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PHYSITEL 1.0

USER'S GUIDE

by

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Jean-Pierre VILLENEUVE
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Scientific Report INRS-Eau No 280

31 août 1989

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PART 1

GENERAL INFORMATION

PART 1 GENERAL INFORMATION

1.1 Software main characteristics and hardware requirements

Name:	PHYSITEL 1.0
Objective:	Preparation of watershed data base for streamflow simulation by hydrotel
Programming language:	"C", with use of GKS for display purposes
Type of microcomputer:	IBM compatibles with mathematical co-processor. A VGA board is suggested but not mandatory. Display drivers are furnished with the program for a number of display devices, but monochrome displays are not recommended.
Memory requirements:	640 k.
Written by:	Martin Montminy and Djilali Benmouffok
Developped by:	Jean-Pierre Fortin, Djilali Benmouffok and Martin Montminy

1.2 Introduction

PHYSITEL 1.0 is one of three complementary programs developped specifically for hydrological applications. As seen in figure 1.1, HYDROTEL is a software program allowing simulatiom or forecast of streamflow in rivers. The analysis of remotely sensed data for input to HYDROTEL is done by IMATEL. As for PHYSITEL, it can be considered as a special type a GIS program allowing both the integration of spatial data into hydrological units and determination of relations between these units through the drainage network derived from DEM data.

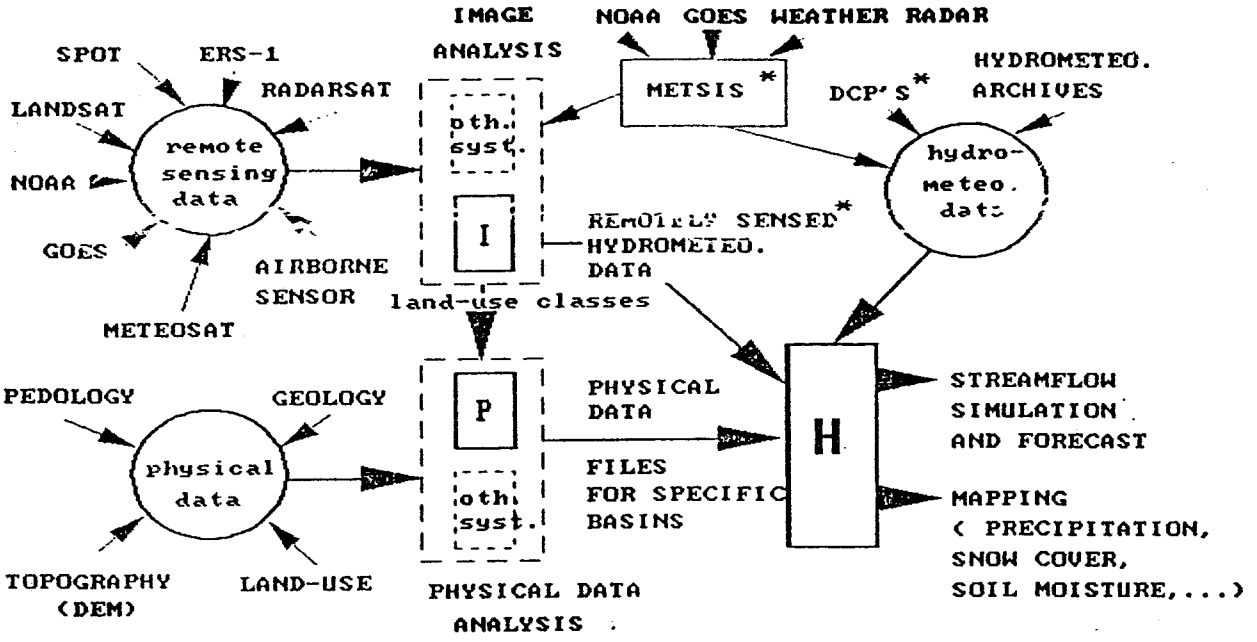

Figure 1.1 Integrated analysis of physical, remotely sensed and meteorological data for streamflow simulation and forescasting by PHYSITEL, IMATEL and HYDROTEL.

PHYSITEL 1.0 is the first version of PHYSITEL released for tests by the ENVIRONMENT Canada and CCRS users only.

PHYSITEL 1.0 does allow spatial integration of original raster data only to multiples of the original spatial resolution, but that limitation will be removed with PHYSITEL 2.0. With PHYSITEL 2.0, master integration will be allowed to any other raster resolution and to hydrological units of any shape.

In PHYSITEL 1.0, a certain number of options in the menus are not operationnel. These options will be come operationnel with PHYSITEL 2.0, together with other options.

1.3 **Organization of the manual**

In part "TWO", the user is first told how to install the computer program. Information on the data set furnished with the program is then given. This data set is made available to the user to allow him to get acquainted with the program. Information on how to start the program is next given. This is followed by a detailed information, window by window, on how to input and process data.

1.4 **Software availability and information**

The current version (1.0) of PHYSITEL is available only to Environment Canada and CCRS personnel participating in the testing of that version.

For more informations on PHYSITEL 1,0, please contact:

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Fax: (418) 654-2600

PART 2

THE PHYSITEL PROGRAM (1.0)

PART 2 THE PHYSITEL PROGRAM (1.0)

2.1 General structure

As will be seen in the main menu, the program allows the preparation of regional as well as watershed data bases.

Regional data bases will contain spatial data coming from various sources with their original spatial resolution. The only modifications made to the original data will be done to their geographical coordinates, if necessary, as all data in a particular regional data base will be referenced spatially with the same projection (UTM, LAM BERT or polar stereographic). Data sets whose spatial extent is larger or smaller than that of the regional data base will be accepted by PHYSITEL. In particular, PHYSITEL (V 2.0) will be able to input data from and output data to SPANS (from TYDAC).

Data bases for particular watersheds will be derived from regional data bases, with the spatial resolution and particular type of integration chosen by the user. Remember that the choice in PHYSITEL 1.0 is restricted to multiples of the original spatial resolution.

2.2 Getting started

This section gives all necessary informations to install the program on your microcomputer. A data set is also furnished with the program to help the user to get acquainted with it.

2.2.1 List of files on floppy disks

PHYSITEL 1.0 is sent on two 1.2 M floppy disk.

Content:

Disk #1: Program Disk.

. CONFIG.SYS
. AUTOEXEC.BAT
. KERNEL.SYS
. PHYSITEL.EXE
. PHYSITEL.ENM
. MESSAGE.ENG
. INSTALL.COM
. INSTALL.ENM
. DRIVERS.EXE

.\DATA

. CLIFTON.ASC
. CLIFTON.BIN
. CLIFTON.SR8
. CLIFTON.ALT
. CLIFTON.PTE
. CLIFTON.ORI
. CLIFTON.MSK
. CLIFTON.CLA

Disk #2: Display drivers disk.

Adage/Lexidata PG90 Model 30	ADAGE30.SYS
AT&T 6300/6310 - 640 x 400 Monochrome	CGI6300B.SYS
AT&T 6300/6310 - 640 x 400 Color	CGI6300C.SYS
Compaq Portable III Display	COMPAQ3.SYS

DGIS High Performance Displays	CGIDGIS.SYS
Hercules InColor Display	HERCINCO.SYS
Hercules Monochrome Graphics Adapter	HERCBW.SYS
High Resolution EGA Displays	HIRESEGA.SYS
IBM 8514/a 1024 x 768 Display	IBMAFH.SYS
IBM 8514/a 640 x 480 Display	IBMAFL.SYS
IBM Color Graphics Adapter - High Res. Mono.	IBMBW.SYS
IBM Color Graphics Adapter - Med. Res. Color	IBMCO.SYS
IBM Enhanced Graphics Adaptor - 4 modes	IBMEGA.SYS
IBM Personal System/2 - Mode 11	IBMVGA11.SYS
IBM Personal System/2 - Mode 12	IBMVGA12.SYS
IBM Personal System/2 - Mode 13	IBMVGA13.SYS
Toshiba 3100 Lap Top Display	T3100.SYS

2.2.2 Installing PHYSITEL 1.0

The AUTOEXEC.BAT and CONFIG.SYS files on your system should first be modified to run PHYSITEL 1.0.

- modifications to AUTOEXEC.BAT file

add: SET KERNEL = path\PHYSITEL

where: "path" is the full path name including drive specification of location of the PHYSITEL subdirectory.

- modifications to CONFIG.SYS file

add: FILES = 20 (or more)
DEVICE = path\nam.name.sys

where: "path" is the full path name of the directory where the display driver is.
"name" is the name of the display driver file.

DEVICE = path\GSSCGI.SYS

where: "path" is the full path name of the directory where the GSSCGI.SYS file is.

NOTE: the previous command may be modified to.

DEVICE = path\GSSCGI.SYS/T

In that case, only the essential parts of the GSS program are loaded when booting the computer, saving memory space for other programs run on the computer. It is then necessary to copy DRIVERS.EXE in the PHYSITEL directory and to run it prior to run physitel. Otherwise, this is not necessary.

When the AUTOEXEC.BAT and CONFIG.SYS files are modified, one may proceed with the other files.

PHYSITEL 1.0 can be installed using program INSTALL.COM present on program disk or by following the steps given below.

2.2.2.1 Installing PHYSITEL 1.0 using INSTALL.COM program

Run the program INSTALL.COM from the disk simply by typing INSTALL and a window will appear (figure 2.1). Enter the full path name of the directory including the drive.

```
INSTALLATION OF PHYSITEL 1.0

Directory where PHYSITEL 1.0 will be installed: c:\bin

F10:RUN                                                    ESC:RUN
```

Figure 2.1 Shows an example where the user wants to install PHYSITEL on drive C under directory \bin.

2.2.2.2 Installing PHYSITEL manually

You can also install PHYSITEL 1.0 following these very simple steps:

1. Create as new directory (or subdirectory) PHYSITEL, using DOS command MD;

2. Change from current directory (or subdirectory) to the new directory (subdirectory) PHYSITEL, using DOS command CD;

3. When in subdirectory PHYSITEL make two new subdirectories under PHYSITEL, one called RDB the other called WDB.

4. Copy the files PHYSITEL.EXE, PHYSITEL.ENM and MESSAGE.ENG present on the program disk to the current directory PHYSITEL.

You should now be ready to start the program.

2.2.3 Test data and structure of data files

In order to familiarize the user with PHYSITEL 1.0, a data set is included with the program. At the same time, it should be looked at as an example, for the preparation of other data sets.

Test basin: sub-basin of the Eaton river upstream of streamgauge station 030242 (located downstream of the bridge on highway 210, at Sawyerville. Figure 2.2 shows the position of the station on the map, together with those of meteorological stations and basins limits.

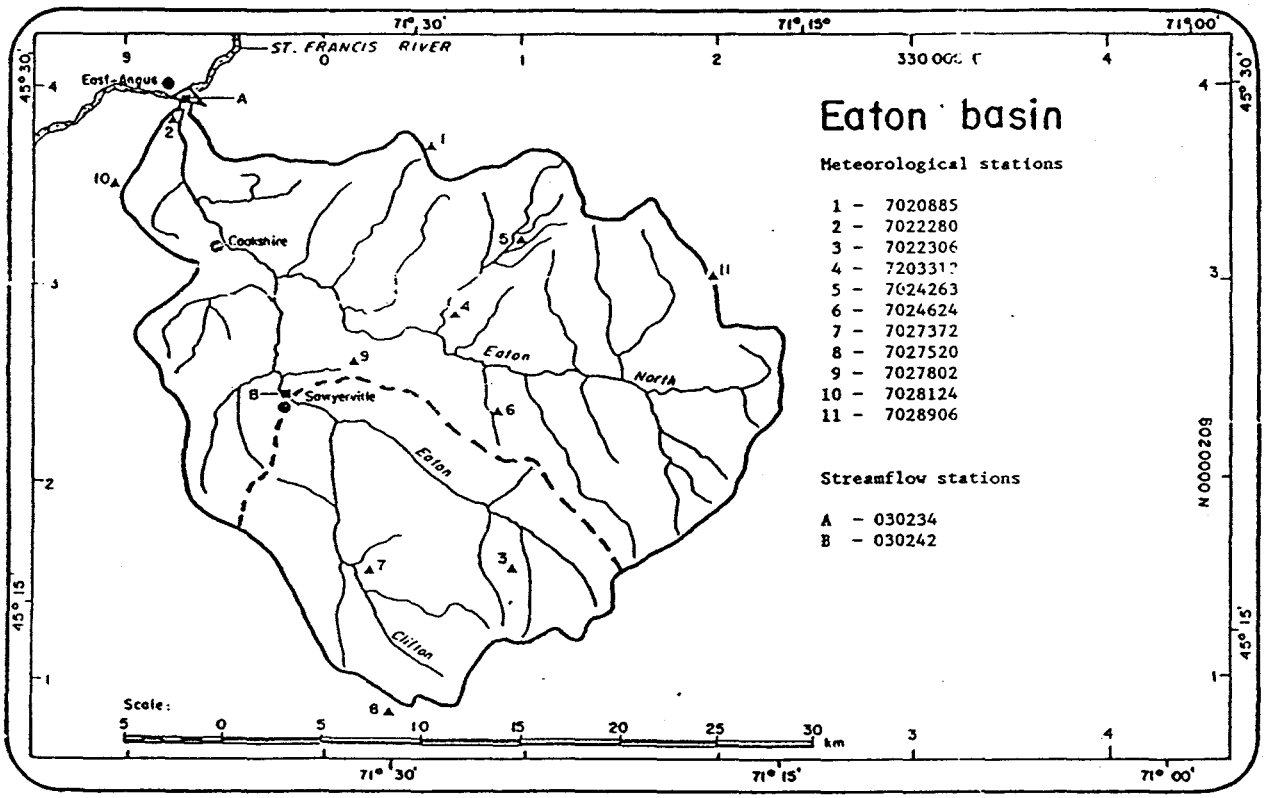

Figure 2.2 Geographic location of the test basin.

Are included in the data set:

. topographic data:

- File names and content for INPUT file:

  - Clifton.ASC: mean altitude of each square (m), ASCII file.
  - Clifton.BIN: mean altitude of each square (m), BINARY file.
  - Clifton.SR8: land-use data for each square; imatel file/SR8 format). Unfortunately this is not a classification of the Clifton basins and it's purpose is only to provide the user with a file in the correct format so that be can test the program.

- File structure for ASCII file (Clifton.ASC):

  - matrix of altitude of each square entered row by row. Each value is separeted by one or more space, a tab or a new line. There is no header.

- File structure for binary file (Clifton.BIN):

  - matrix of altitude of each square entered row by row. Each value is a binary integer coded on two bytes (Type short in C).

- File structure for land-use data (Clifton.SR8):

  - this is the SR8 format used by IMATEL 1.0.

