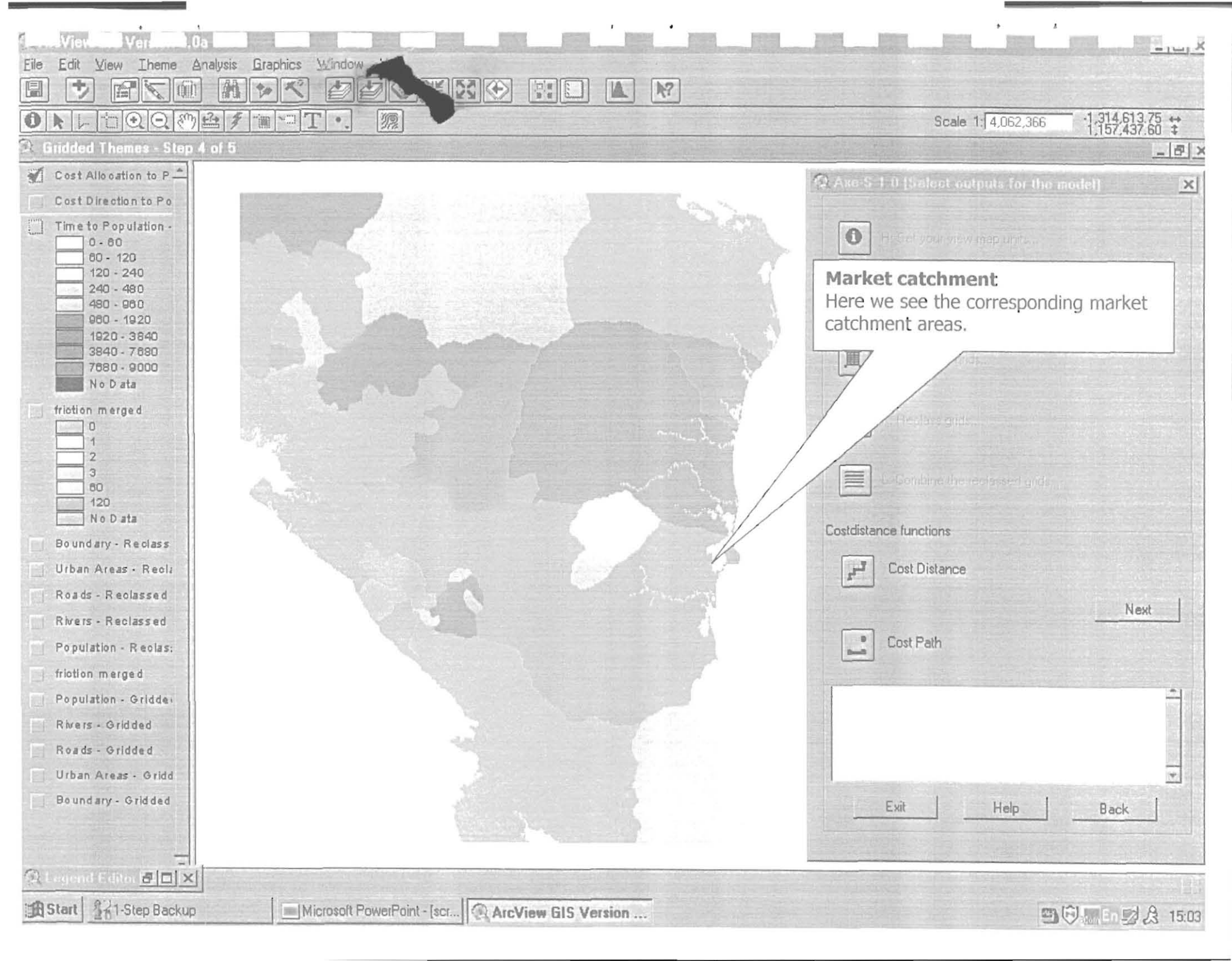

File Edit View Theme Analysis Graphics Window Help
Scale 1: 3,800,120
-84.66
12.83
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
Axe-6 1.0 [I: Project to Lambert Azimuthal]
I: Project to Lambert Azimuthal...
Projection
The process is explained, and the user is prompted to read the manual.
Now we project the themes to an equal area projection....If you don't understand why we are doing this, read the manual. Additional info can be found be holding the SHIFT key down whilst clicking the Projector icon.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
14:02

