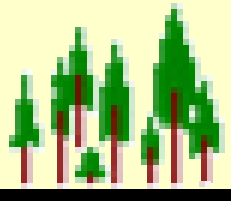
Introduction & Loading of the Landscape Management System

University of Washington

College of Forest Resources

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE



Silviculture Laboratory

http://lms.cfr.washington.edu/

Rural Technology Initiative

http://www.ruraltech.org/

Welcome to the Landscape Management System 2.0.45 Tutorial. The objective of this tutorial is to provide an introduction in the use of the Landscape Management System (LMS). This tutorial is organized in a series of sections, shown in the table of contents. For purposes of instruction, users will be shown first how to operate LMS and LMS companion programs with a pre-installed example portfolio. Later in this tutorial users are provided with instruction on how to create a new portfolio from user supplied data .

Introduction

The landscape Management System (LMS) is an evolving set of software tools designed to aid in landscape level management of forest resources. LMS is being developed as part of the Landscape Management Project at the Silviculture Laboratory, College of Forest Resources, University of Washington and the Yale School of Forestry and Environmental Studies.

LMS coordinates the execution and information flow between many different computer programs (60+). These programs: format, classify, summarize, and export information; project tree growth and snag decay; manipulate stand inventories; and present stand and landscape level visualization and graphics.

What is the Landscape Management Project?

The Landscape Management Project is a cooperative between the Silviculture Laboratory, College of Forest Resources, University of Washington, Yale School of Forestry and Environmental Studies, and the USDA Forest Service, State and Private Forestry.

The Landscape Management Project was created to investigate methods and facilitate techniques for the management of forested landscapes. One focus of the project is to emphasize management over broader temporal and spatial scales. Funding for the project was initiated through the efforts of Washington Congressman Norm Dicks. A major effort of the Landscape Management Project is to integrate and/or develop necessary technologies to facilitate landscape level management.

Description of the Landscape Management System

The Landscape Management System integrates forest inventory information, geographic information, computerized growth models, decision support systems, and other applications to facilitate landscape, ecosystem, and watershed management. LMS projects changes in individual stands and landscapes up to 50,000 acres; it can be used on any forested region for which there is a growth model and appropriate inventory information. LMS can be used for management, planning, policy-making, and education. It has been designed with the following features:

Modular – It can incorporate many forms of inventory data, geographic information, growth models, and decision support systems; various parts of the system can be replaced as new information and techniques become available or they can be used as components in other computerized systems.

Flexible – LMS works with a representative tree list. By maintaining the large amount of information about stands contained in a tree list, LMS can incorporate new management objectives and measures that can be linked to the tree list information.

Easy to Use – LMS is a Microsoft Windows ® application and operates in a point and click manner.

Projects Growth – LMS projects growth at the stand level using existing growth models (of your choice). Changes in stands can be projected over time under different management regimes. Landscapes are the aggregate of the simulations for the individual stands.

Presents Visualizations – LMS, in concert with the Stand Visualization System (SVS) and EnVision, provides visualizations of the projected stands, which can be used to provide information on changing habitats, susceptibilities to fire, etc., along with wood quality and quantity in graphic and tabular forms.

LMS coordinates the activities of various pieces of software that, in combination, can be used for the management, projection, summarization, and visualization of information about stands on the landscape. It is an integrative effort that combines technologies and available software into a comprehensive system that facilitates landscape level planning, management, and analysis.

In LMS, landscapes are composed of stands. These stands are projected through time using available forest projection models (growth and yield or successional). Existing models are incorporated into the system using data filters that translate and reformat data as needed to accommodate the projection and analysis systems. Other attributes of a stand can be projected by providing projection models for those attributes.

The stands in LMS are represented by a tree list for each stand. The tree list includes species, diameter, height, trees per acre, and other attributes for trees in the stand. Stand average information can also be used. These tree lists are the basic unit of projection and allow LMS to be flexible because information about individual trees on the landscape is maintained as the stands are projected.

LMS System Requirements

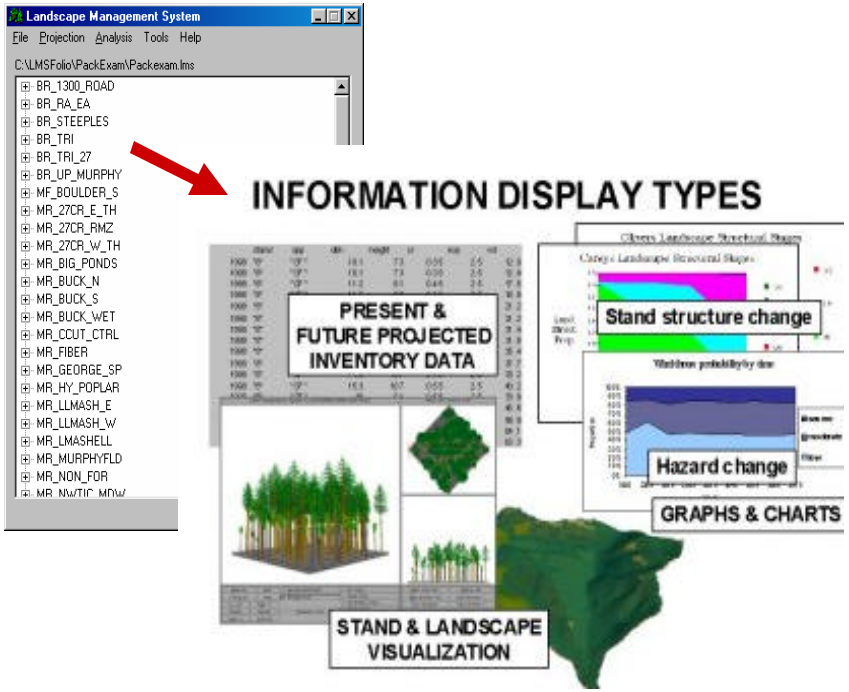
The Landscape Management System run on most machines capable of running Microsoft Windows. The specific requirements are:

• IBM Pentium PC running Windows 98 is required as a minimum, a Pentium II (or higher) 400Mhz (or higher) running Windows 98/NT/2000 is recommended.

• SVGA video required, 8MB minimum recommended, 32MB or more preferred. 2D hardware acceleration useful for stand visualization. 3D OpenGL hardware acceleration useful for landscape visualization.

• 64MB RAM required, 128MB or greater recommended.

• 60MB of hard drive space is required. The data and intermediate files can use considerably more space.



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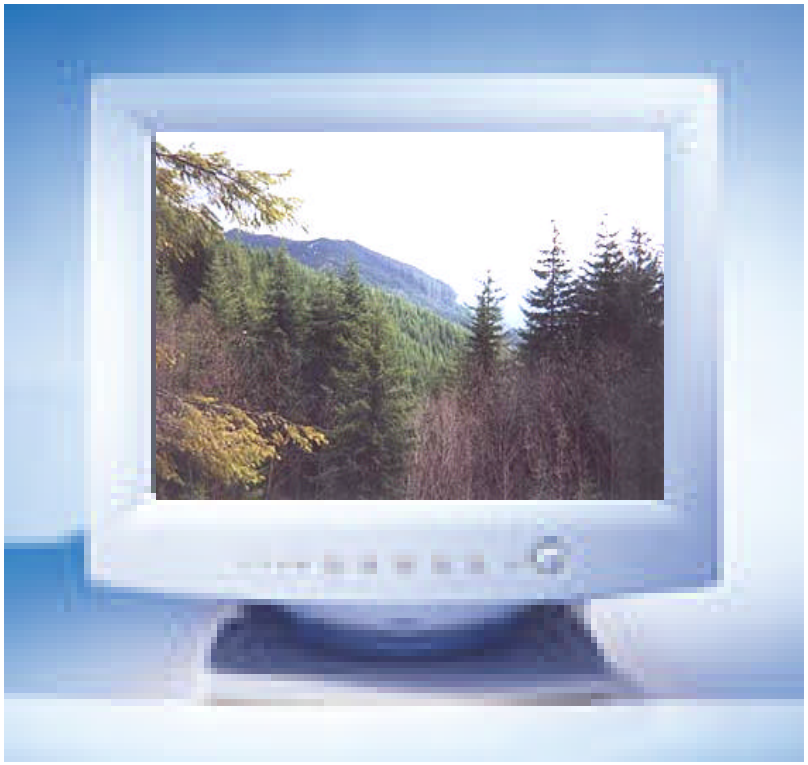
The Landscape Management System, LMS, is used by forest managers to estimate the performance of multiple forest stands in a spatial and temporal context. Individual forest stands may be large or small. Collectively these stands may comprise an individual ownership or a watershed. They may be contiguous or scattered but when the management of one stand depends upon the activities in the others, we call the assemblage: a landscape portfolio. Several types of data files are needed to create a landscape portfolio:



Inventory Information

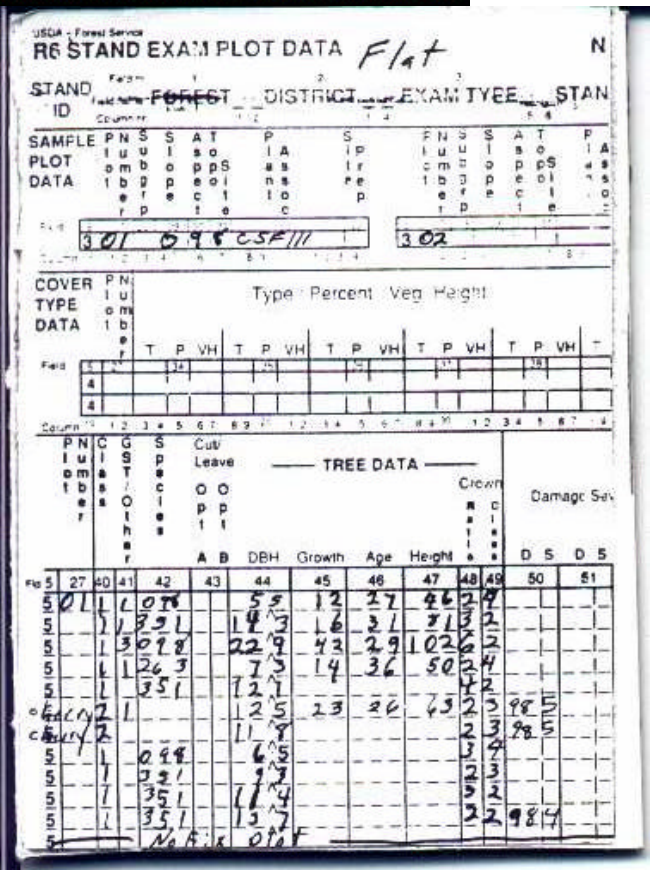
Stand Attributes

Digital Elevation

Spatial Characteristics

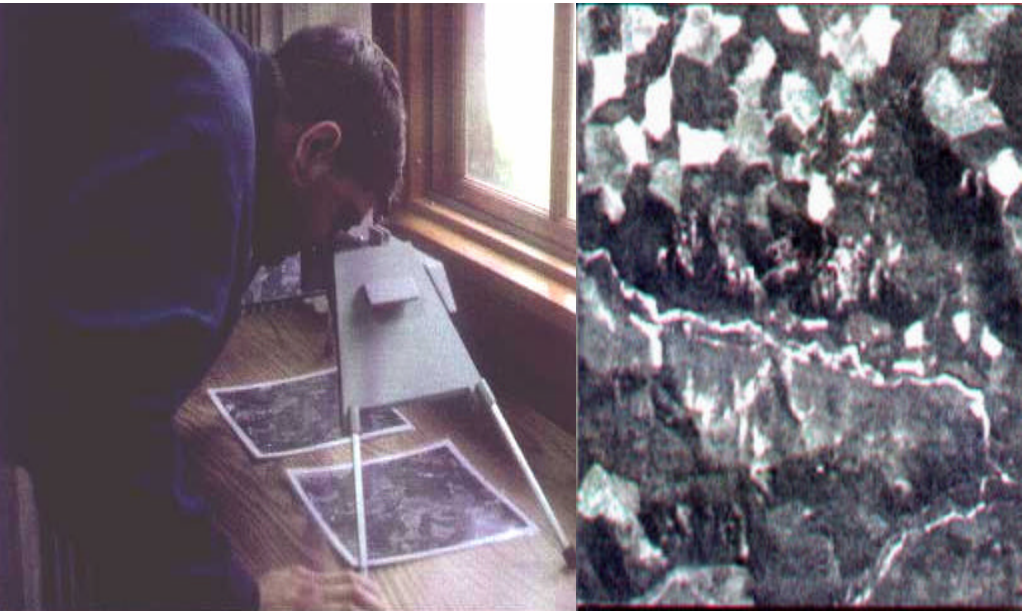
Inventory information originates with a field sample or cruise of the trees for each stand within the landscape area. A minimum of 20 tree records per stand is necessary for the growth model to operate correctly. These tree records when combined with the appropriate expansion factor (sampling multiplier) and entered into a formatted MS Excel spread sheet become the tree inventory data.

Tree data is used to create an inventory file containing the initial year of the portfolio, the stand name, the tree record number, species, DBH, height, crown ratio, expansion factor, volume per tree, and maximum crown width. Height, volume per tree, and maximum crown width will be calculated by the growth model if unavailable from field sampling information. Note: proper species codes are discussed in Section 11 (Scenario Files)



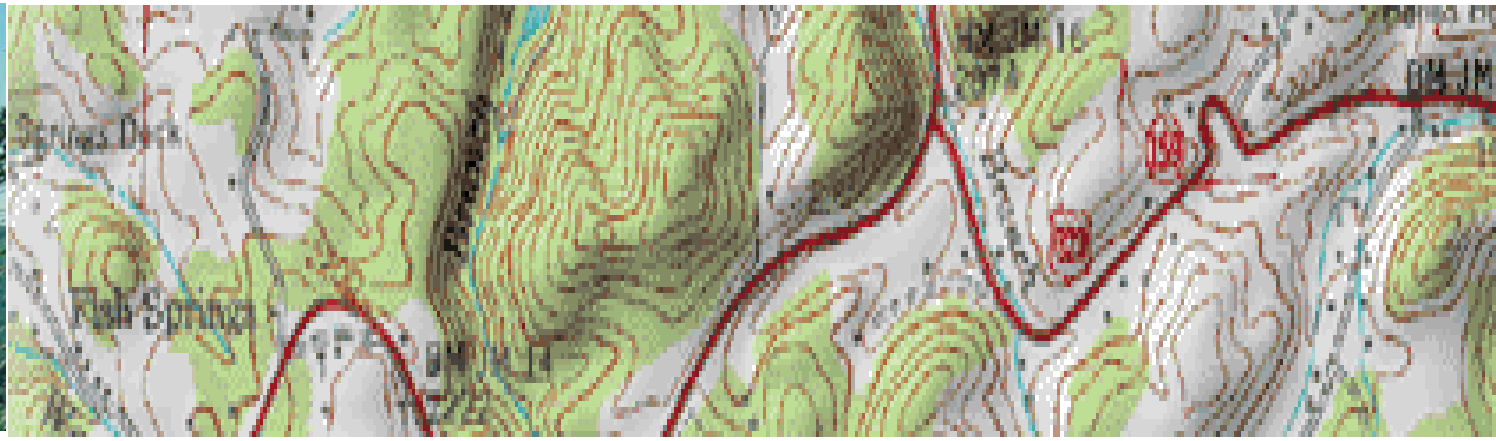
; Year	Stand	Tree#	Species	DBH	Height	CrwnRatio	Exp	VolPerTree	MCW
2000	STAND1	1	DF	18.1	126	0.54	2.44	340	20.7
2000	STAND1	2	DF	16.7	125	0.53	2.44	298	19.8
2000	STAND1	3	DF	16.3	103	0.52	2.44	236	19.6
2000	STAND1	4	DF	19.8	131.7	0.58	2.45	424	21.7
2000	STAND1	5	DF	22.1	127	0.59	2.45	623	23
2000	STAND1	6	DF	11.5	77.4	0.46	2.44	80	16.2
2000	STAND1	7	RA	9.9	61	0.25	2.42	75	21.1

Stands, also referred to as polygons in GIS, are management units created from historical or anticipated use patterns.



Stand attribute information can be taken from a combination of field data, aerial and ortho photographs, and Geographical Information System (GIS) outputs. Stand data is assembled in a formatted MS Excel spread sheet that is easily imported into LMS. Needed is stand name, site index, age, slope, aspect, elevation, and acres. The location column is for use with the Forest Vegetation Simulator (FVS) growth model. A 0 is entered here as a default value. Habitat Code and Lat may be entered as 0 in most cases. Plot is entered as 1.