- File names and content for OUTPUT file:

  - Clifton.ALT: mean altitude of each square (m);
  - Clifton.ORI: aspect of each square to eight points of the compass, identified 1 to 8 counterclockwise from East (=1);
  - Clifton.PTE: slope of each square (m/m);
  - Clifton.MSK: basin mask;

- File structure for *.ALT, *.ORI, *.PTE, *.MSK:

  - line #1: file type: 1;
  - line #2: number of lines, number of colums;
  - line #3: UTM coordinates (Easting, Northing) of upper left corner, grid size (m);
  - line #4: title or comment identifying the file;
  - line #5 to 4 + (li X co): data (separated by blanks).

. land-use data for each square (OUTPUT)

- File name: Clifton.CLA;

- File structure:

  - line #1: file type: 1;
  - line #2: number of line, number of columns, number of classes;
  - line #3: EAST, NORTH, class codes, TOTAL;
  - line #4 to 3 + (li x co): UTM coordinates (Easting, Northing) of upper left corner, number of pixels belonging to each class, total number of pixels.

- class identification and codes:

  - bare fields: "champ";
  - crops and pasture 1: "herbe";
  - crops and pasture 2: "paill";
  - extracting areas: "gravi";
  - forested areas 1 (coniferous): "resin";
  - forested areas 2 (deciduous): "feuil";
  - highways and other impervious areas: "route";
  - surface waters 1: "eau1";
  - surface waters 2: "eau2";
  - urban areas: "urb" (not in use);
  - waste lands and bushes: "frich" and "coupe";
  - wet lands and marshes: "MAR" (not in use).

2.2.4 Starting PHYSITEL 1.1

Change to the directory in which you have your program files and type "PHYSITEL - e" to access the English version of PHYSITEL. The main menu will then appear on the screen. You are now ready to start your session with PHYSITEL 1.0.

2.3 Using PHYSITEL 1.0

The main menu of PHYSITEL 1.0 contains 2 options (figure 2.3) allowing to access either regional or watershed data bases.

You can select either option by using the arrows on the key board and pressing "ENTER". It is also possible to select an option by typing its number directly. At the end of a session, it is possible to exit PHYSITEL 1.0 by selecting "EXIT" and pressing "ENTER" or by typing "0".

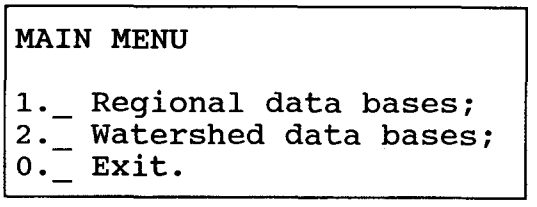

Figure 2.3 Main menu.

2.3.1 Sub-menu #1.0: régional data bases

Two options are offered in sub-menu 1.0 (figure 2.4). Option 1 allows the definition of a new regional data base. If the user wants to access an existing data base, he selects option 2. One can return to the "main menu" by selecting option "0" and pressing "ENTER" or typing "0".

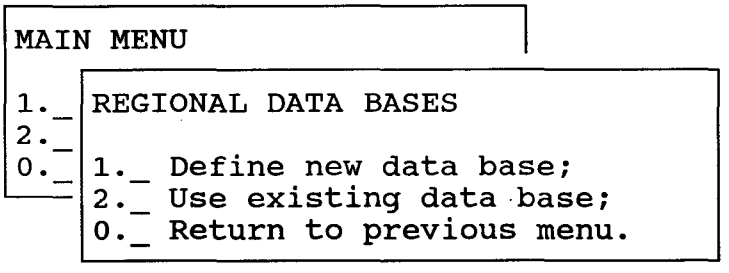

Figure 2.4 Sub menu #1.0: régional data bases.

2.3.1.1 Sub-menu #1.1: define new regional data base

Sub-menu #1.1 (figure 2.5) is used to define the characteristics of a new regional data base.

First type the file name (without extension) under which the RDB will be saved. A title or comment identifying the file more explicitely can be typed on the next lines.

The geographical area covered by the RDB is then entered, lower left corner first and upper right corner last. For each corner, the first coordinate is the longitude and the second the latitude. Both coordinates are typed as shown. For example, 71° 40' west would be typed as "7140.000W". Thousanths of a minute are used instead of "seconds" for accuracy purposes. Only portions of data sets included inside of these geographical limits will be stored in the RDB.

The cartographic projection to be used has also to be chosen. All data in the RDB will be spatially referenced with the projection. With PHYSITEL 1.0, only the UTM projection is available, so select "UTM".

One can quit the sub-menu any time by pressing "ESC" and return to the previous menu. Otherwise, once the characteristics of the new RDB are given they may be saved by pressing "F10". Informations on the characteristics of the cartographic projection to be used are then ashed. Press "return" after entering the needed informations.

A new RDB is then created and a return to the previous menu is done automatically.

```
DEFINE NEW REGIONAL DATA BASE

...Regional data base name: sudquec
...Title of comment identifying the file:
Regional data base for southern Quebec

...Geographical area:                          LONG.          LAT.
    -Lower left corner  (deg min.dec):     7140.184W      4506.913N
    -Upper right corner (deg min.dec):     7117.973W      4523.599N

...Cartographic projection to be used: 1
        1 - UTM
        2 - LAMBERT(not available)
        3 - POLAR STEREOGRAPHIC(not available)

F10: store information                                        ESC: QUIT
```

Figure 2.5 Sub-menu #1.1: define new regional data base.

2.3.1.2 Sub-menu #1.2: existing regional data base

Seven options are now active in sub-menu #1.2. (figure 2.6). The two "user's defined tasks" will be available with PHYSITEL 2.0.

First a RDB has to be selected as the current one, by option 1.

Option 2 allows the user to see the actual content of the selected data base.

The header of the RDB, containing the characteristics of the data base defined in sub-menu #1.1, can be shown if option 3 is selected.

To input new data select option 4.

If a change in x-y coordinates is necessary it can be done by choosing option 5.

Modification of file content can be done if option 6 is chosen.

Finally, it is possible to display the data, if option 7 is selected.

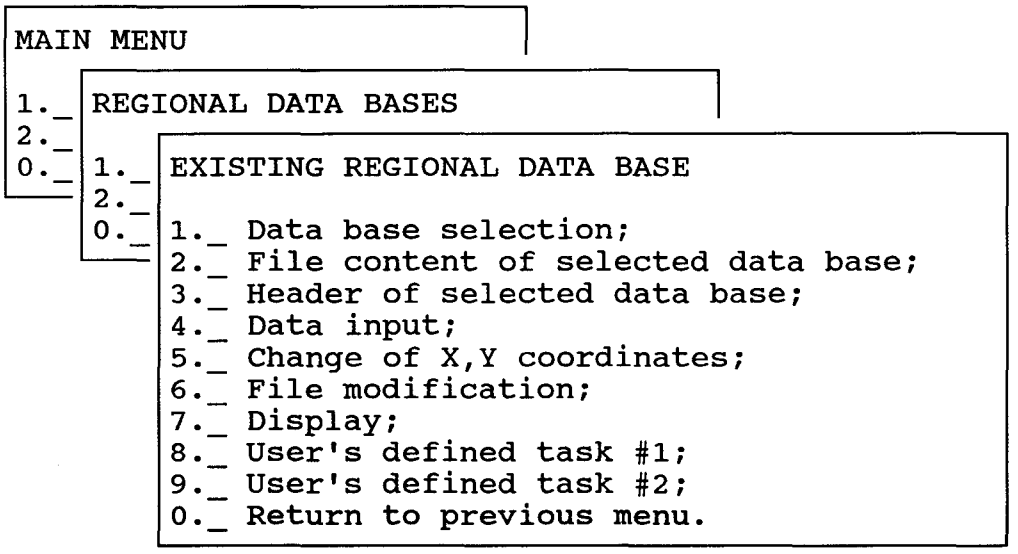

Figure 2.6 Sub-menu #1.2: existing regional data base.

2.3.1.2.1 Sub-menu #1.2.1: data base selection

A list of existing RDB is produced when sub-menu #1.2.1 is chosen (figure 2.7). Select the RDB on which you want to work by placing the cursor on that data base name and then by pressing "ENTER". The name of the current data before selection base appears in the lower left corner of the menu.

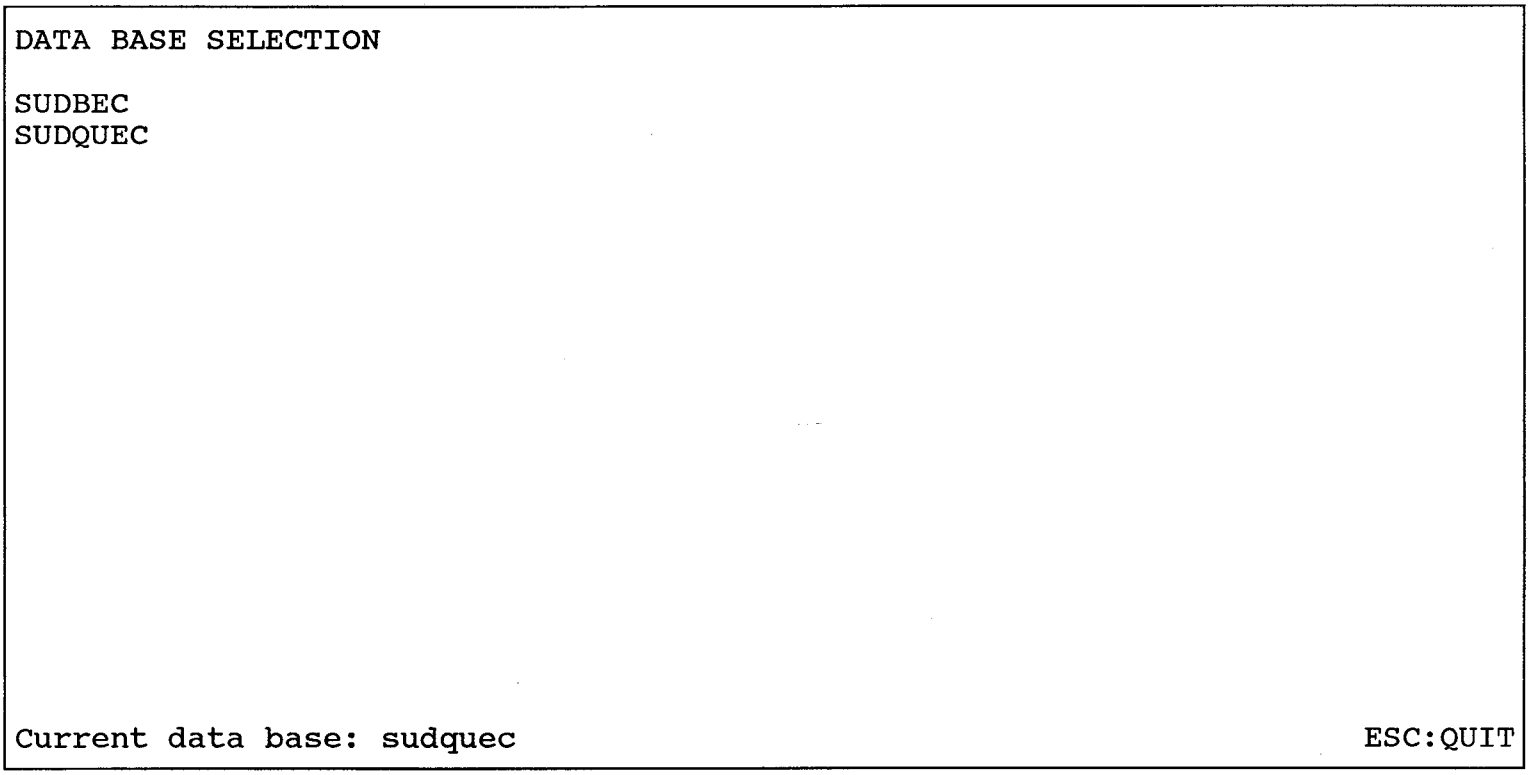

Figure 2.7 Sub-menu #1.2.1: data base selection.

2.3.1.2.2 Sub-menu #1.2.2: file content of selected regional data base

Sub-menu #1.2.2 shows the name of the RDB together with a list of files actually in the RDB (figure 2.8). A return to the previous menu is obtained by striking any key.

```
CONTENT OF CURRENT REGIONAL DATA BASE : sudquec

SUDQUEC.MNT
SUDQUEC.DEM
SUDQUEC.ID
SUDQUEC.SR8









Please strike any key to continue!
```

Figure 2.8 Sub-menu #1.2.2: file content of selected regional data base.

2.3.1.2.3 Sub-menu #1.2.3: header of selected regional data base

The content of the header of the selected RDB is shown in sub-menu #1.2.3 for information only. No action can be taken. Return to the previous menu is done by striking any key.

```
HEADER OF SELECTED DATA BASE

Regional data base name: sudquec

Description of data base:
Regional data base from southern Quebec

Cartographic projection: UTM
        characteristics: zone : 19

Geographical area:      EASTING     NORTHING
   Lower left corner :   290000     4999000
   Upper right corner:   319999     5028999

Please strike any key to continue
```

Figure 2.9 Sub-menu #1.2.3: header of selected regional data base.

2.3.1.2.4 Sub-menu #1.2.4: data input

Sub-menu #1.2.4 (figure 2.10) is used to access specific menus for input of various types of data. With PHYSITEL 1.0 it will be possible to input:

- land-use classes pixel by pixel from Imatel (option 1)

- land-use classes (% over individual and calls) from ARIES-III (not implemented for PHYSITEL 1.0)

- raster data formatted as defined in sub-menu #1.2.4.3.

- vector data formatted as defined in sub-menu #1.2.4.4 (not implemented for PHYSITEL 1.0).

Input of raster and vector data from SPANS (a Tydac TM) will be available with PHYSITEL 2.0.

Two more user's defined data input formats will be available with PHYSITEL 2.0.