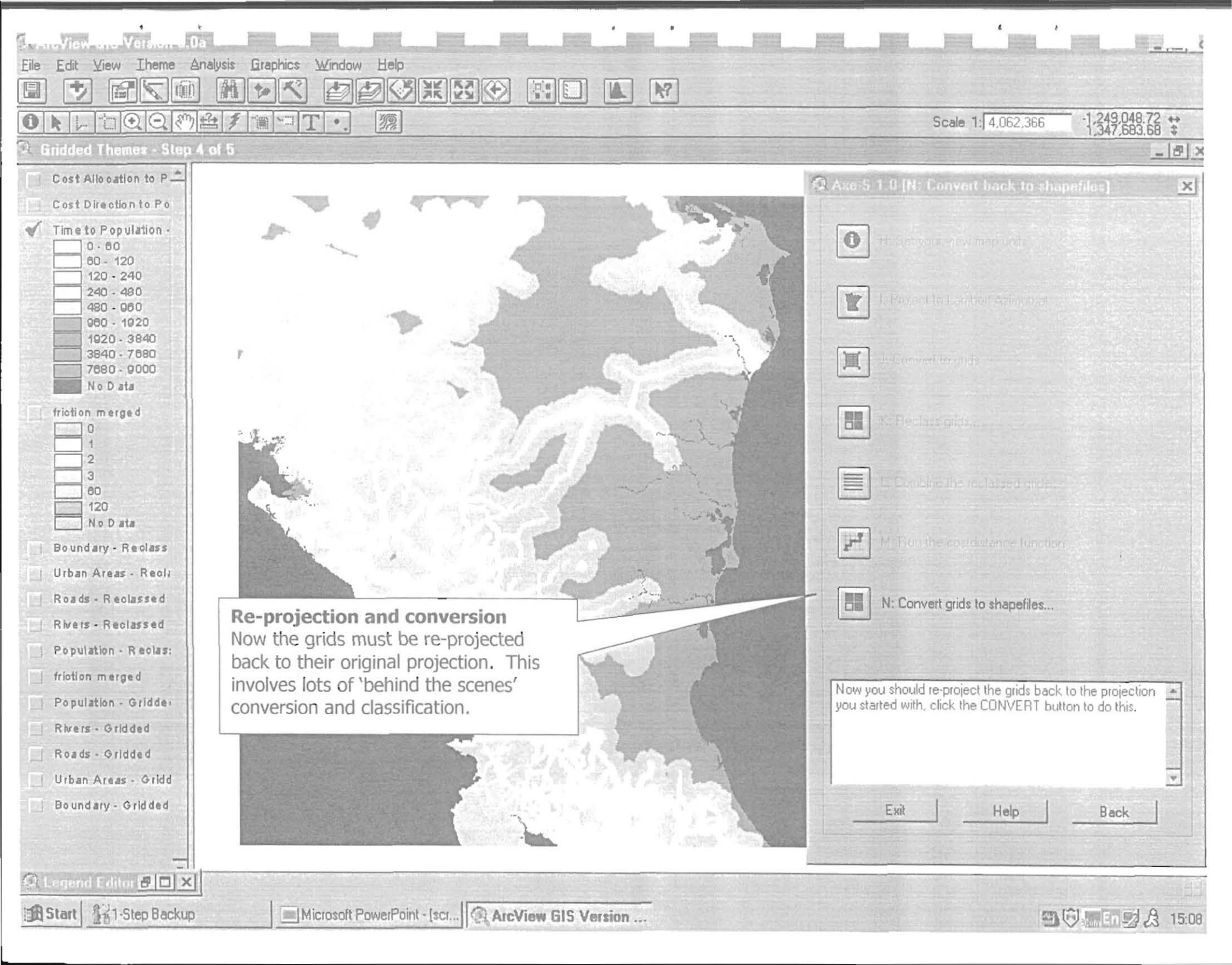

File Edit View Theme Analysis Graphics Window Help
Scale 1: 3,800,120
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
Projector!
Please pick output units
OK
Cancel
meters
meters
feet
miles
kilometers
yards
centimeters
Projection dialogue
To make the travel time calculations easier, metres are chosen for the output units.
Axe-S 1.0 [I: Project to Lambert Azimuthal]
1: Project to Lambert Azimuthal...
Now we project the themes to an equal area projection....If you don't understand why we are doing this, read the manual. Additional info can be found be holding the SHIFT key down whilst clicking the Projector icon.
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
14:03