;Stand	Plots	Location	SiteIndex	HabitatCode	Age	Slope	Aspect	Elev	Lat	Acres
STAND1	1	0	120	0	9	28.1	249.1	1509.1	0	15.2



Digital elevation information is an electronically available topographic map. Digital elevation maps can be downloaded from the United States Geological Service (USGS) web site. In the GIS programs, Arc View and Arc Info, map layers such as roads, streams, and stand boundaries are created to make up the **Spatial characteristics** of the landscape. When the spatial characteristics and the digital elevation information are aligned in GIS to the same coordinate system and selected for the area of the landscape, this data is ready for import to the LMS.

It should be noted that GIS data is only necessary for the landscape visualization capability of LMS. All other capabilities including stand visualization are available with only inventory and stand data. More discussion of these files is included in the **Creating a New Portfolio** section at the end of this tutorial.

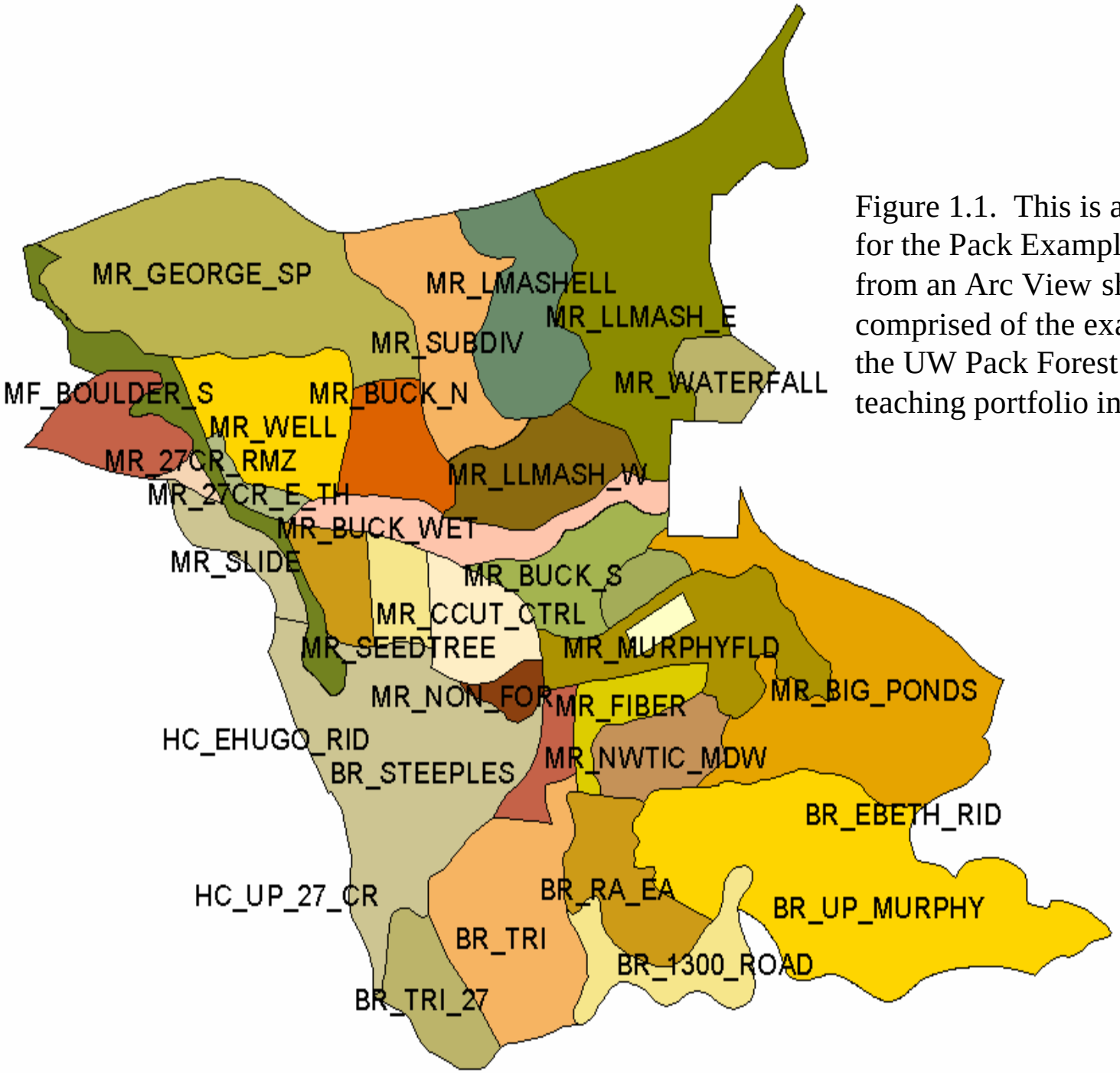


Figure 1.1. This is a BMP file or bit map for the Pack Example landscape taken from an Arc View shapefile. This map is comprised of the example stands from the UW Pack Forest that are used as a teaching portfolio in this tutorial.

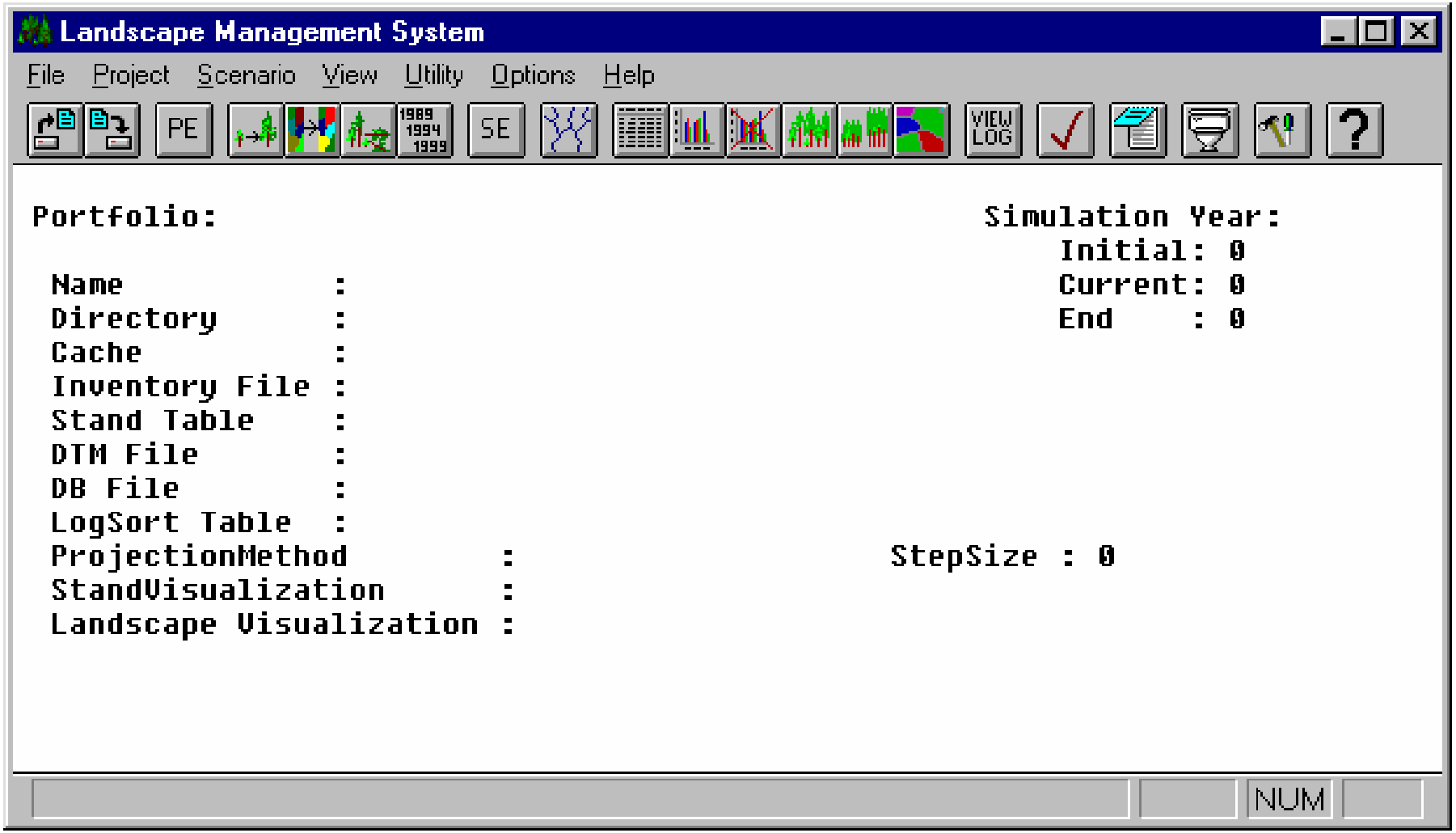


Figure 1.2. In earlier versions (1.x series), the LMS main window was composed of five basic parts in a typical windows presentation. These parts included the Title Bar, the Drop Down Menu, the speed bar or Graphical User Interface (GUI), the Main Application Window, and the Status Bar.