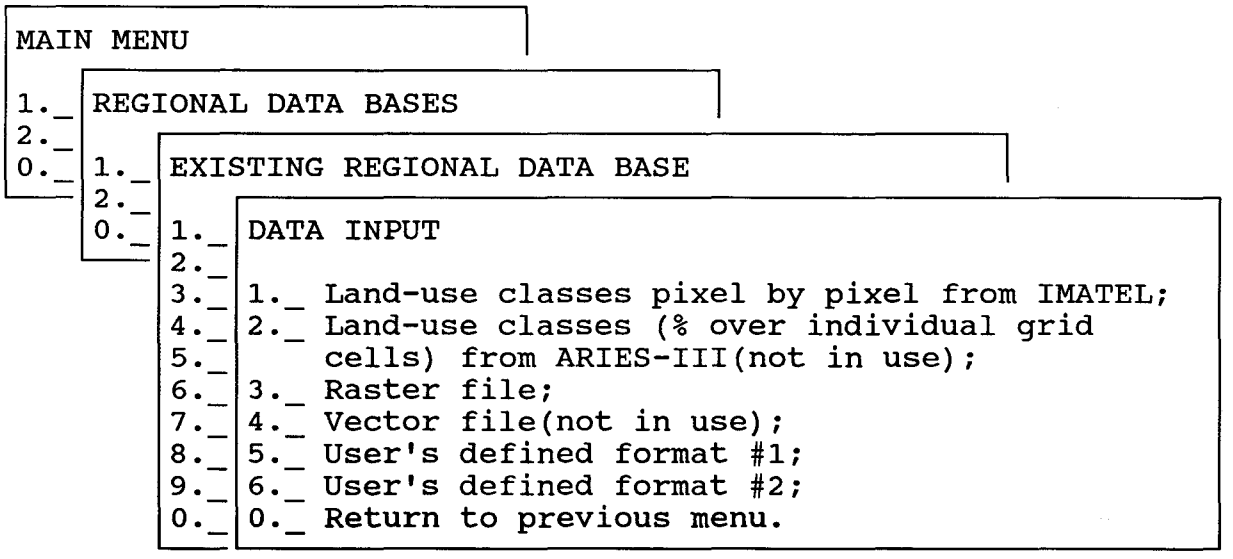

Figure 2.10 Sub-menu #1.2.4: data input.

2.3.1.2.4.1 Sub-menu #1.2.4.1: land-use classes pixel by pixel from IMATEL

Land-use classes on a pixel by pixel basis can be input from IMATEL. The land-use file, as output by IMATEL, should contain all needed informations on class identification (see section 2.2.3 for more details).

Type the name of the IMATEL file and the extension to the extension to the regional file name, which will identify the file. You can also type a comment which will be stored in the header of the RDB file. Press "F10" to store the file.

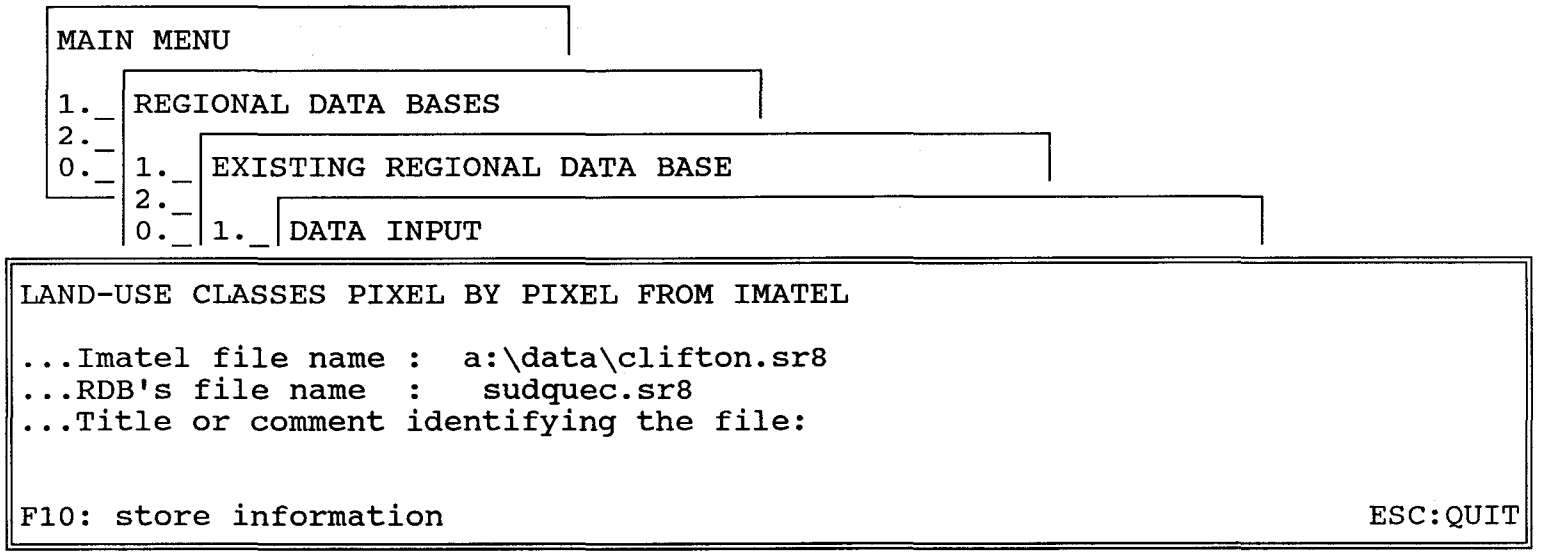

Figure 2.11 Sub-menu #1.2.4.1: land-use classes pixel by pixel from IMATEL.

2.3.1.2.4.2 Sub-menu #1.2.4.2: input data from raster file

A general purpose raster format is available with PHYSITEL 1.0 (see section 2.2.3 for more details) (figure 2.12). It is provided to read D.E.M. data primarily, but could be used to read similar types of data as well.

Type first the original file name of the raster data. Then, enter the type of data: 0 for "ASC", 1 for binary coded on two bytes. Continue by entering the extension to the regional file name under which the data will be saved. On the next line you can add a comment to identify the file.

Indicate the cartographic projection of the raster data, the coordinates of the lower left corner and the upper right corner (x-coordinate first). With PHYSITEL 1.0, only UTM coordinates may be entered. Finally, enter the grid size, in meters, in the X and Y directions.

The raster file is read and saved by pressing "F10".

```
INPUT DATA FROM RASTER FILE

...Raster file's name: a:\data\clifton.asc
..Type of raster data: 0
          0 - ascii
          1 - binary

...RDB's file name   :  sudquec.mnt
...Title or comment identifying the file:
Imported DEM from ascii file clifton.asc from program disk.

...Cartographic projection: 1
          1 -   UTM
          2 -   LAMBERT
          3 -   Polar stereographic
          4 -   Degree
                              X           Y
...Lower left corner :    290000      4999000
...Upper right corner:    320000      5029000

....Grid size(meters):     1000        1000

F10: store information                                          ESC:QUIT
```

Figure 2.12 Sub-menu #1.2.4.2: input data from raster file.

2.3.1.2.5 Sub-menu #1.2.5: change de X, Y coordinates

As can be seen in sub-menu 1.2.5 (figure 2.13), with PHYSITEL 2.0, it will be possible to change the geographical coordinates of a point from degrees to any of three cartographic projection and back. However, with PHYSITEL 1.0, it is only possible to change from degrees to UTM coordinates and back (options 1 and 4).

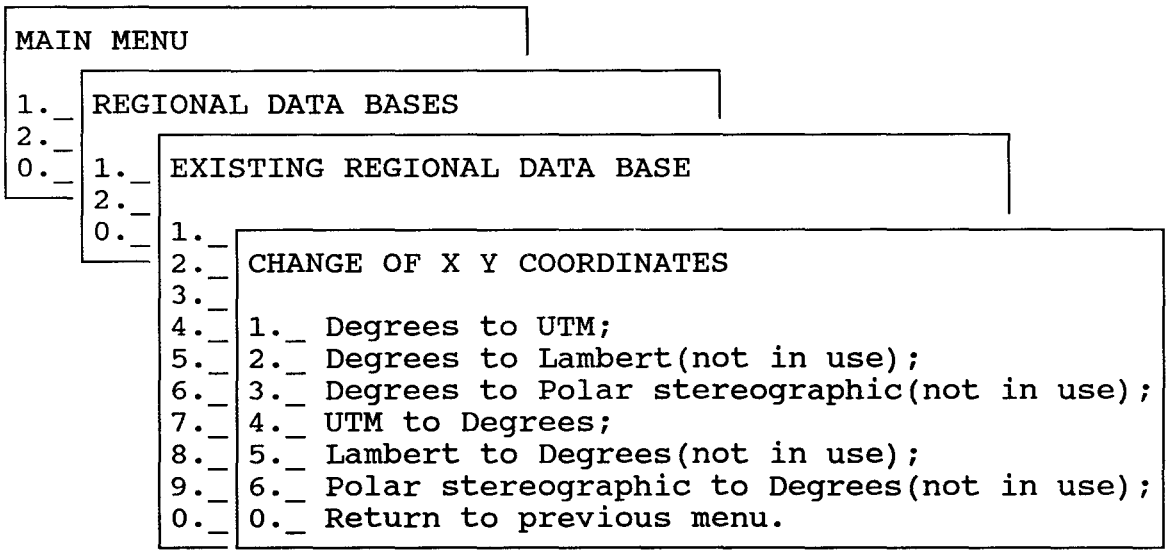

Figure 2.13 Sub-menu #1.2.5: change of X, Y coordinates.

2.3.1.2.5.1 Sub-menu #1.2.5.1: degrees to UTM

Within PHYSITEL 1.0 sub-menu 1.2.5.1 (figure 2.14) serves as a geographical coordinate expressed in degrees.

The user enters the longitude and latitude of the coordinates in degrees using the same format as in sub-menu 1.1 plus the UTM zone relative to which the transformation will be performed.

The result will appears when pressing "F10".

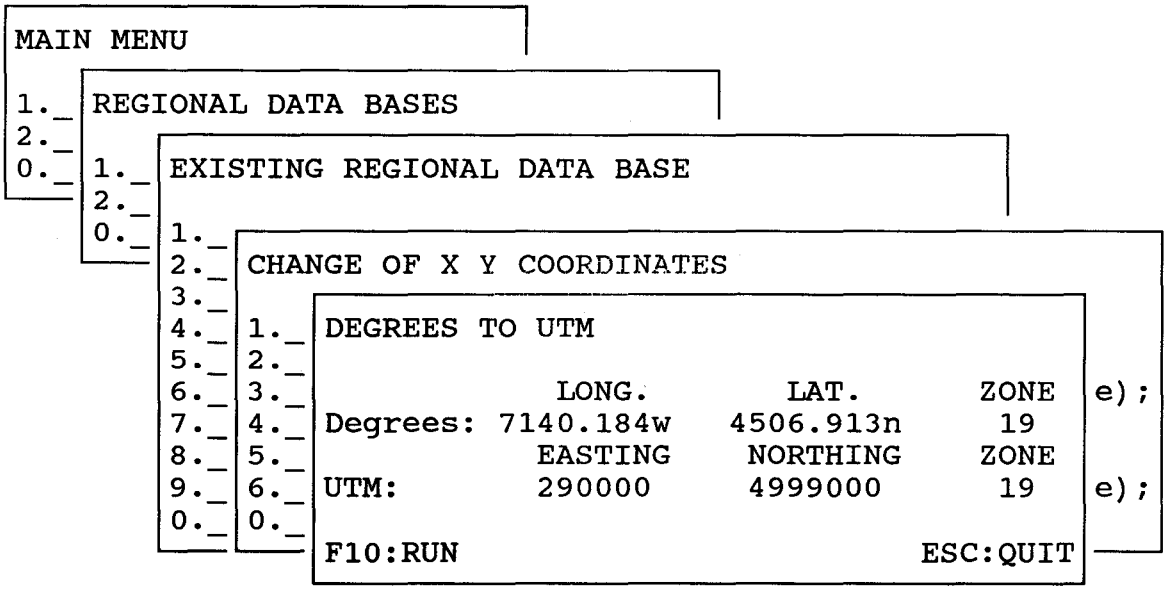

Figure 2.14 Sub-menu #1.2.5.1: degrees to UTM.

2.3.1.2.5.2 Sub-menu #1.2.5.2: UTM to degrees

Sub-menu 1.2.5.2 (figure 2.15) is the conterpart of sub-menu 1.2.5.1 and is used to obtain the degree equivalent of a geographical coordinate expressed in UTM.

The users enters the easting, northing ans zone of the UTM coordinate and press "F10" to get the result.

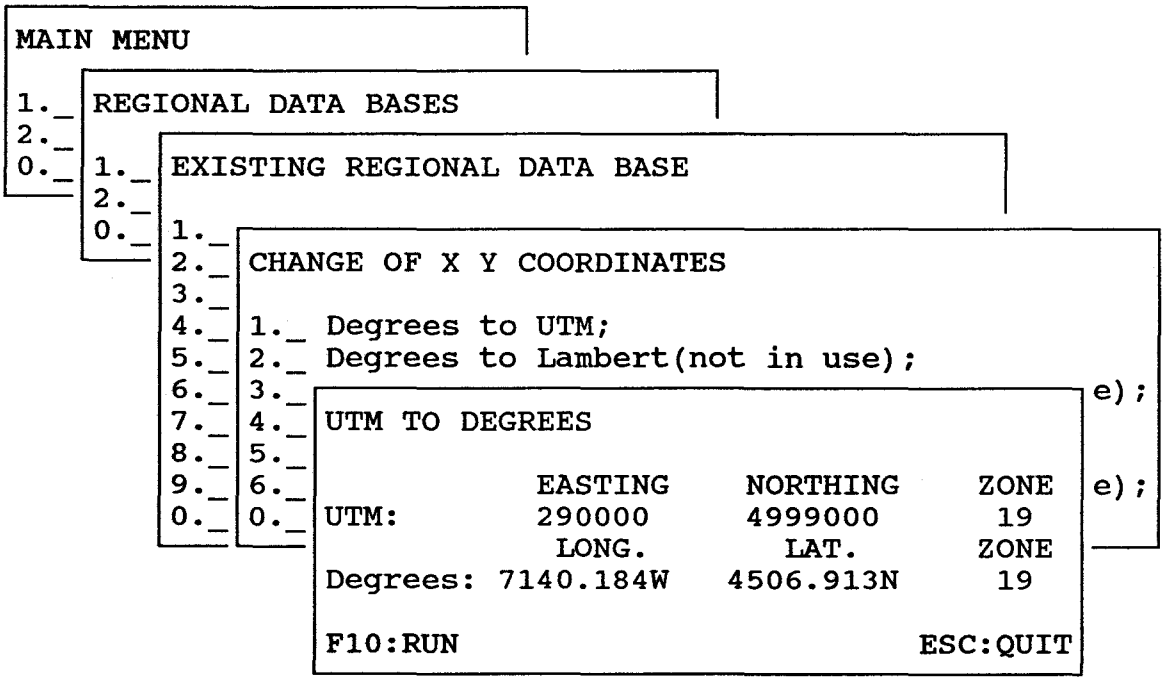

Figure 2.15 Sub-menu #1.2.5.2: UTM to degrees.

2.3.1.2.6 Sub-menu #1.2.6: file modification

If a user wants to modify a file without leaving PHYSITEL, he may use this menu (figure 2.16). He has access to DOS and may use the program of its choice to edit the file. When this is done, he comes back to PHYSITEL 1.0 by typing "EIXT".

```
Type "exit" to return to PHYSITEL.


The COMPAQ Personal Computer MS-DOS
Version 3.31

(C) Copyright Compaq Computer Corp. 1982, 1988
(C) Copyright Microsoft Corp. 1981, 1987

D:\PHYSITEL=>
```

Figure 2.16 Sub-menu #1.2.6: file modification.