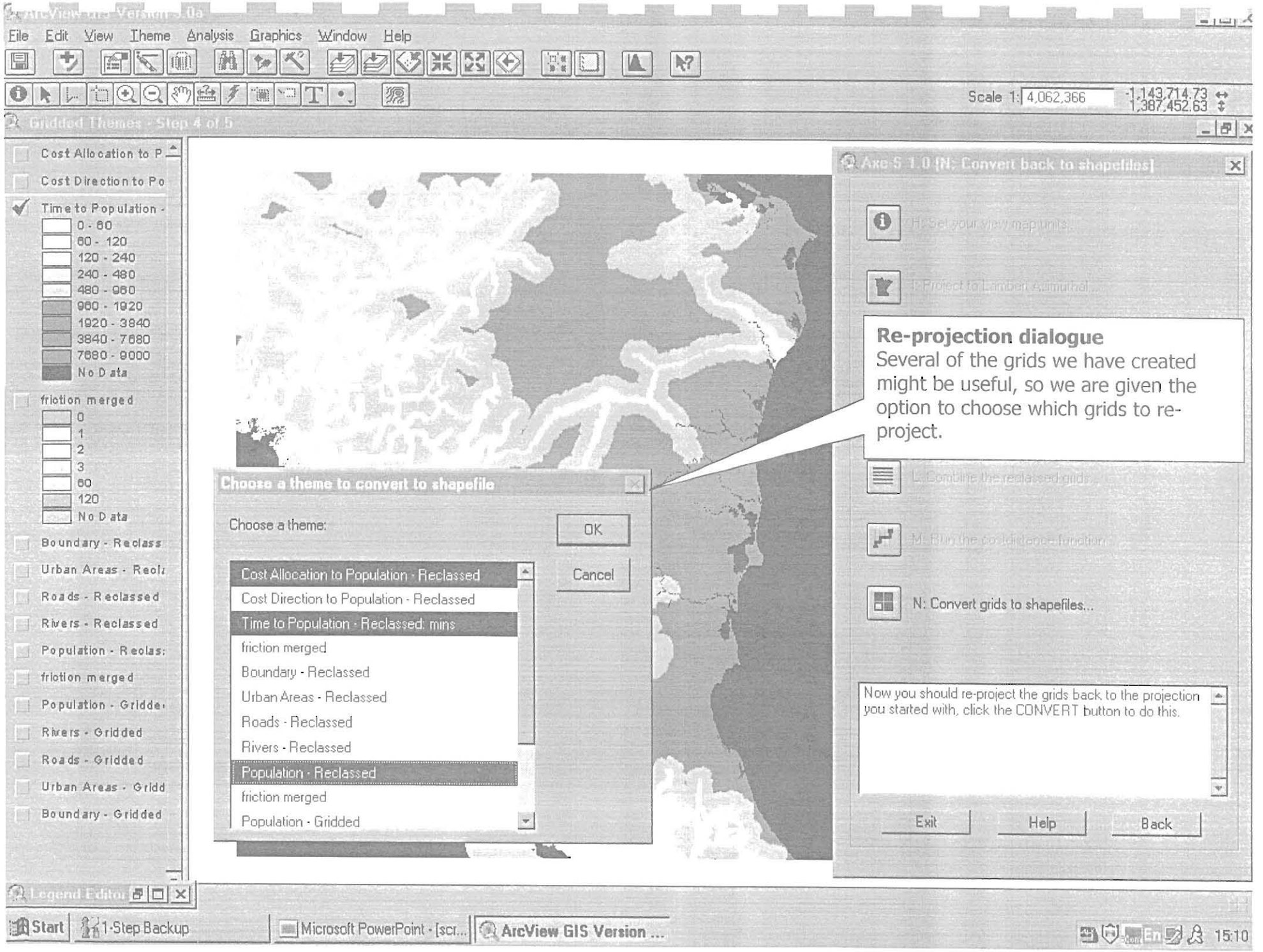

File Edit View Theme Analysis Graphics Window Help
Scale 1: 3,800,120
Clipped Themes - Step 2 of 5
Clip of lineroads
Clip of lineriver
Clip of pointpop
Clip of polyurban
0
1
Clip of boundary
Projection dialogue
The choice of projection is made here.
Lambert Equal Area Equatorial
Projection is chosen.
Projection Properties
Standard
Custom
OK
Cancel
Category: Projections of a Hemisphere
Type: Lambert Equal-Area Azimuthal (Equatorial)
Projection: Lambert Equal-Area Azimuthal
Spheroid: Sphere
Central Meridian: -72.53333
Reference Latitude: 0.00000
Axe-S 1.0 [I: Project to Lambert Azimuthal]
I: Project to Lambert Azimuthal...
Now we project the themes to an equal area projection....If you don't understand why we are doing this, read the manual. Additional info can be found be holding the SHIFT key down whilst clicking the Projector icon.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
Exploring - C:\RECYCLED
14:08