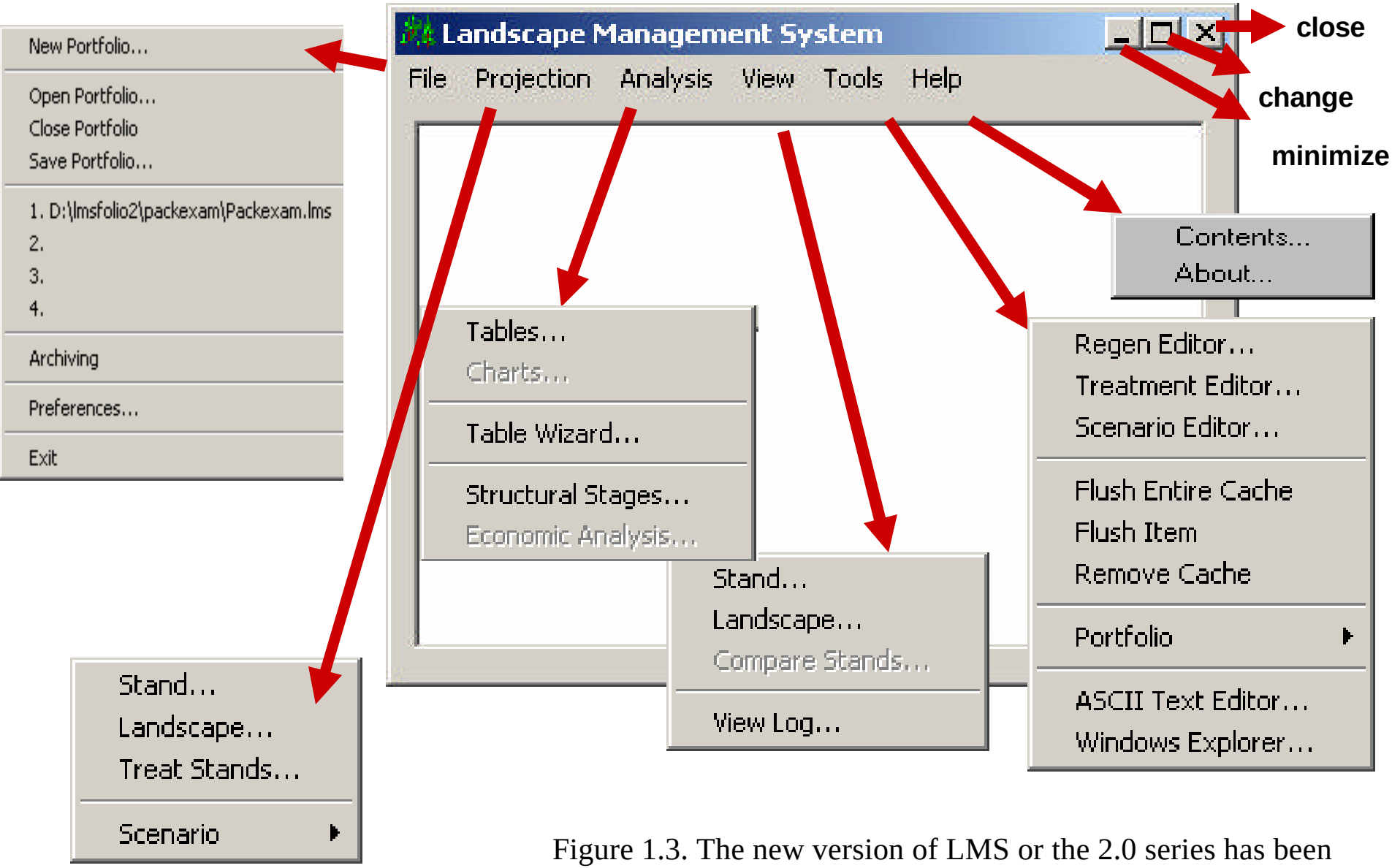


Figure 1.3. The new version of LMS or the 2.0 series has been simplified to present three main parts: the Title Bar, the Drop Down Menu, and the Main Application Window.

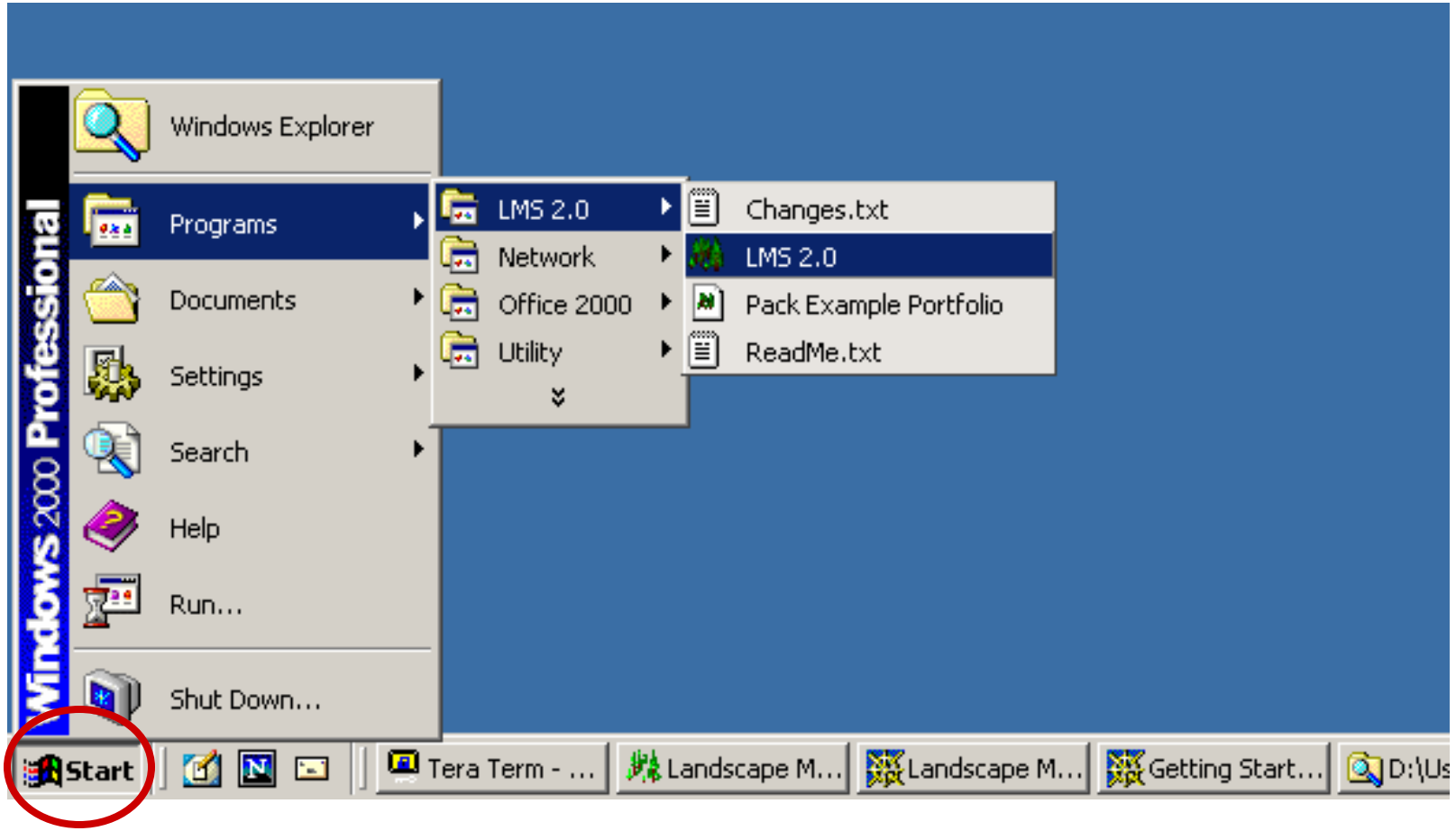


Figure 1.4. The Landscape Management System may be installed on your computer by using CD-ROM or by downloading the program from the web site of the Silviculture Laboratory of the College of Forest Resources at the University of Washington, http://lms.cfr.washington.edu/. Once LMS has been installed, the program may be opened by clicking Start/Programs/LMS 2.0/ LMS 2.0.