2.3.1.2.7 Sub-menu #1.2.7: display

Display of digital elevation model data or land-use classes on a pixel by pixel basis in the RDB, will be vailable in PHYSITEL. Display of other files in the RDB is yet to be decided.

Choose option for DEM display and option 2 for land-use classe (figure 2.17).

These options will be available with PHYSITEL 2.0.

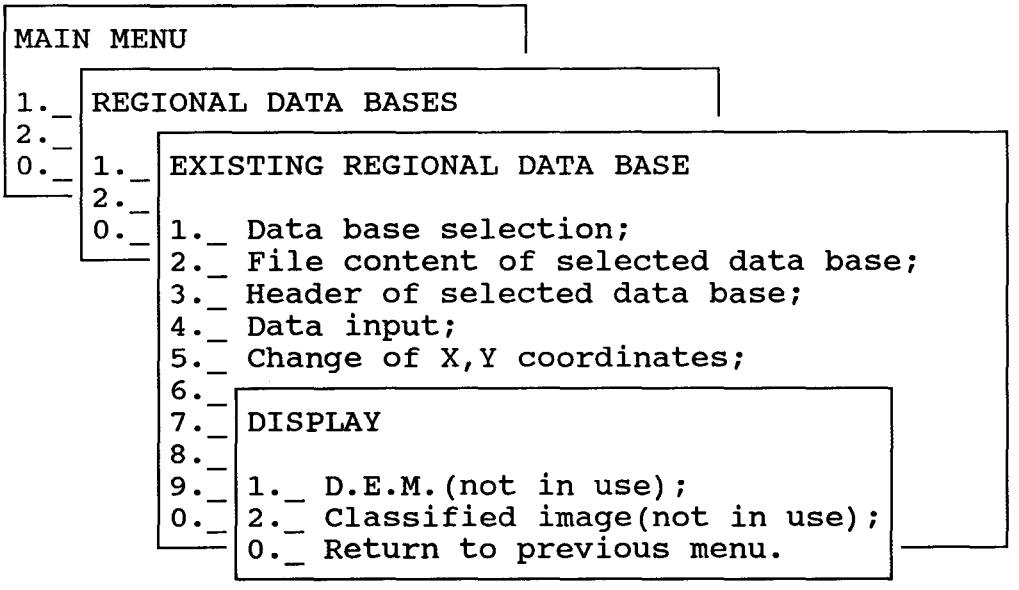

Figure 2.17 Sub-menu #1.2.7: display.

2.3.2 Sub-menu #2.0: watershed data bases

It should noted immediately that a number of menus permitting to work on the watershed data bases (WDB) will be similar to those of the regional data bases (RDB).

Two options are offered in sub-menu 2.0 (figure 2.18). Option 1 allows the definited of a new water shed data bases. To have access to an existing WDB, option 2 has to be selected. On can return to the "main menu" by typing "0" or selecting option "0" and pressing "ENTER".

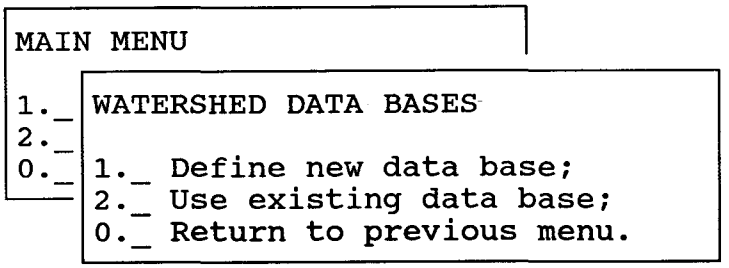

Figure 2.18 Sub-menu #2.0: watershed data bases.

2.3.2.1 Sub-menu #2.1: define new watershed data base

Sub-menu #2.1 (figure 2.19) is used to define the characteristics of a new watershed data base.

Frist type the file name (without extension) under which the WDB will be saved and the file name (without extension) of RDB from which it will be created. A title or comment identifying the file may be added next.

The geographical area within which all pertinent data should be has also to be entered. All subsequent operations in the WDB will be performed only on the data within that geographical area rather than on the larger RDB geographical area, in other words, on a subject of the RDB data set. Choose the cartographic projection (only UTM for PHYSITEL 1.0) and give the longitude and latitude of the lower left corner and of the upper right corner of the area.

The grid size (in meters) used for spatial integration is next given. Remember that with PHYSITEL 1.0, only multiples of the original spatial resolution may be chosen. The cells obtained from that process will be the basis for the second spatial integration into homogeneous hydrological areas available with PHYSITEL 2.0.

Once the characteristics of the new WDB are given, they may be saved by pressing "F10". Informations on the parameters of the chosen cartographic projection are then asked. After giving those informations, press "enter".

```
DEFINE NEW WATERSHED DATA BASE

...Watershed data base name: clifton
...From regional data base : sudquec
...Title or comment identifying the data base:
Watershed data base for clifton basin from RDB sudquec

...Cartographic projection: 1
             1 - UTM
             2 - LAMBERT
             3 - Polar stereographic
             4 - Degree

...Geographical area:         LONG.           LAT.
    -lower left corner :    7140.184W       4506.913N
    -upper right corner:    7117.973W       4523.599N
                               X               Y
.....grid size(m):            1000            1000

F10: store information                                          ESC:QUIT
```

Figure 2.19 Sub-menu #2.1: define new watershed data base.

2.3.2.2 Sub-menu #2.2: existing watershed data base

Apart from two user's defined tastes, five options are offered in sub-menu 2.2 (figure 2.20).

First particular a WDB has to be selected as the current data base, using option 1.

The header of the WDB, containing the characteristics of the data base defined in sub-menu 2.1, can be shown if option 2 is selected.

Option 3 user the uses to see the actual content of the selected data base.

Option 4 and 5 lead to a series of other permitting to add or edit files or display them.

Option 6 should be selected if the user wants to export files.

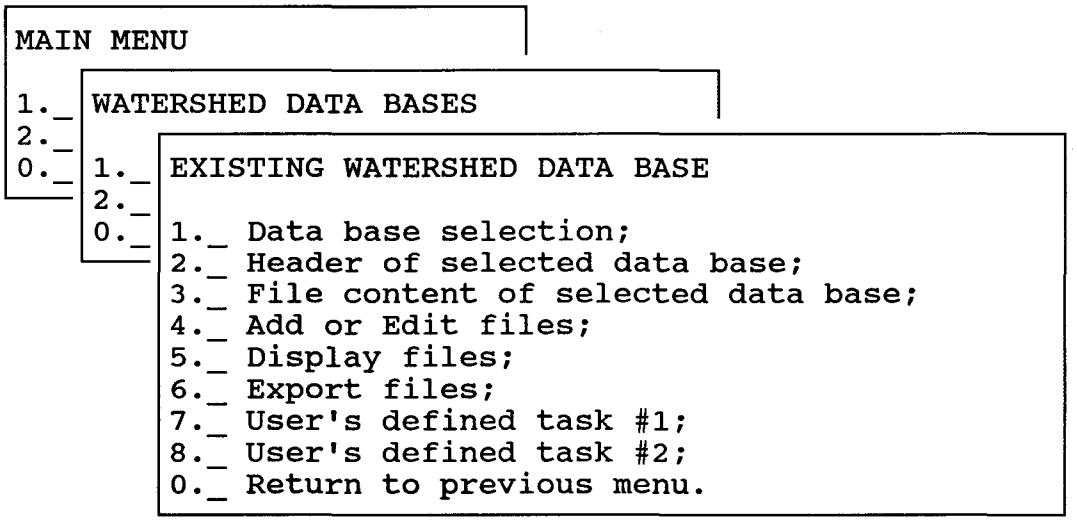

Figure 2.20 Sub-menu #2.2: existing watershed data base.

2.3.2.2.1 Sub-menu #2.2.1: data base selection

A list of existing WDB is produced when sub-menu #2.2.1 is chosen (figure 2.21). Select the WDB on which you want to work by placing the cursor on that data base name and then pressing "ENTER". The name of the current data base before selection appears in the lower left corner of the menu.

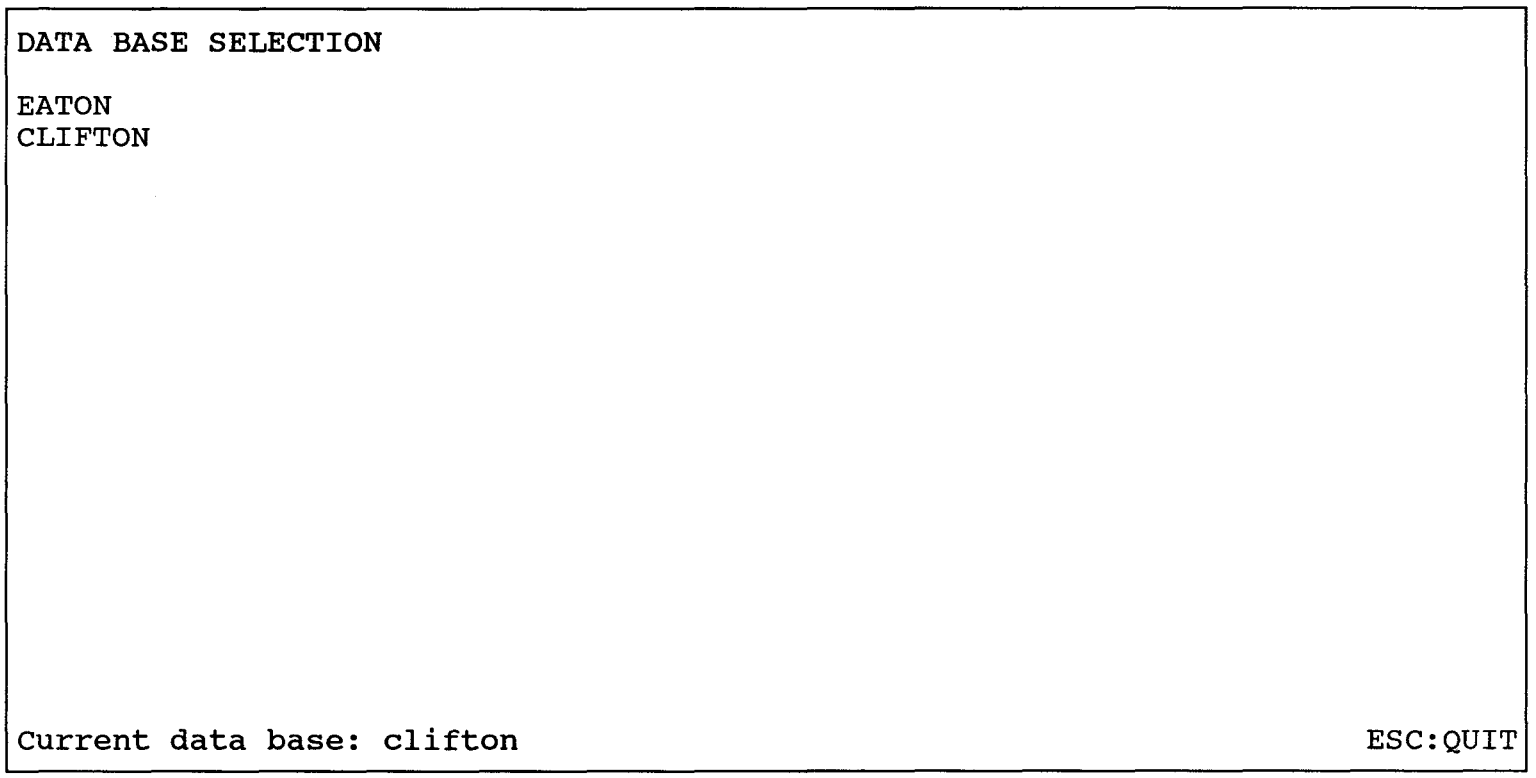

Figure 2.21 Sub-menu #2.2.1: data base selection.

2.3.2.2.2 Sub-menu #2.2.2: header of selected data base

The header content of the selected WDB is shown in sub-menu #2.2.2 (figure 2.22) for information purposes only. No action can be taken. Return to the previous menu by striking any key.

```
HEADER OF SELECTED DATA BASE

Watershed data base name: clifton
From regional data base:  sudquec

Description of data base:
Watershed data base of Eaton bassin

Cartographic projection: UTM
         Caracteristics: zone : 19

Geographical area:      EASTING     NORTHING
   Lower left corner :   290000     4999000
   Upper right corner:   319999     5028999

Grid size(m):             1000        1000

Please strike any key to continue
```

Figure 2.22 Sub-menu #2.2.2: header of the selected data base.

2.3.2.2.3 Sub-menu #2.2.3: file content of selected evatershed data base

Sub-menu #2.2.3 shows the name of the WDB, together with a list of files currently in the WDB (figure 2.23). A return to the previous menu is obtained by striking any key.

```
FILE CONTENT OF SELECTED DATA BASE: clifton

CLIFTON.ID                CLIFTON.DEB
CLIFTON.FIL
CLIFTON.HIG
CLIFTON.LOW
CLIFTON.MNT
CLIFTON.MAX
CLIFTON.MIN
CLIFTON.SLO
CLIFTON.ASP
CLIFTON.LPT
CLIFTON.PAN
CLIFTON.FLA
CLIFTON.NET
CLIFTON.BAS
CLIFTON.PA2
CLIFTON.DB
CLIFTON.ORI
CLIFTON.PT1
CLIFTON.PLA

Please strike any key to continue
```

Figure 2.23 Sub-menu #2.2.3: file content of selected evatershed data base.

2.3.2.2.4 Sub-menu #2.2.4: add or edit files

Sub-menu #2.2.4 (figure 2.24) gives access to the main tasks related to the preparation of a WDB.

Option 1 is selected if raster data have to be spatially integrated according to the grid spacing defines dor the WDB, prior to other operations.

Option 2 leads to a series of tasks used to define the drainage network uptream of a particular point on a river, and this the watershed area uptream of that point. All points belonging to the watershed are subsequently identified using a mask of the watershed.

Option 3 permits to define the characteristics of the river channels needed by HYDROTEL. In PHYSITEL 1.0, only a manual input is available to prepare the file in the proper format to be read by HYDROTEL.

Option 4 is to be used for the spatial integration of land-uses classes from various sources.

Option 5 allows editing of the files.