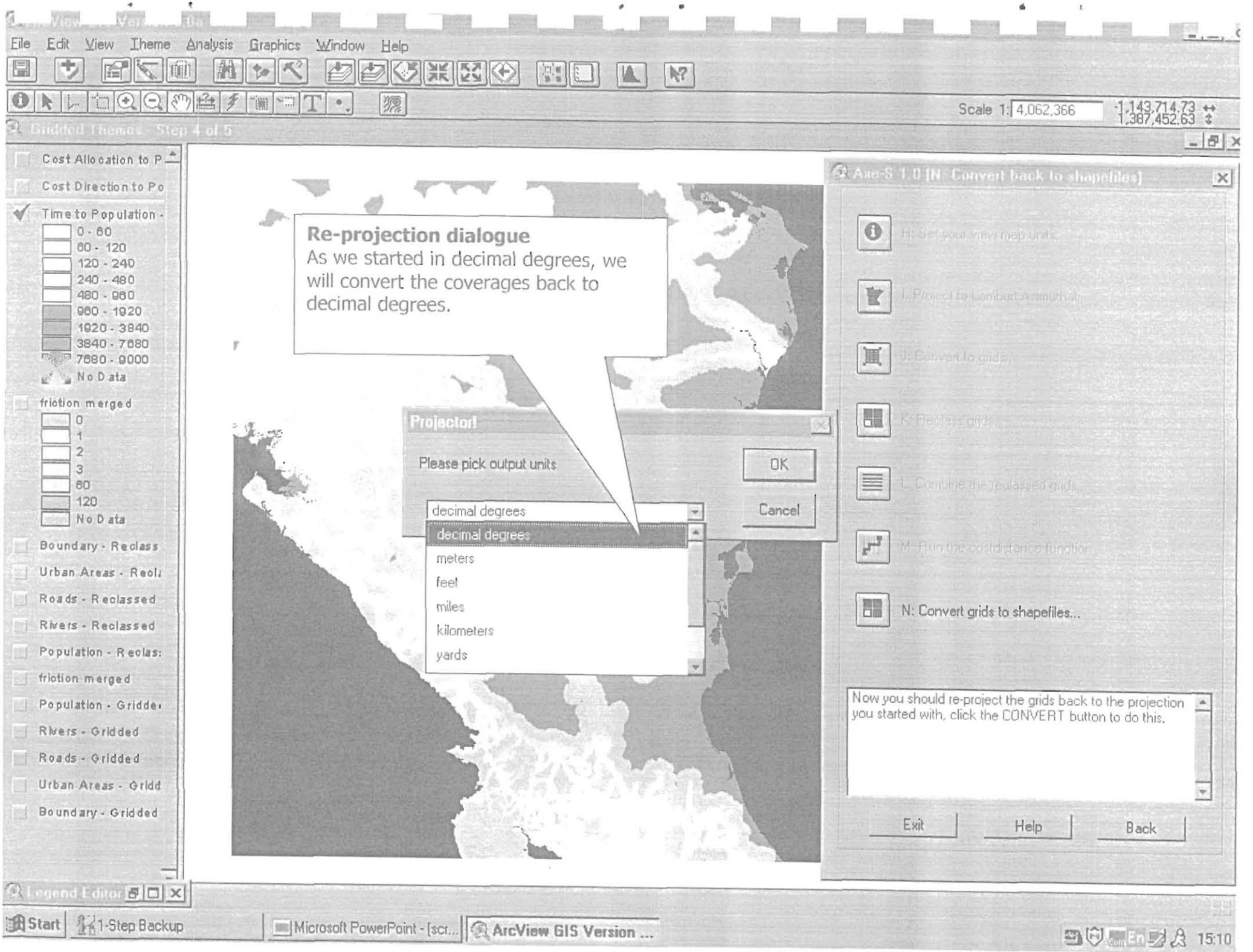

File Edit View Theme Analysis Graphics Window Help
Scale 1: 4,062,366
-1,143,714.73
1,387,452.63
Gridded Themes - Step 4 of 5
Cost Allocation to P
Cost Direction to Po
Time to Population -
0 - 60
60 - 120
120 - 240
240 - 480
480 - 960
960 - 1920
1920 - 3840
3840 - 7680
7680 - 9000
No Data
friction merged
0
1
2
3
60
120
No Data
Boundary - Reclass
Urban Areas - Recl
Roads - Reclassed
Rivers - Reclassed
Population - Reclas
friction merged
Population - Gridde
Rivers - Gridded
Roads - Gridded
Urban Areas - Gridd
Boundary - Gridded
Re-projection dialogue
As we started in decimal degrees, we will convert the coverages back to decimal degrees.
Projector!
Please pick output units
OK
Cancel
decimal degrees
decimal degrees
meters
feet
miles
kilometers
yards
Axe-S 1.0 [N: Convert back to shapefiles]
N: Convert grids to shapefiles...
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:10