Depending on how LMS was installed you may get an error when running LMS for the first time.

If you see this error about LMS not being able to find the LMS portfolio directory, click OK, and then locate the lmsfolio2 directory on the C: drive. After selecting the directory, click OK and LMS will display the main dialog.

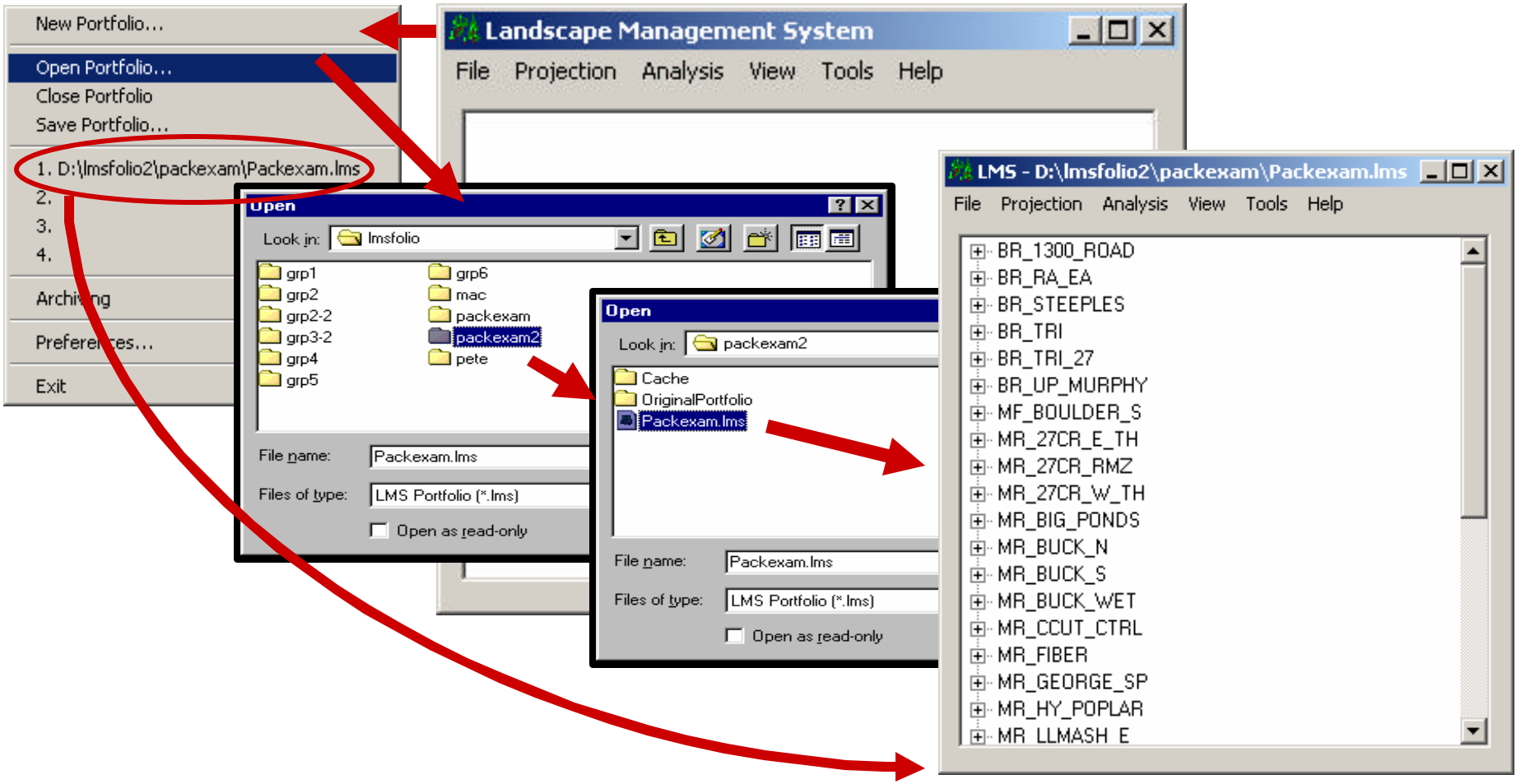


Figure 1.5. To open a portfolio click on **File in the Drop Down Menu**, then click **Open Portfolio**, double click on the **selected portfolio in the D:/lmsfolio2 directory** (in this case PackExam, note also that on some computers lmsfolio2 may appear in the C drive), and then double click the ***.lms file** (in this case Packexam.lms). The Main Application Window will fill with a list of stands that comprise the selected landscape portfolio. The portfolio title and path will appear across the top of the main display window. The file drop down menu keeps a record of the 4 last previously opened portfolios. Clicking on the previously opened path will automatically open the portfolio. The portfolio is now ready for use.

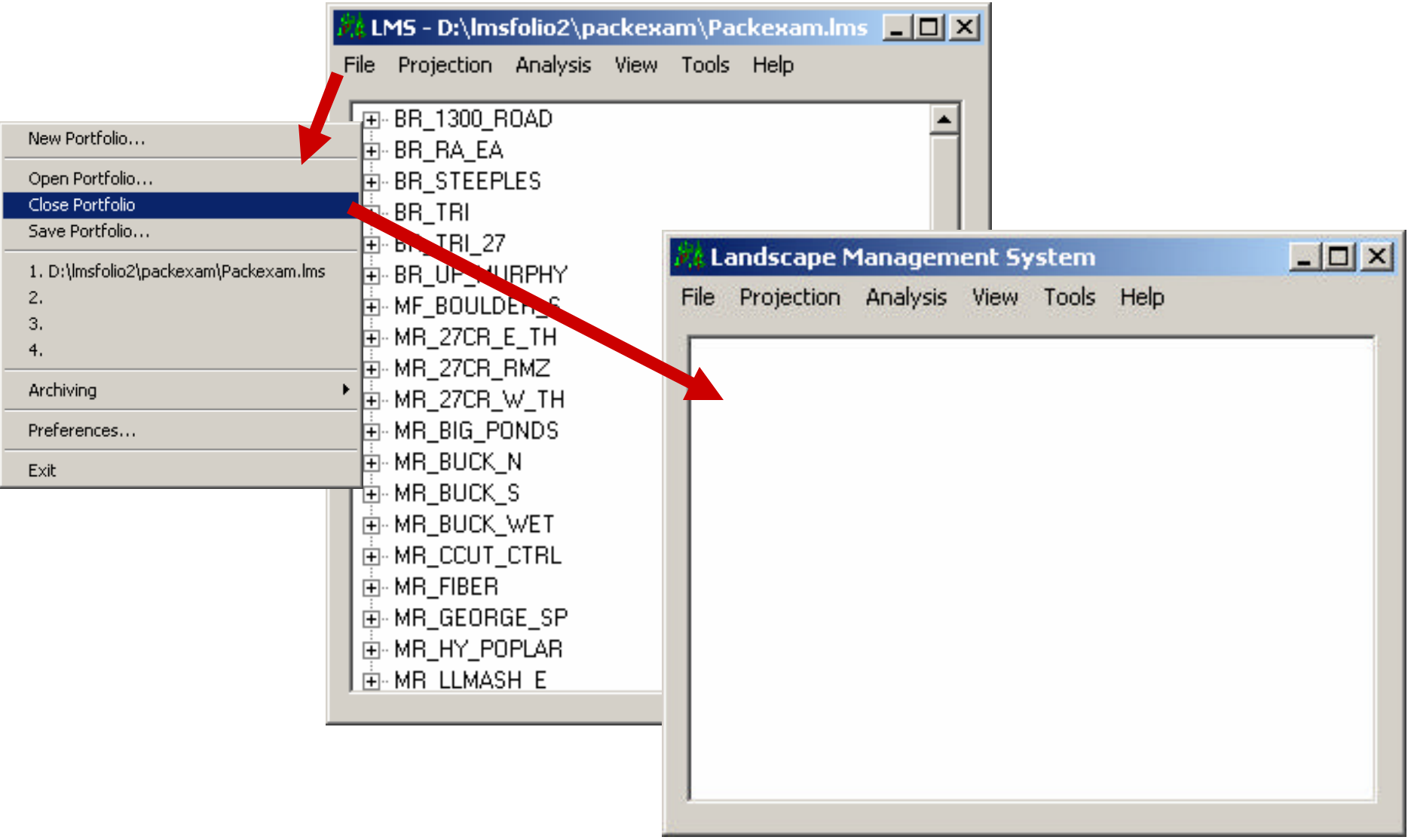


Figure 1.6. To close the portfolio click on **File in the Drop Down Menu** and then click **Close Portfolio**. The portfolio will close and an empty main window will remain.