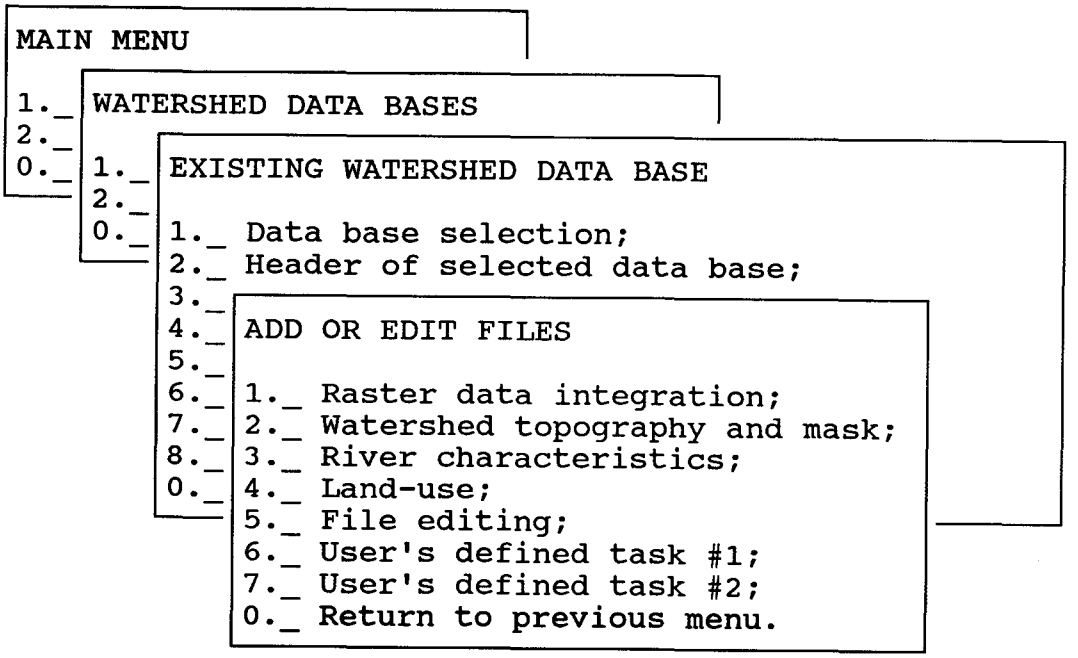

Figure 2.24 Sub-menu #2.2.4: add or edit files.

2.3.2.2.4.1 Sub-menu #2.2.4.1: raster data integration

If raster data have to be spatially integrated, sub-menu #2.2.4.1 is chosen (figure 2.25). This may be the case for a D.E.M. data file.

The name of the raster file in the RDB and its name (extension to the watershed file name) in the WDB are given first.

Then an integration process is chosen. Only one integration process is available for the moment, in which the mean areal value is computed.

Tape "F10" to run the task. All other needed informations are obtained from the header file of the WDB.

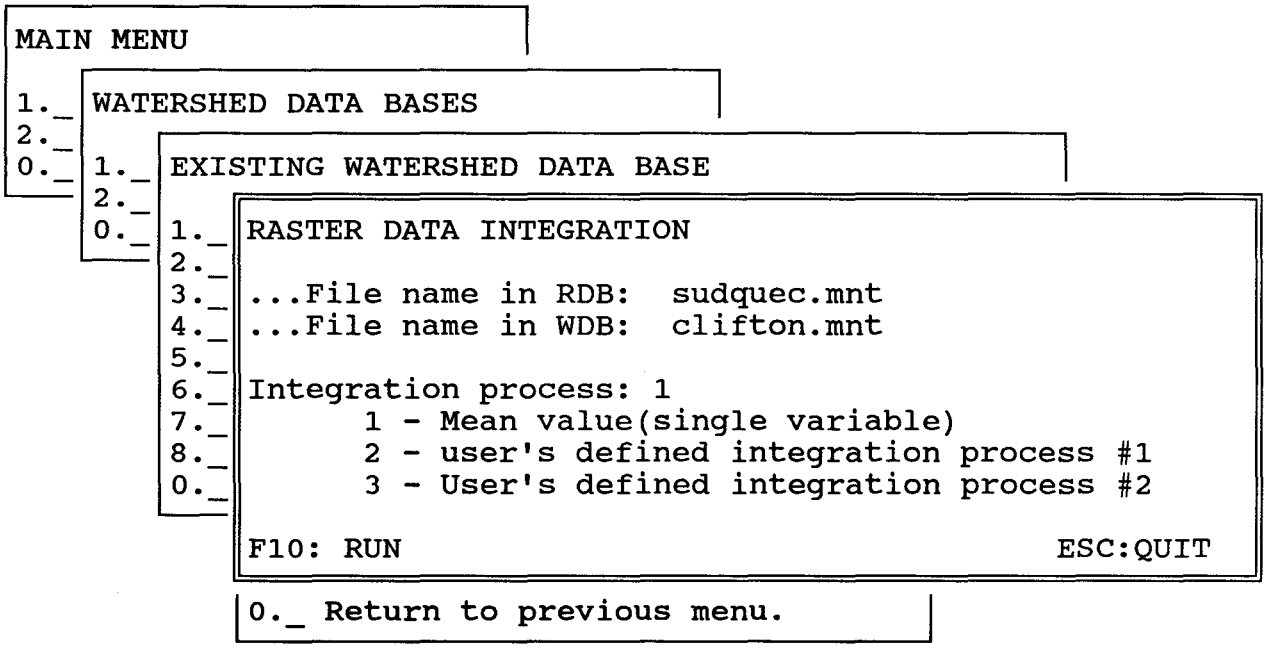

Figure 2.25 Sub-menu #2.2.4.1: raster data integration.

2.3.2.2.4.2 Sub-menu #2.2.4.2: watershed topography and mask from WDB files

Sub-menu #2.2.4.2 (figure 2.26) gives access to all tasks necessary to defined the drainage network upstream of a particular point on a river and this the area covered by the watershed corresponding to that network.

Option 1 is selected to pre-process the DEM file in order to obtain a smoother variation of elevation from point to point.

Option 2 is used to determine slopes, whereas option 3 is used for aspect treatment.

Option 4 is a spacial group of tasks permitting to make the necessary modifications for points or groups of points causing interruptions in the drainage network.

Option 5 allows determination of the drainage network. This option should be selected when all necessary modifications have been done.

Two more user's defined functions will be available with PHYSITEL 2.0.

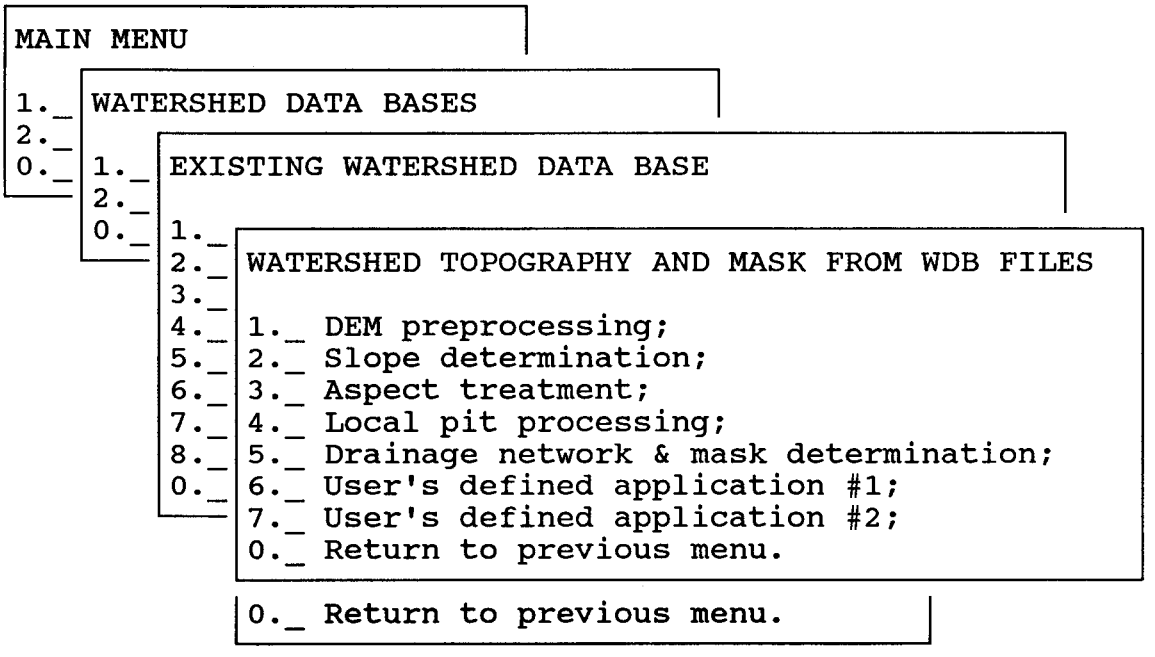

Figure 2.26 Sub-menu #2.2.4.2: watershed topography and mask from WDB files.

2.3.2.2.4.2.1 Sub-menu #2.2.4.2.1: dem preprocessing

Two options are accessed by sub-menu #2.2.4.2.1 (figure 2.27) for pre-processing purposes on the original DEM file.

Option 1 is selected if filtering of the original file is wished. Erroneous values in the file resulting in extreme (minima or maxima) values can be removed if option 2 is selected.

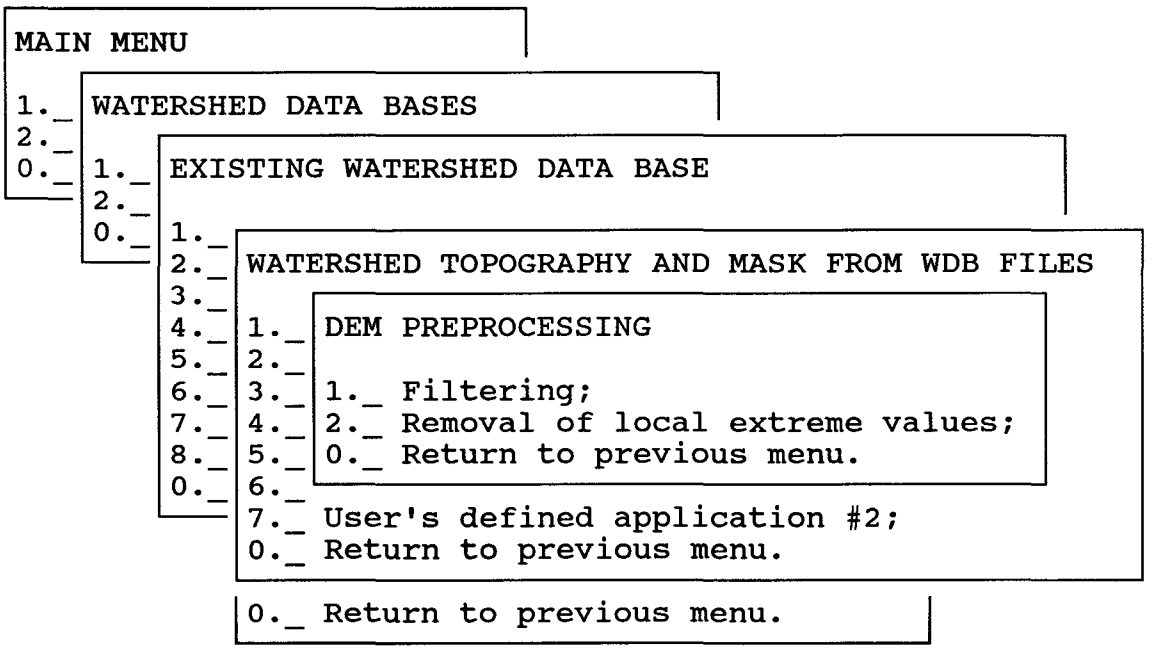

Figure 2.27 Sub-menu #2.2.4.2.1: dem preprocessing.

2.3.2.2.4.2.1.1 Sub-menu #2.2.4.2.1.1: filtering

First enter the name of the file to be filtered (usually the original filename) and that of the filtered file (figure 2.28). In practice, only extensions to the filenames have to be given as all file in the WDB differ only by their extensions.

With PHYSITEL 1.0, only a 3 X 3 filter is used, so choose option 1. Other options will be available with PHYSITEL 2.0.

Press "F10" to execute the task. It is also possible to display either the file to be filtered or the filtered file by pressing "F1". The name of the file to be displayed is asked. Press any key to come back to menu.

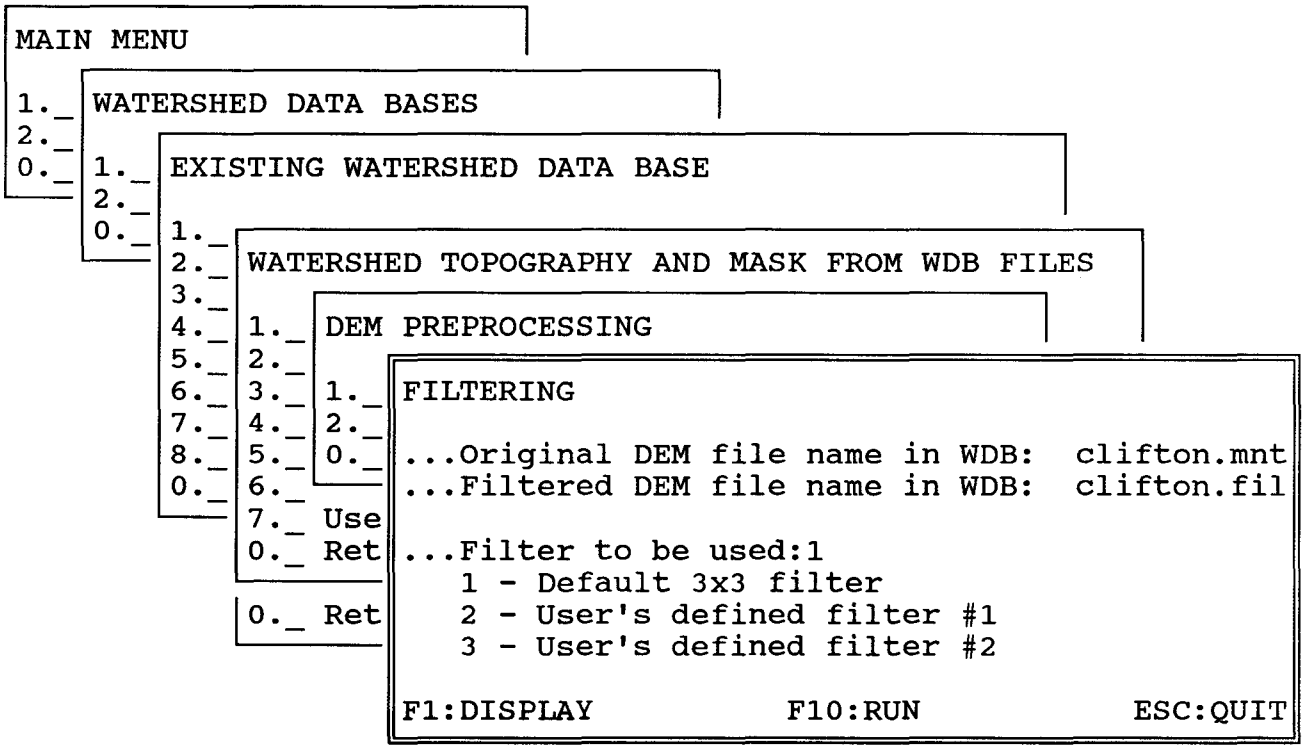

Figure 2.28 Sub-menu #2.2.4.2.1.1: filtering.