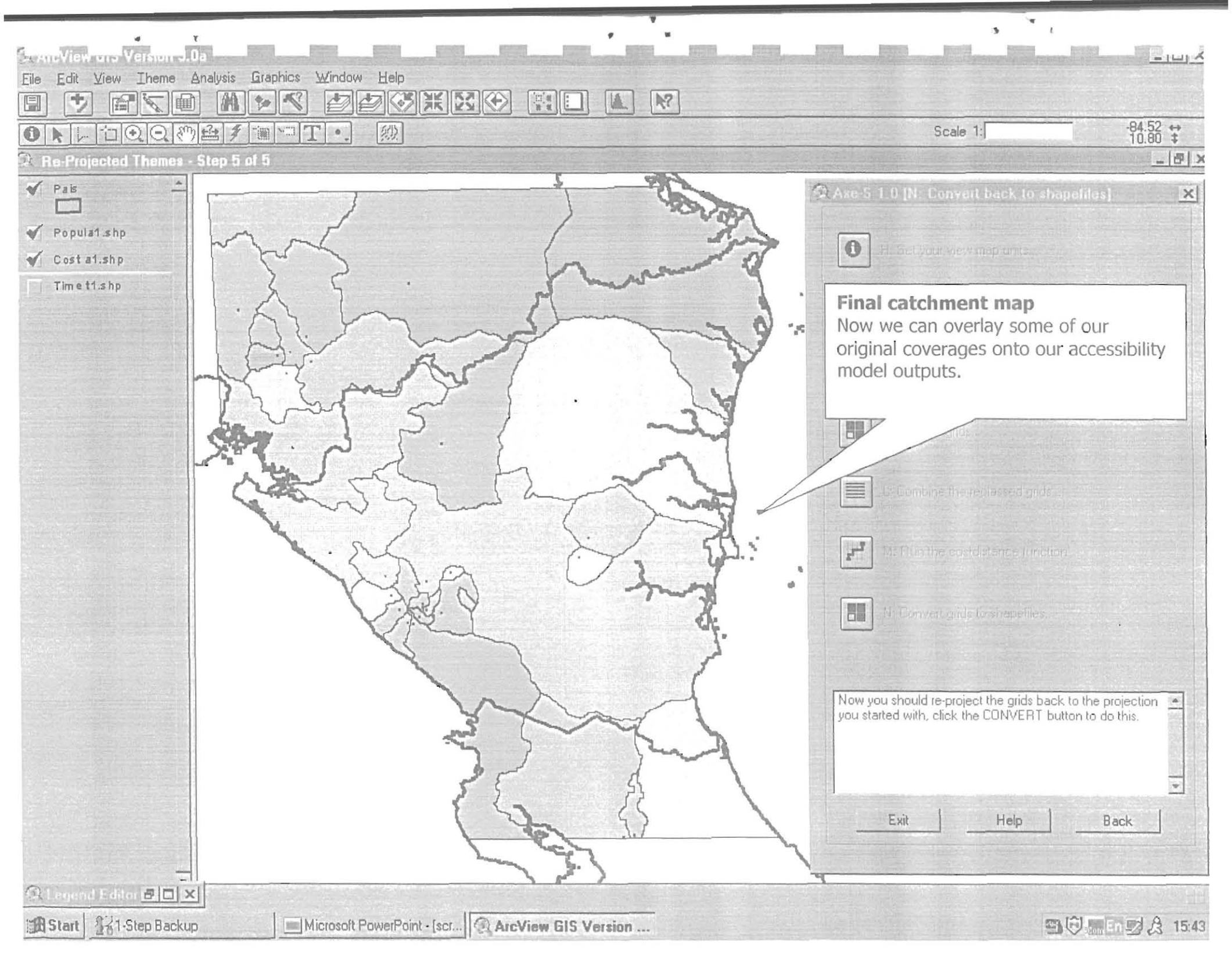

File Edit View Theme Analysis Graphics Window Help
Scale 1:
Re-Projected Themes - Step 5 of 5
Pais
Popula1.shp
Cost a1.shp
Time t1.shp
Final catchment map
Now we can overlay some of our original coverages onto our accessibility model outputs.
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:43