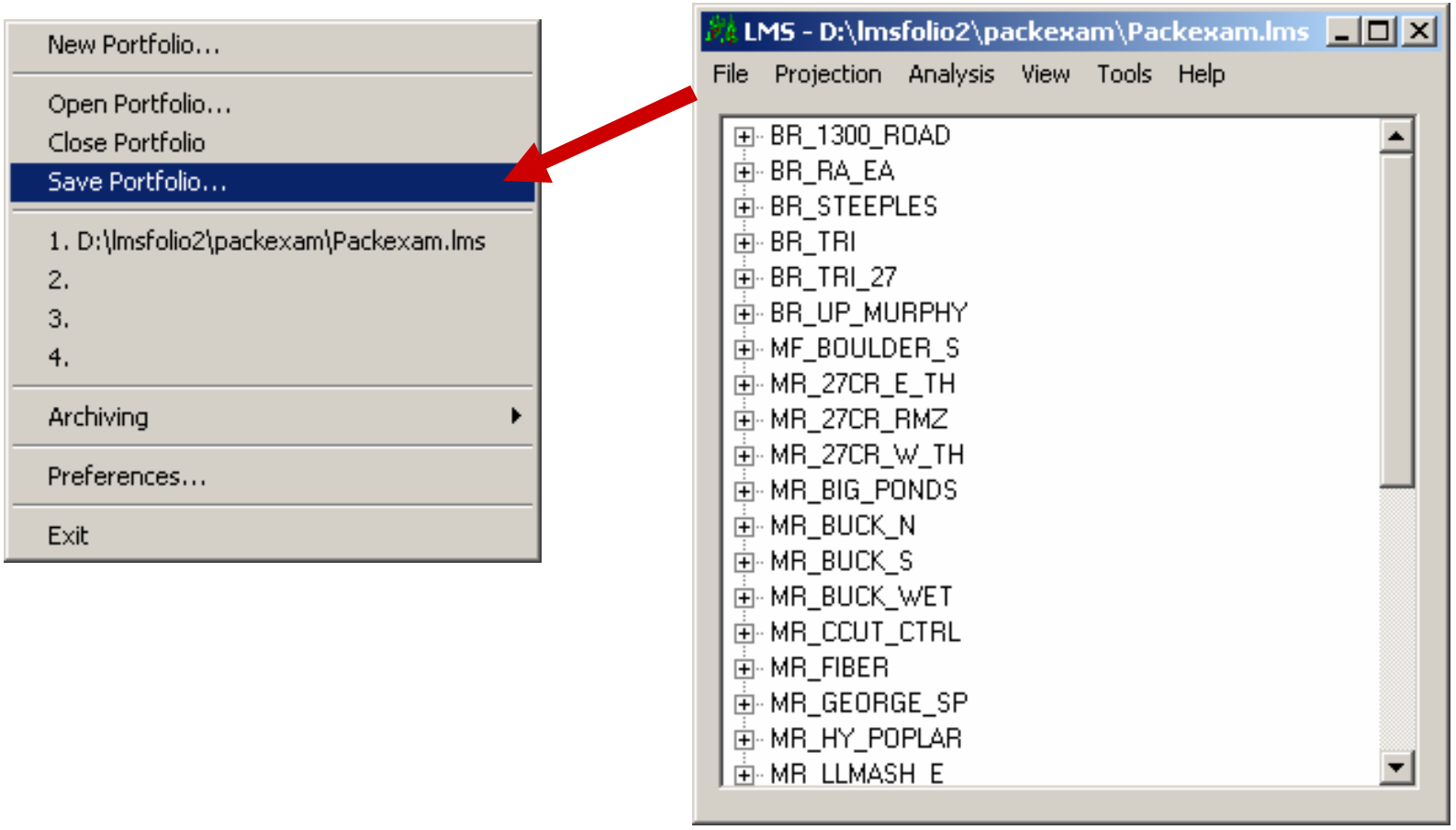
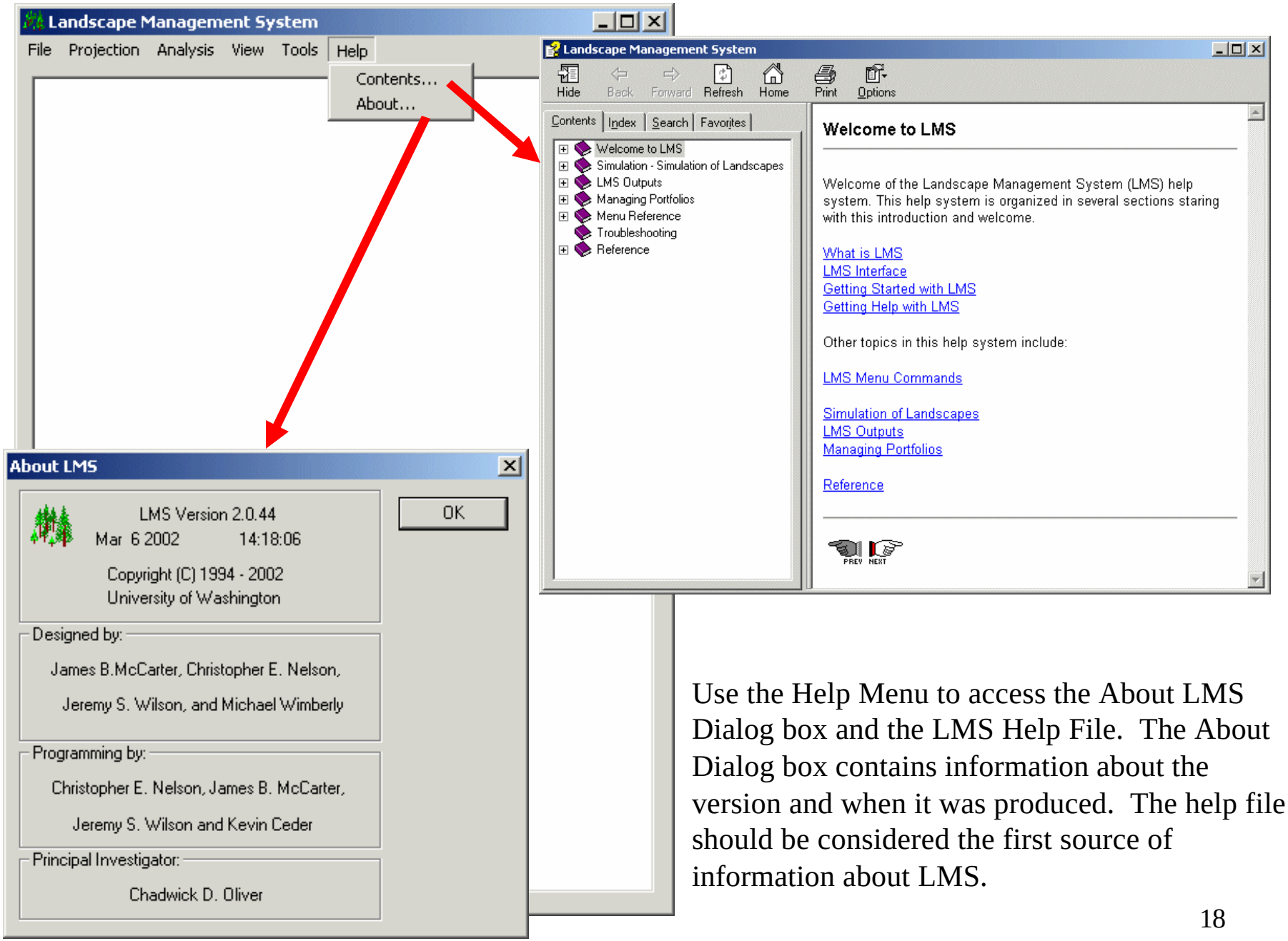


Figure 1.7. To save changes to a portfolio, click **File in the Drop Down Menu** and then click **Save Portfolio**.