2.3.2.2.4.2.1.2 Sub-menu #2.2.4.2.1.2: removal of local extreme values

Local extreme values which one effectively wrong values may be removed from the DEM file by task 2.2.4.2.1.2 (figure 2.29).

Enter the name of the DEM file (filtered or unfiltered) from which you want to remove those extreme values. Next, enter the filename under which you want to store the maxima and that for the minima. Storing the extreme values gives the user the possibility to decide that a particular value is not a wing value but correspond to a time value on the terrain.

Press "F10" to execute the tast and "F1" to display the file before and/or after removal of the extreme values.

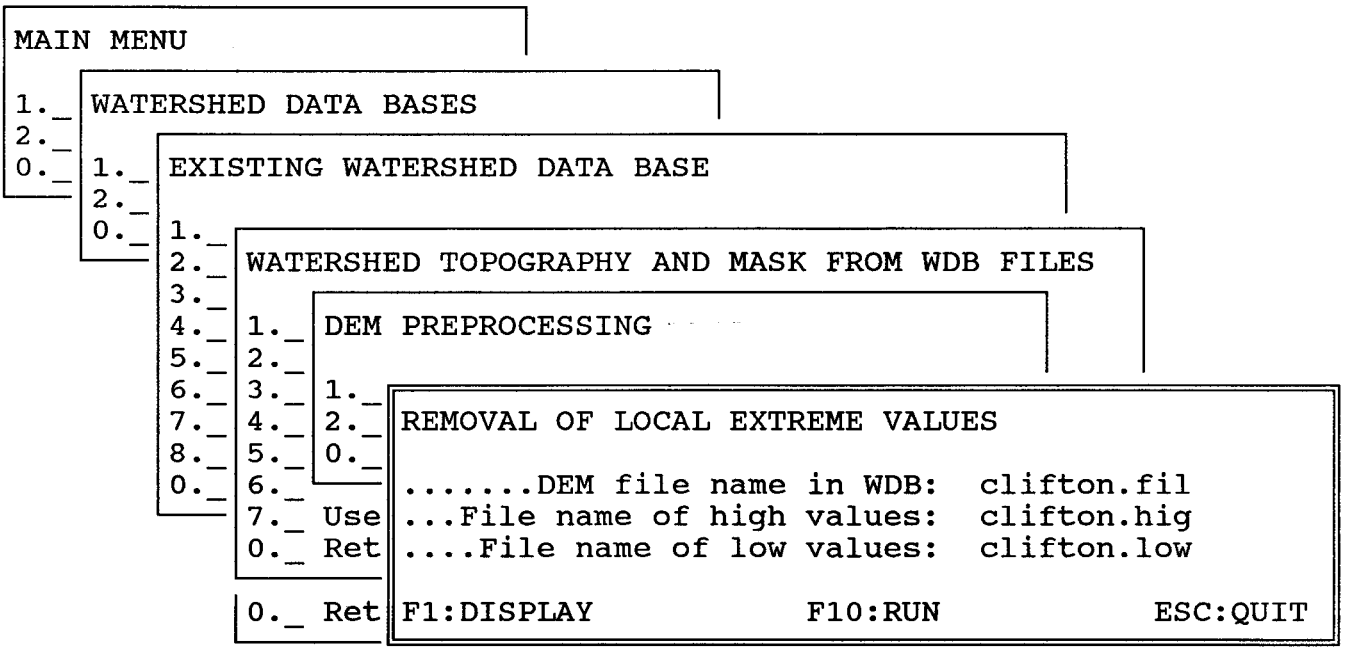

Figure 2.29 Sub-menu #2.2.4.2.1.1: removal of local extreme values.

2.3.2.2.4.2.2 Sub-menu #2.2.4.2.2: slope determination

The slopes are determined by using task 2.2.4.2.2 (figure 2.30). Enter the filename of the DEM file in the WDB, followed by the filename you want to give to the slope file. Remember that only extensions need be given.

The method used to determine the slope is chosen next. With PHYSITEL 1.0, only option 1 is available.

Press "F10" to run the task and "F1" to display the slope file.

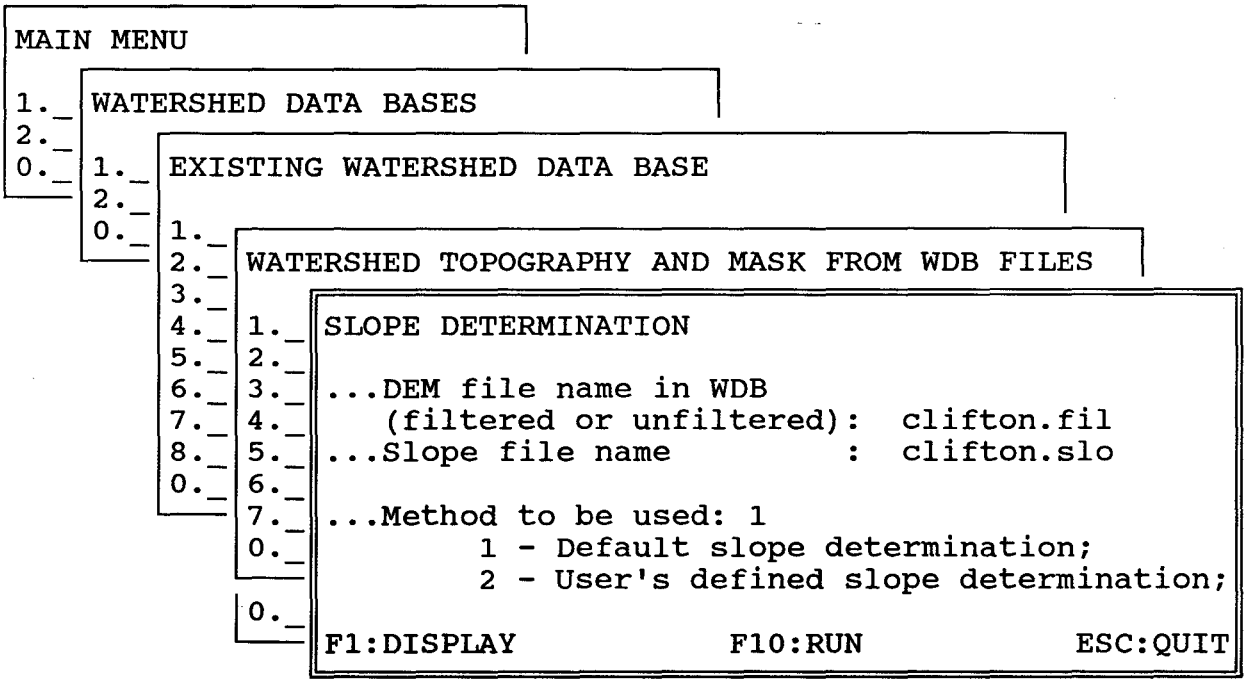

Figure 2.30 Sub-menu #2.2.4.2.2: slope determination.

2.3.2.2.4.2.3 Sub-menu #2.2.4.2.3: aspect treatment

In sub-menu 2.2.4.2.3 (figure 2.31) two options are offered. A first determination of aspect is obtained by using option 1. Then option 2 is used, more or less as a filter, to correct particular aspect directions with the help of both the slope and the DEM files. This happens, for instance if two contiguous slopes are in opposite direction, as computed previously.

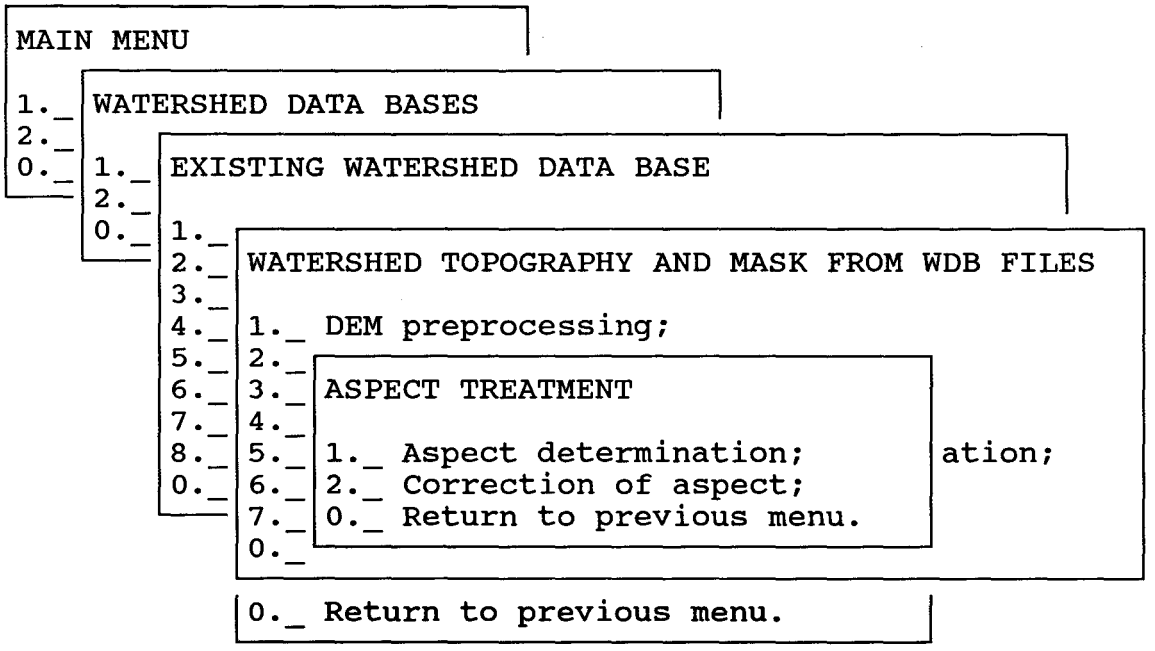

Figure 2.31 Sub-menu #2.2.4.3.2.3: aspect treatment.

2.3.2.2.4.2.3.1 Sub-menu #2.2.4.2.3.1: aspect determination

In order to compute aspect directions, enter the filename of the DEM file you want to use and then the filename of the aspect file that will be created (figure 2.32).

Only option 1 is available with PHYSITEL 1.0 to compute the aspects.

Press "F10" to run the task and "F1" to display the aspect file.

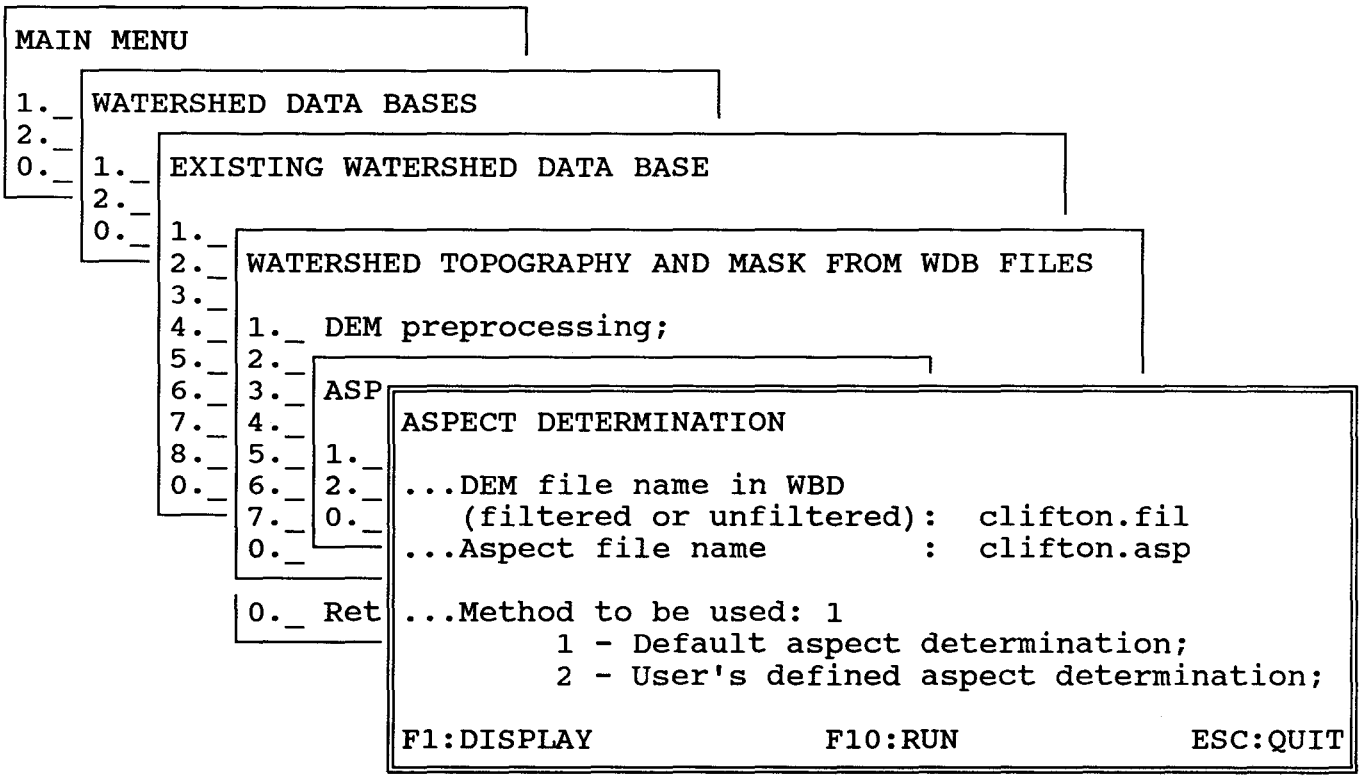

Figure 2.32 Sub-menu #2.2.4.2.3.1: aspect determination.

2.3.2.2.4.2.3.2 Sub-menu #2.2.4.2.3.2: correction of aspect

If a few aspect directions have to be corrected, it is possible to do so. The following task will make use of informations coming from the DEM, slope and aspect files to check conflicting directives that make the correction if necessary. Enter the filenames of the previously created DEM, slope and aspect files (figure 2.33) and press "F10" to run the task. The corrections are made directly to the aspect file. The corrected aspect file may be displayed by pressing "F1".