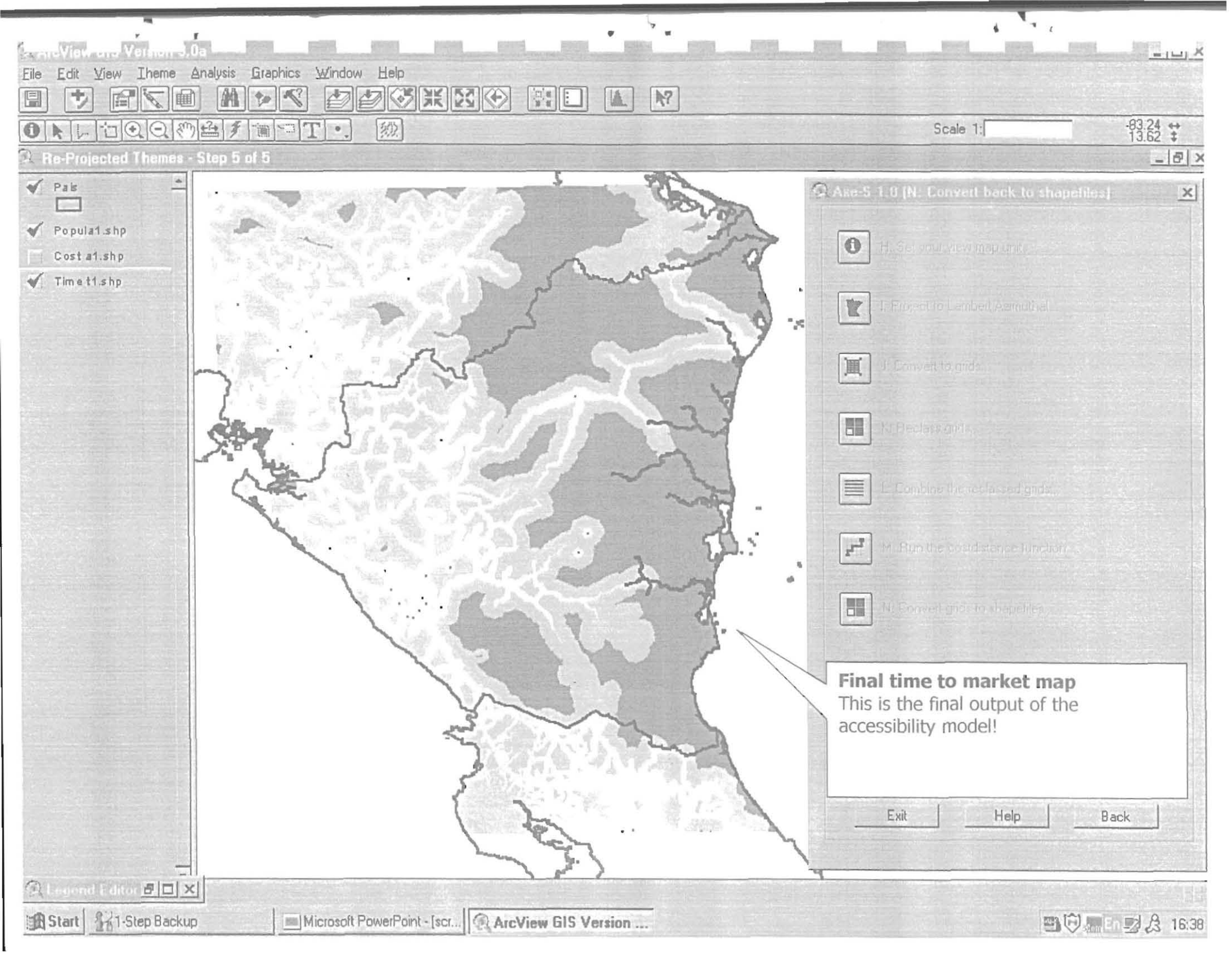

File Edit View Theme Analysis Graphics Window
Scale 1: 4,062,366
-1,314,613.75
1,157,437.60
Gridded Themes - Step 4 of 5
Cost Allocation to P
Cost Direction to Po
Time to Population -
0 - 60
60 - 120
120 - 240
240 - 480
480 - 960
960 - 1920
1920 - 3840
3840 - 7680
7680 - 9000
No Data
friction merged
0
1
2
3
60
120
No Data
Boundary - Reclass
Urban Areas - Recl
Roads - Reclassed
Rivers - Reclassed
Population - Reclas:
friction merged
Population - Gridde
Rivers - Gridded
Roads - Gridded
Urban Areas - Gridd
Boundary - Gridded
Market catchment
Here we see the corresponding market catchment areas.
Costdistance functions
Cost Distance
Next
Cost Path
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:03


File Edit View Theme Analysis Graphics Window Help
Scale 1: 4,062,366
-1,249,048.72
1,347,683.68
Gridded Themes - Step 4 of 5
Cost Allocation to P
Cost Direction to Po
Time to Population -
0 - 60
60 - 120
120 - 240
240 - 480
480 - 960
960 - 1920
1920 - 3840
3840 - 7680
7680 - 9000
No Data
friction merged
0
1
2
3
60
120
No Data
Boundary - Reclass
Urban Areas - Recl
Roads - Reclassed
Rivers - Reclassed
Population - Reclas
friction merged
Population - Gridde
Rivers - Gridded
Roads - Gridded
Urban Areas - Gridd
Boundary - Gridded
Re-projection and conversion
Now the grids must be re-projected back to their original projection. This involves lots of 'behind the scenes' conversion and classification.
Axe-S 1.0 [N: Convert back to shapefiles]
N: Convert grids to shapefiles...
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:08