Use the Help Menu to access the About LMS Dialog box and the LMS Help File. The About Dialog box contains information about the version and when it was produced. The help file should be considered the first source of information about LMS.

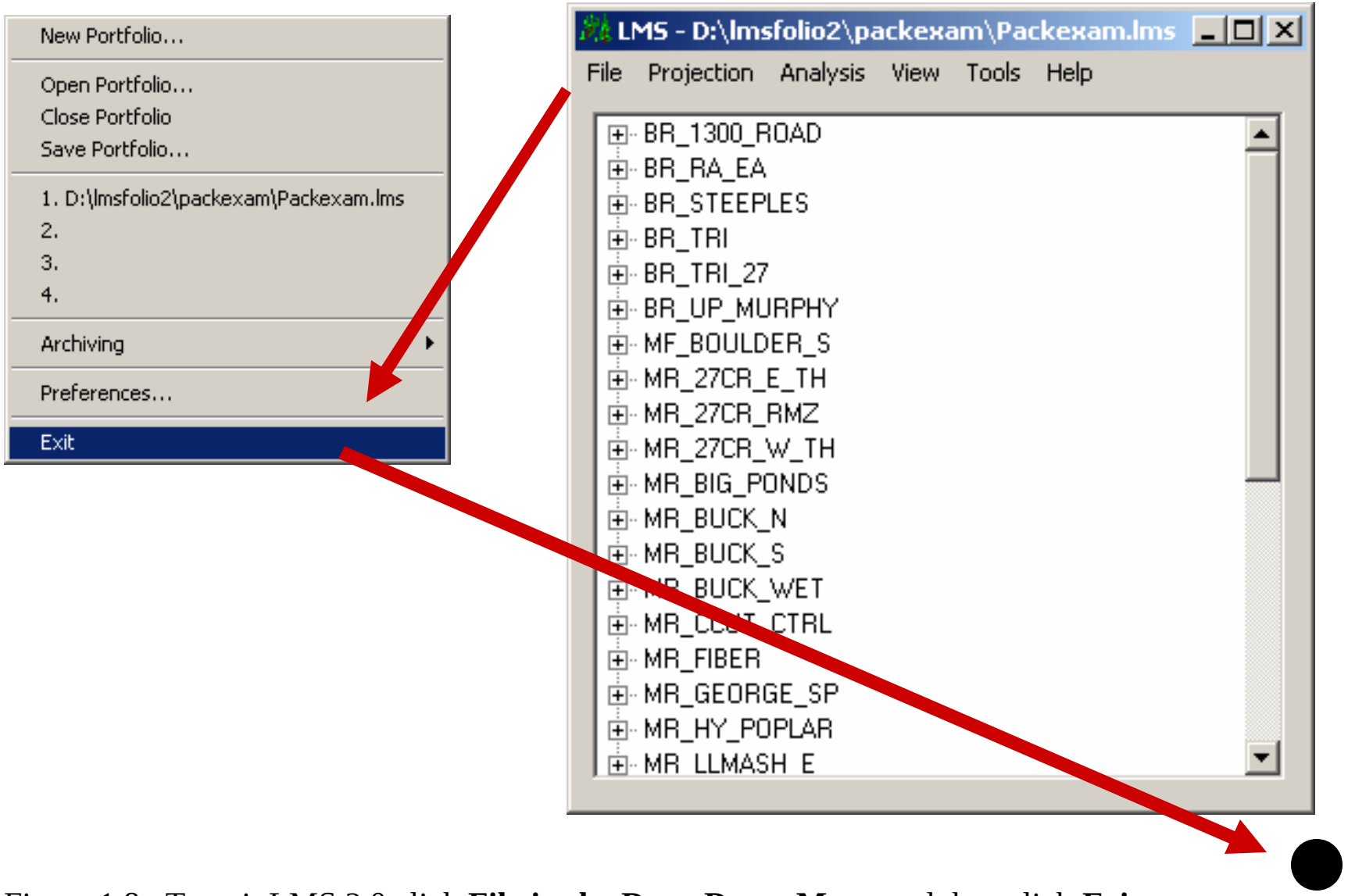


Figure 1.8. To exit LMS 2.0 click **File in the Drop Down Menu** and then click **Exit**.

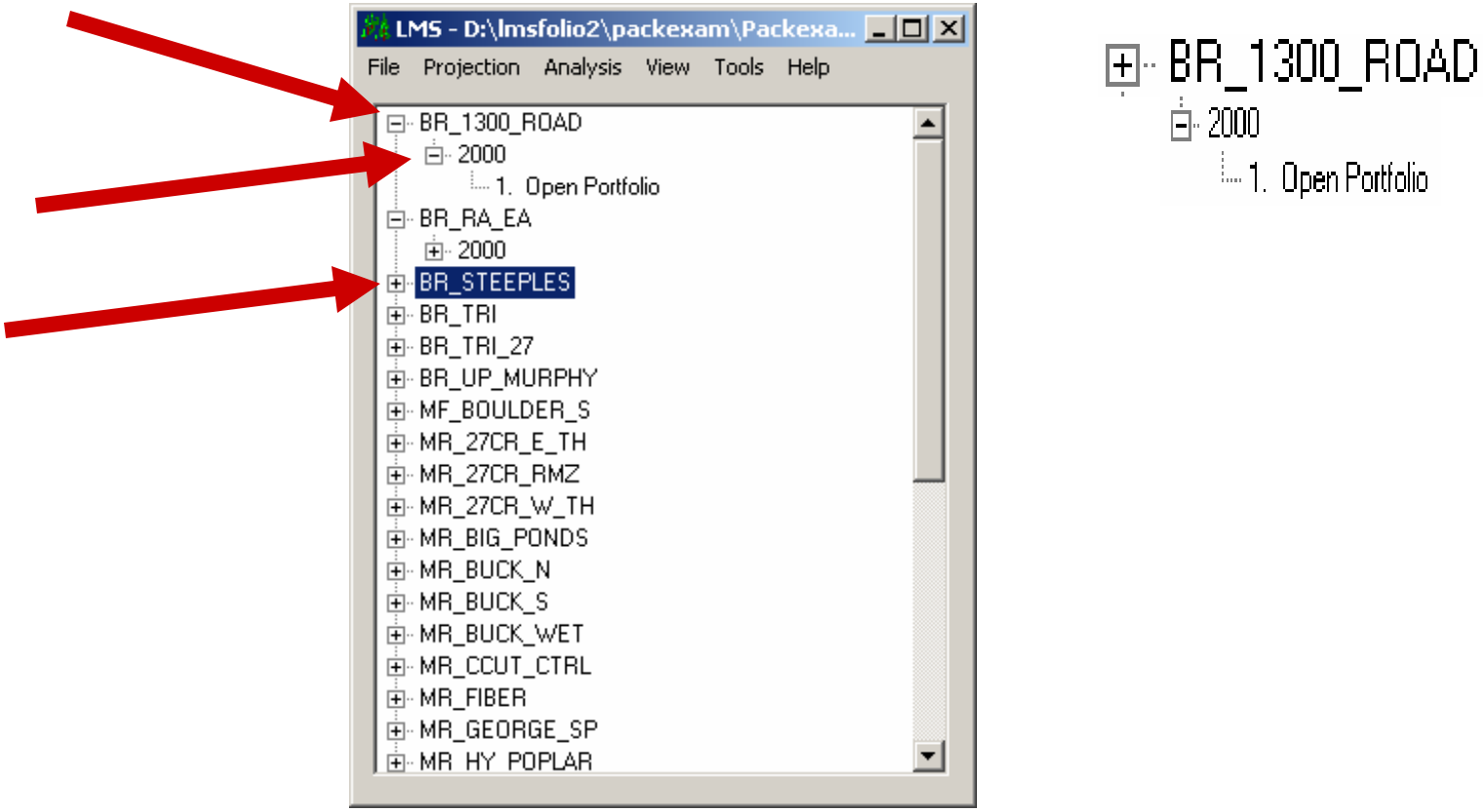
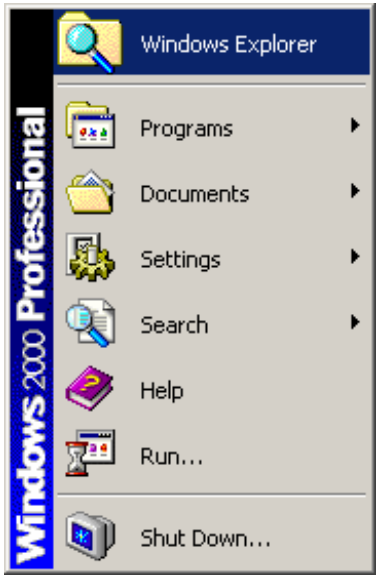


Figure 1.9. The main Application Window of LMS 2.0 stores a record of stand activities in the open portfolio. Click the **square with a plus** and the square changes to contain a dash and opens to reveal the hidden activities record for years treated. Click again on the **square by the year** and the activities log is opened. In this case the only activity has been to open the portfolio. Clicking directly on the **stand name** highlights the stand for copying purposes to be discussed later.