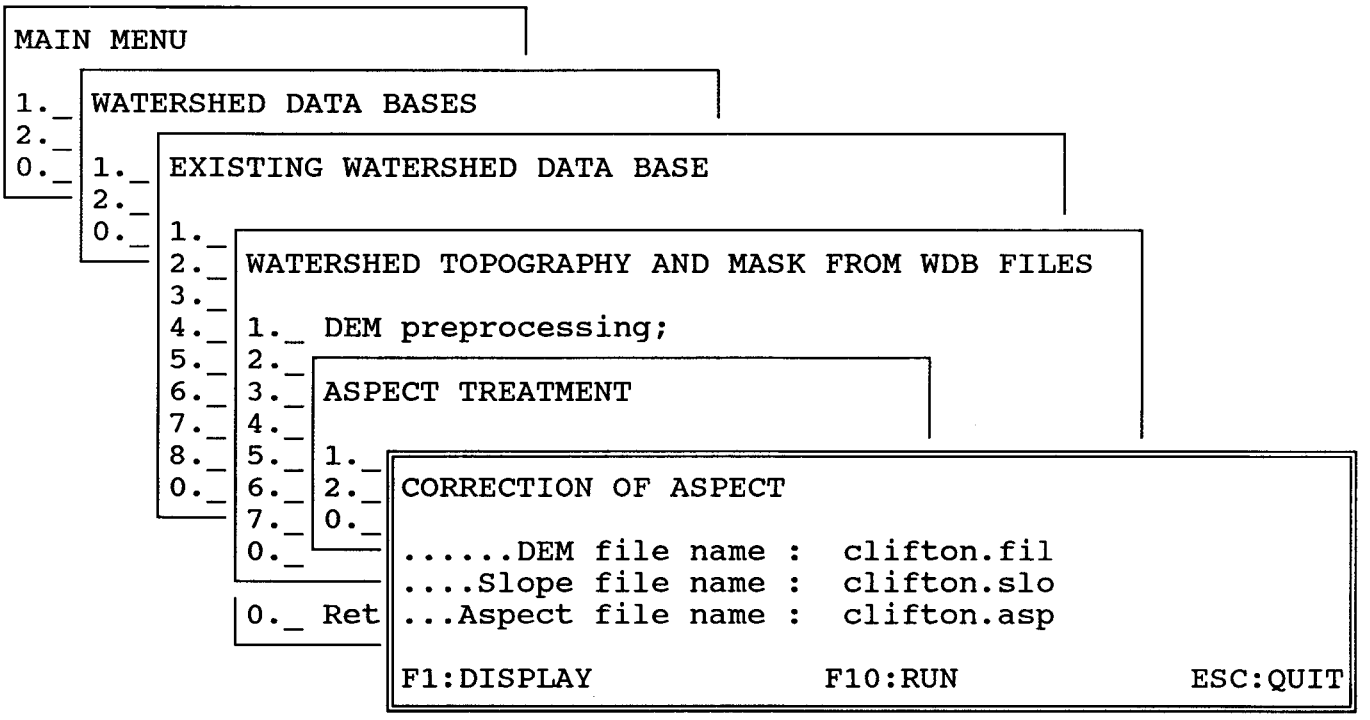

Figure 2.33 Sub-menu #2.2.4.2.3.2: correction of aspect.

2.3.2.2.4.2.4 Sub-menu #2.2.4.2.4: local pit processing

Normal drainage from different parts of a watershed may be bloked by a point whose altitude is lorner than all surrownding points or by a group of such points, all at the same altitude and forming a flat area. The tasks accessed by sub-menu #2.2.4.2.4 (figure 2.34) are designed to find an outlet for such points or flat areas.

Option 1 is used to locate all local pits (single point).

A temporary working data base regrouping all information on each point must be created with option 2 to facilitate the other options.

Option 3 give access to the task permitting to find an outlet from local pits or flat areas blocking normal drainage.

Option 4 is used to complete the work for all uptream points whose normal drainage was block previously.

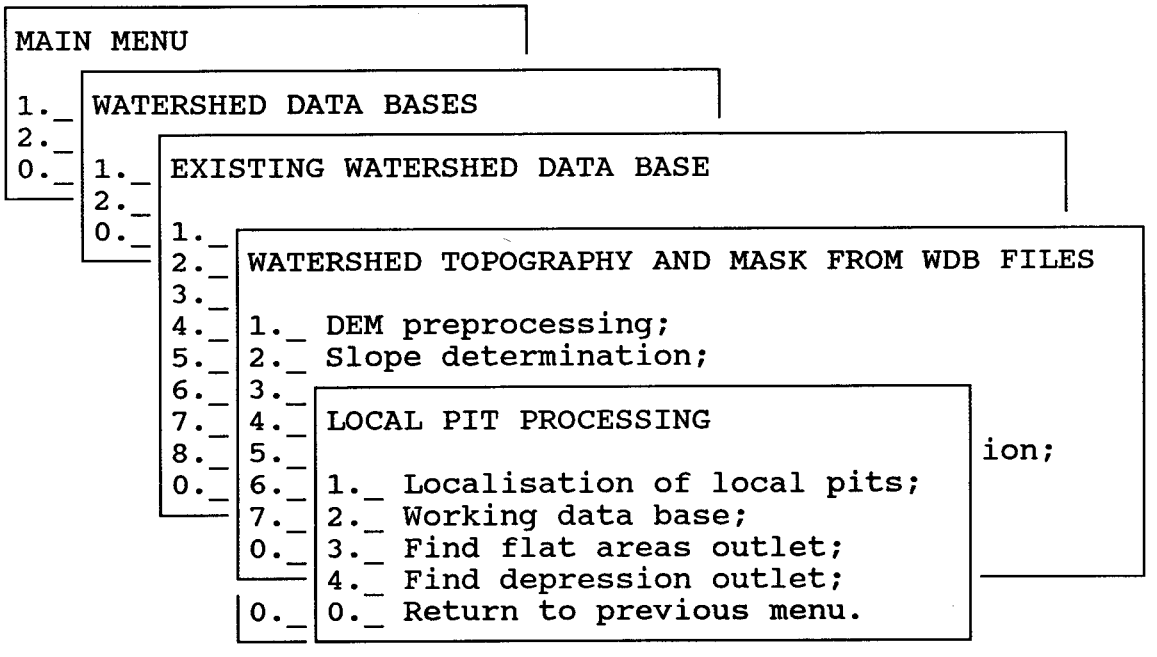

Figure 2.34 Sub-menu #2.2.4.2.4: local pit processing.

2.3.2.2.4.2.4.1 Sub-menu #2.2.4.2.4.1: localisation of local pits

Enter the filenames of the DEM and aspect file, as well as the filename of the file to contain informations on format local pits (figure 2.35). Press "F10" to run the task.

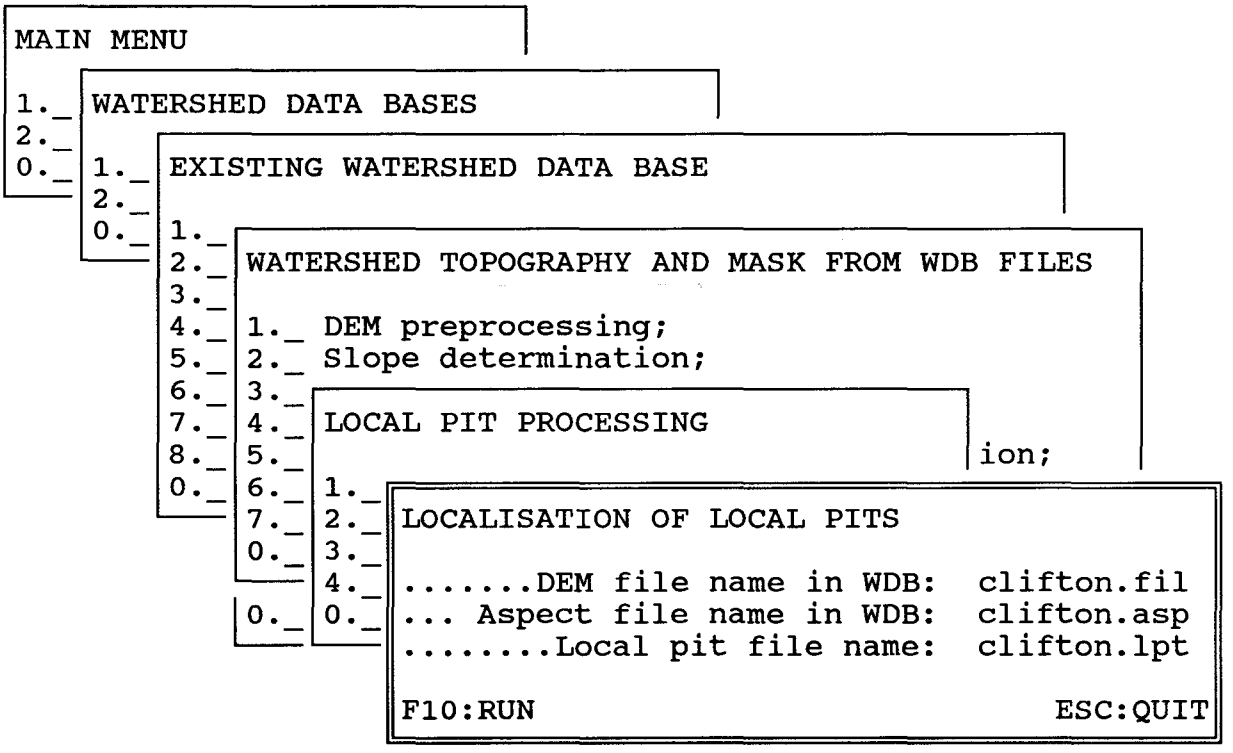

Figure 2.35 Sub-menu #2.2.4.2.4.1: localisation of local pits.

2.3.2.2.4.2.4.2 Sub-menu #2.2.4.2.4.2: working data base

To simplify the next sub-menus a working data containing all pertinent information on each point in particular the DEM, slope and aspect files is prepared. Enter the filenames of the DEM, slope and aspect files, as well as the filename of the temporary working data base. Then, press "F10" to run the task (figure 2.36).

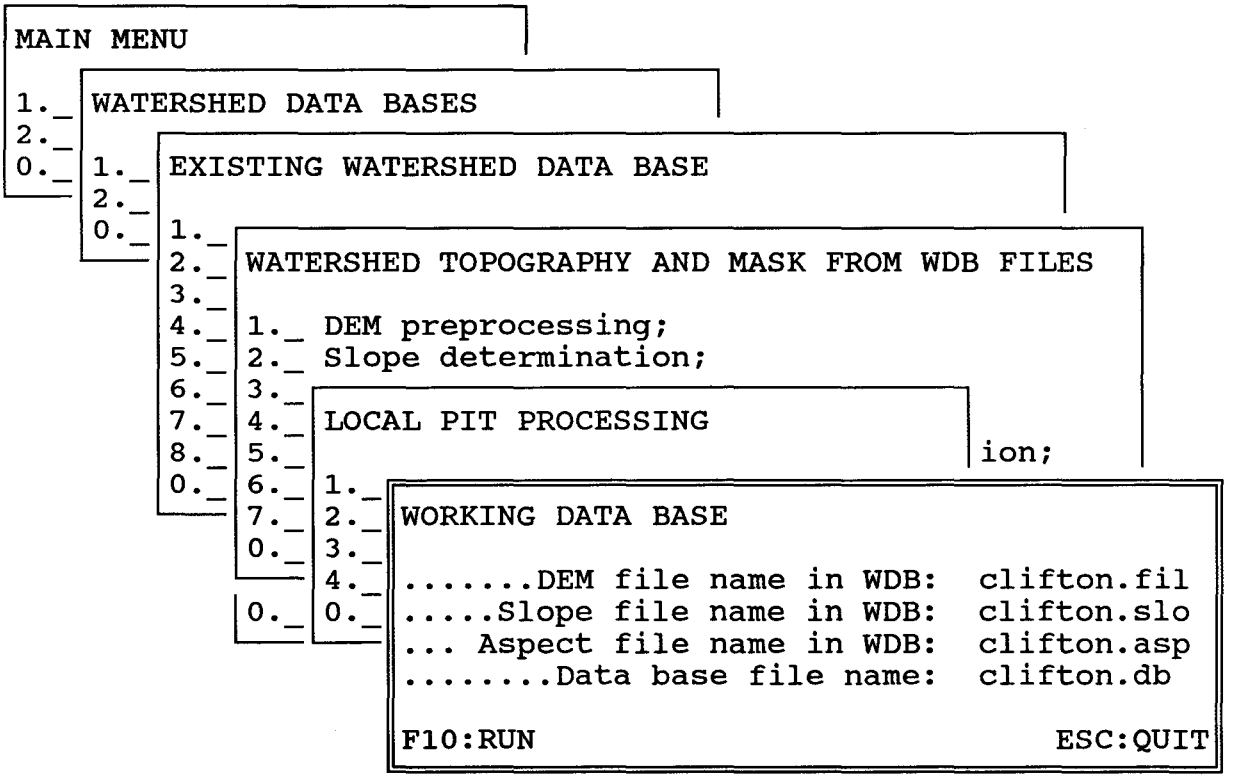

Figure 2.36 Sub-menu #2.2.4.2.4.2: working data base.

2.3.2.2.4.2.4.3 Sub-menu #2.2.4.2.4.3: flat area outlets

Sub-menu #2.2.4.2.4.3 gives access to the task permitting to find an outlet from local pits or flat areas blocking normal drainage from upstream points. Enter the filenames of the working data base and local pit files as well as those of the files in which informations on outlets and flat areas will be stored (figure 2.37). The flat area file is prepared for informations only. It can be used to localise flat areas on a map.