File Edit View Theme Analysis Graphics Window Help
Scale 1: 4,062,366
Gridded Themes - Step 4 of 5
Cost Allocation to P
Cost Direction to Po
Time to Population -
0 - 60
60 - 120
120 - 240
240 - 480
480 - 960
960 - 1920
1920 - 3840
3840 - 7680
7680 - 9000
No Data
friction merged
0
1
2
3
60
120
No Data
Boundary - Reclass
Urban Areas - Recl
Roads - Reclassed
Rivers - Reclassed
Population - Reclas
friction merged
Population - Gridde
Rivers - Gridded
Roads - Gridded
Urban Areas - Gridd
Boundary - Gridded
Legend Editor
Choose a theme to convert to shapefile
Choose a theme:
OK
Cancel
Cost Allocation to Population - Reclassed
Cost Direction to Population - Reclassed
Time to Population - Reclassed: mins
friction merged
Boundary - Reclassed
Urban Areas - Reclassed
Roads - Reclassed
Rivers - Reclassed
Population - Reclassed
friction merged
Population - Gridded
Axe-S 1.0 [N: Convert back to shapefiles]
H: Set your view map units...
I: Project to Lambert Azimuthal...
L: Combine the reclassed grids...
M: Run the confidence function...
N: Convert grids to shapefiles...
Re-projection dialogue
Several of the grids we have created might be useful, so we are given the option to choose which grids to re-project.
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:10


File Edit View Theme Analysis Graphics Window Help
Scale 1: 4,062,366
-1,143,714.73
1,387,452.63
Gridded Themes - Step 4 of 5
Cost Allocation to P
Cost Direction to Po
Time to Population -
0 - 60
60 - 120
120 - 240
240 - 480
480 - 960
960 - 1920
1920 - 3840
3840 - 7680
7680 - 9000
No Data
friction merged
0
1
2
3
60
120
No Data
Boundary - Reclass
Urban Areas - Recl
Roads - Reclassed
Rivers - Reclassed
Population - Reclas
friction merged
Population - Gridde
Rivers - Gridded
Roads - Gridded
Urban Areas - Gridd
Boundary - Gridded
Legend Editor
Re-projection dialogue
As we started in decimal degrees, we will convert the coverages back to decimal degrees.
Projector!
Please pick output units
OK
Cancel
decimal degrees
decimal degrees
meters
feet
miles
kilometers
yards
Axe-S 1.0 [N: Convert back to shapefiles]
H: Set your view map units...
I: Project to Lambert Azimuthal...
J: Convert to grids...
K: Reclass grid...
L: Combine the reclassed grids...
M: Run the cost/distance function...
N: Convert grids to shapefiles...
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:10


ArcView GIS Version 3.0a
File Edit View Theme Analysis Graphics Window Help
Scale 1:
-84.52
10.80
Re-Projected Themes - Step 5 of 5
Pais
Popula1.shp
Cost a1.shp
Time t1.shp
Axe-5 1.0 [N: Convert back to shapefiles]
Final catchment map
Now we can overlay some of our original coverages onto our accessibility model outputs.
Now you should re-project the grids back to the projection you started with, click the CONVERT button to do this.
Exit
Help
Back
Legend Editor
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
15:43


File Edit View Theme Analysis Graphics Window Help
Scale 1:
Re-Projected Themes - Step 5 of 5
Pais
Popula1.shp
Cost a1.shp
Time t1.shp
Final time to market map
This is the final output of the accessibility model!
Exit
Help
Back
Start
1-Step Backup
Microsoft PowerPoint - [scr...
ArcView GIS Version ...
16:38