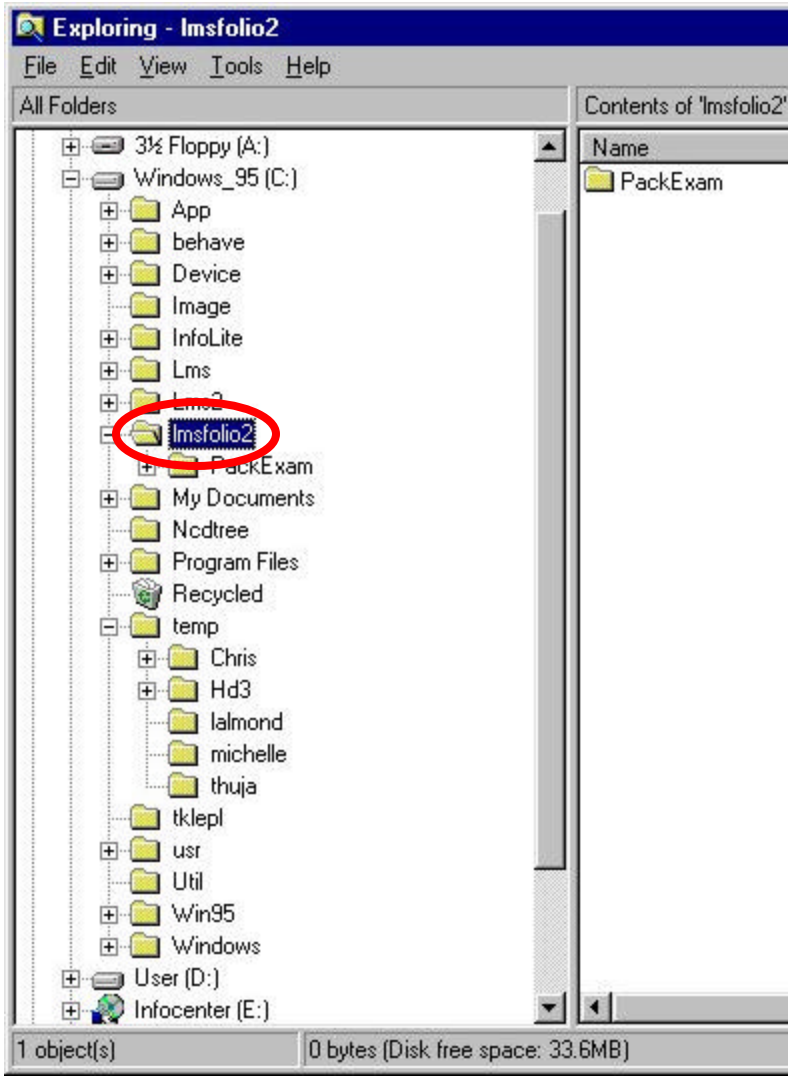
Figure 1.10. During the course of this tutorial, many files will be created as part of the exercises. If files are not properly saved to predetermined locations, then they may be easily misplaced and lost. A good practice is store files related to work on a portfolio in a subdirectory of that portfolio folder.



Click **Start/Windows Explorer** to open Windows Explorer (on some computers Windows Explorer is located under Start|Programs|Accessories or use the Windows Key-E). Click **My Computer**, then click **(C:).** Find **the lmsfolio2** folder, double click to open, and find the **packexam** folder.

C:/lmsfolio2/packexam/

Open the packexam folder.



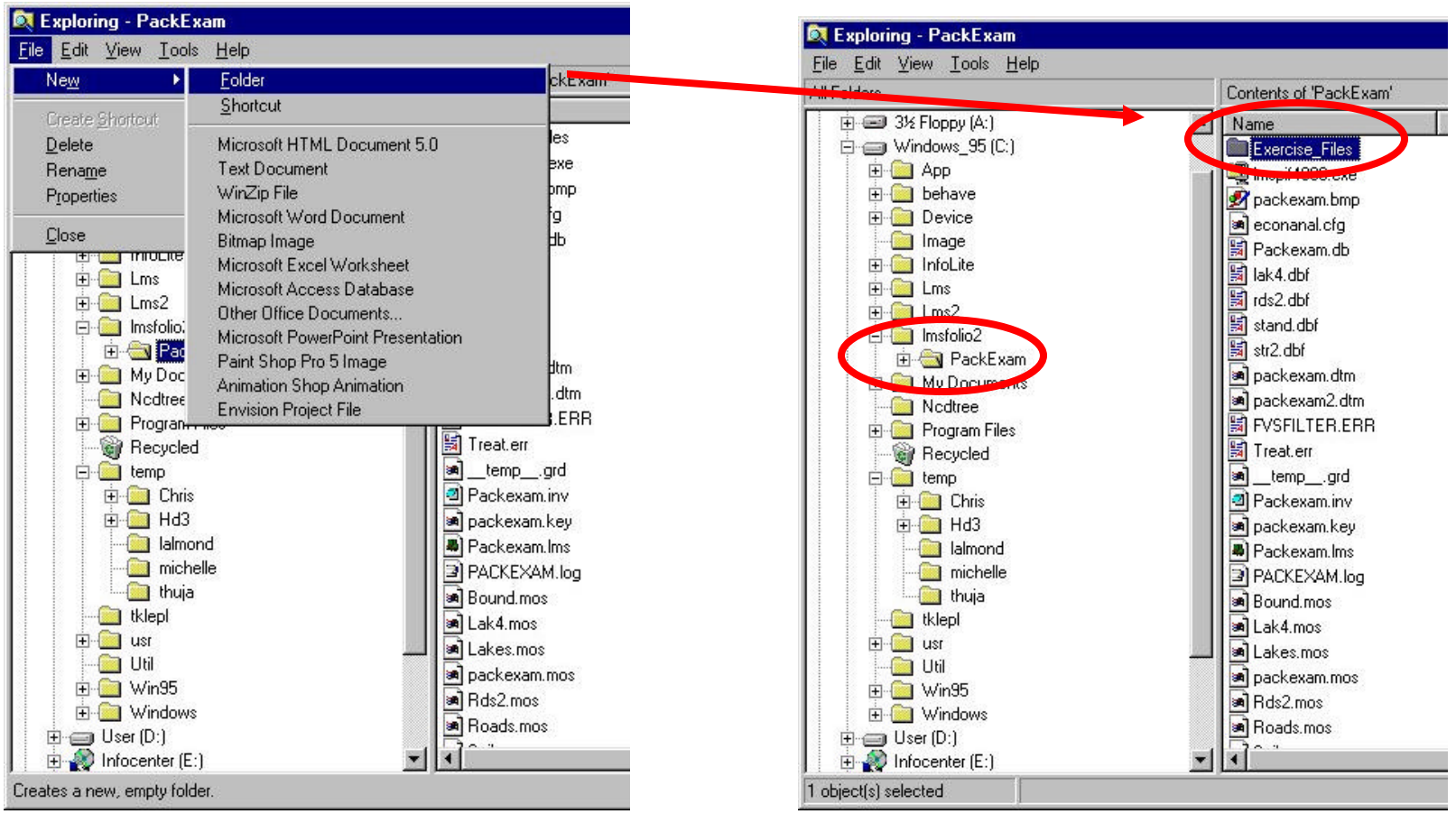


Figure 1.11. With the packexam folder open, click **File/New/Folder/**. A new folder will appear as "New Directory". Type in folder name: **Exercise_Files.** This is where files created from the exercises in this tutorial should be stored.

Notice that this folder employs the underscore to separate the two words. A good habit in file creation is to use this pattern. Some programs like Arc view will not accept filenames with gaps or dots in them.

Exercise

- **Load the designated LMS portfolio**
- **View the LMS functions**
- **Be sure that the Exercise_Files folder is ready to receive files**