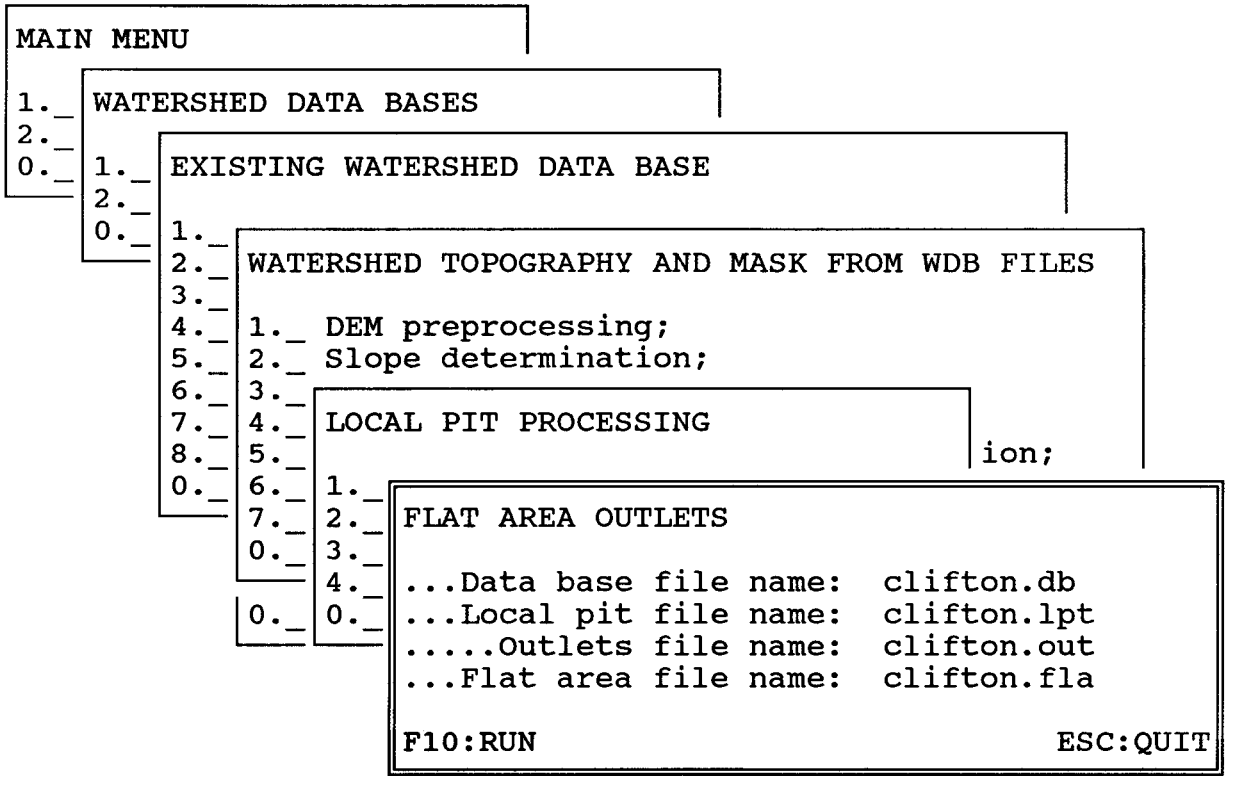

Figure #2.37 Sub-menu #2.2.4.2.4.3: flat area outlets.

2.3.2.2.4.2.4.4 Sub-menu #2.2.4.2.4.4: depression outlets

With the previous task, an outlet is found for each local pit or flat area, the task accessed from sub-menu #2.2.4.2.4.4 does the same of all points upstream of those local pits or flat areas in order to restore normal drainage everywhere. The depressions are made of local pits or flat areas, plus all points upstream of those discontinuities.

Enter the filenames of the working data base and of the depression files as well as that of the outlet file obtained with the previous task (figure 2.38). Press "F10" to run the task.

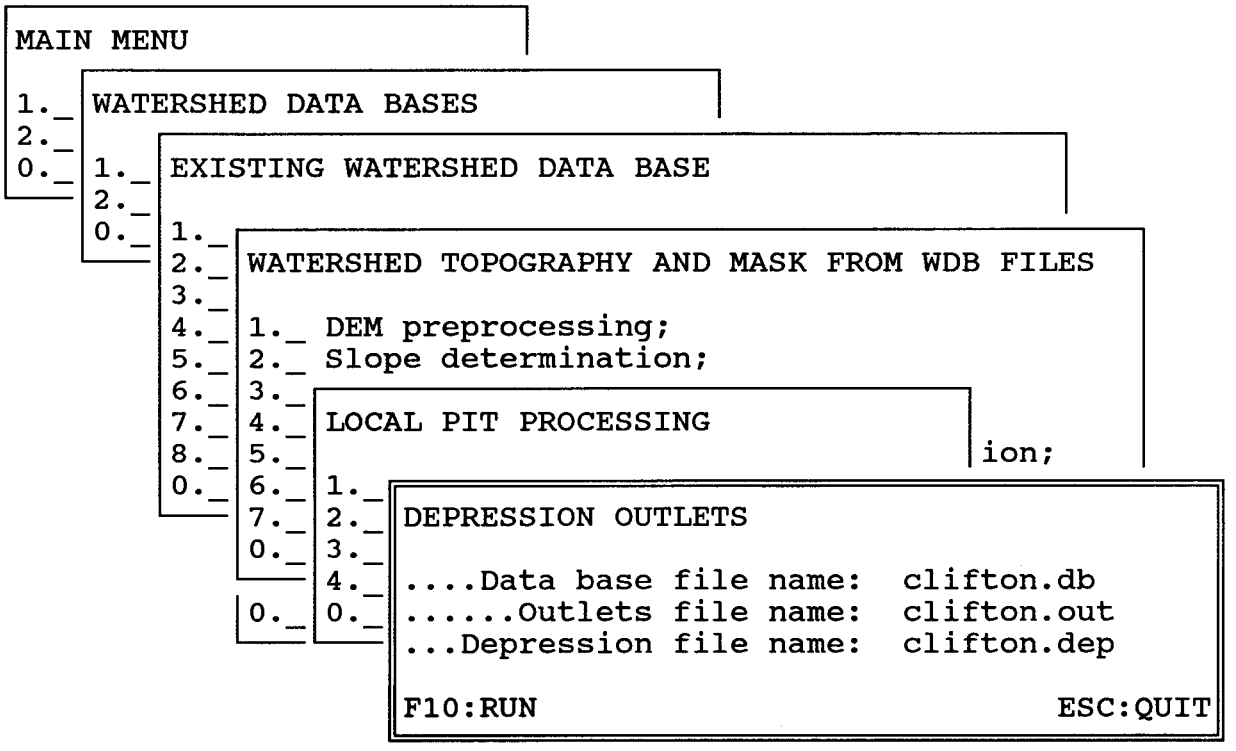

Figure 2.38 Sub-menu #2.2.4.2.4.4: depression outlets.

2.3.2.2.4.2.5 Sub-menu #2.2.4.2.5: drainage network determination

Once all previous operations have been done successfully, it is possible to determine the drainage network. Enter the filename of the working data base and the geographical position of the basin outlet (figure 2.39). With PHYSITEL 1.0, only method #1 is available to determine the drainage network and the mask of the watershed (essentially a finary file identifying points inside or outside the basin limits). The right point has to be chosen as the basin outlet. Otherwise, an erroneous watershed will be obtained. Press "F10" to run the task and "F1" to display the results.

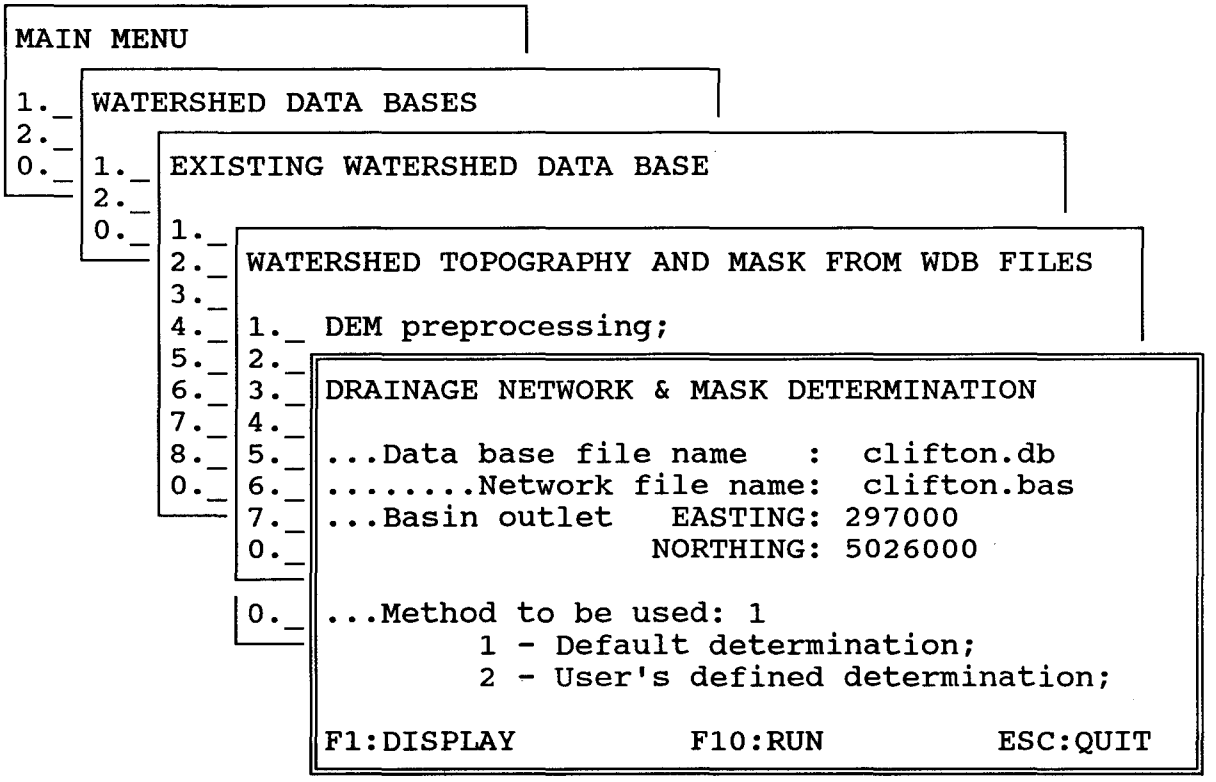

Figure 2.39 Sub-menu #2.2.4.2.5: drainage network determination.

2.3.2.2.4.3 Sub-menu #2.2.4.3: river characteristics

It is intented to use informations from both a remotely sensed image and digital evalation model to determine most river characteristics. This will be available with PHYSITEL 2.0. Only a manual input permitting to go back to DOS to prepare the proper files, is currently available (figure 2.40). So, choose option 1, to prepare the file.

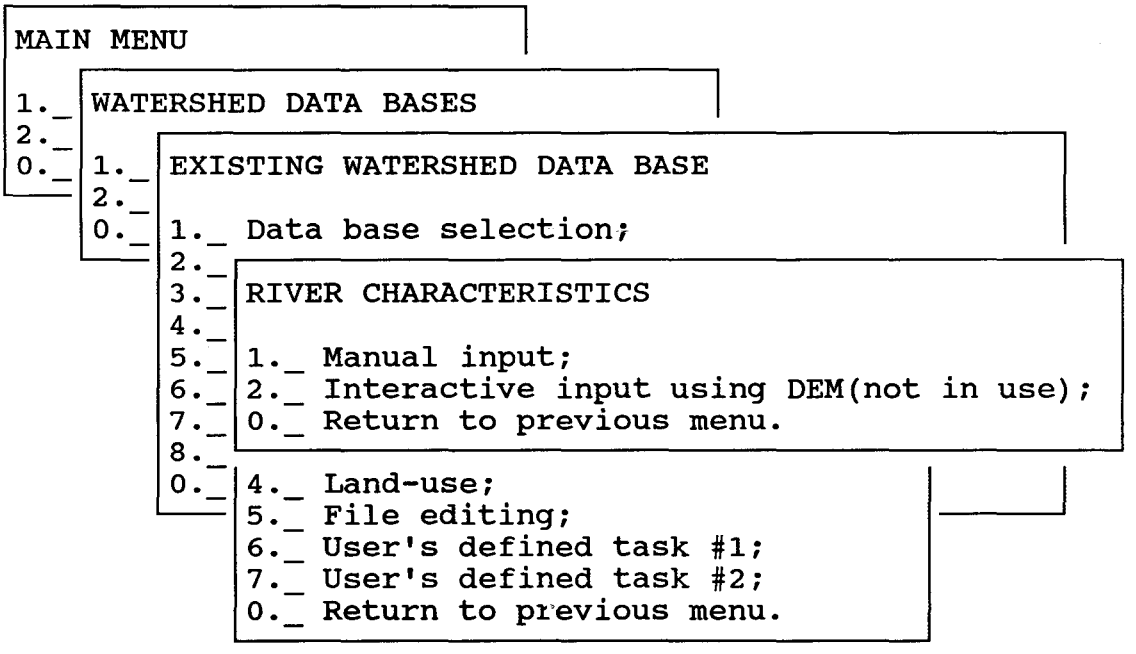

Figure 2.40 Sub-menu #2.2.4.3: river characteristics.

2.3.2.2.4.4 Sub-menu #2.2.4.4: land-use integration for grid intervals

When integration of a raster file containing a single variable (e.g. DEM data) is wished, one should use sub-menu 2.2.4.1. However when the raster file refers to a number of variables, as it is the case for land-use, sub-menu #2.2.4.4 is to be used (figure 2.41). With PHYSITEL 1.0, only integration of land-use raster data from IMATEL is available. So, choose option 1.

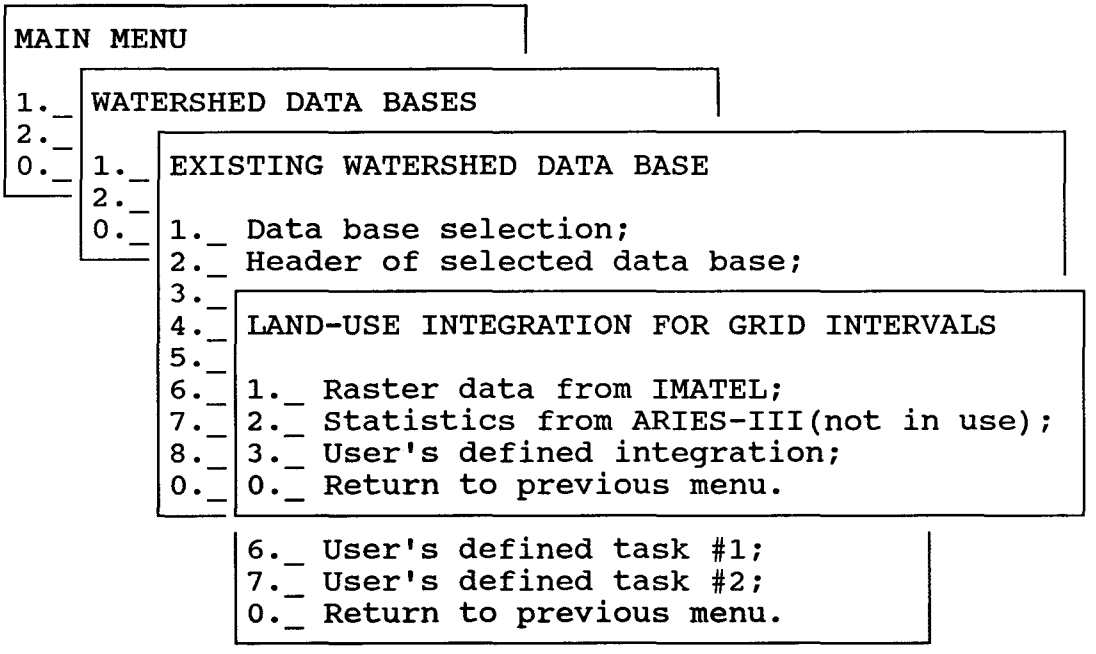

Figure 2.41 Sub-menu #2.2.4.4: land-use integration for grid intervals.

2.3.2.2.4.4.1 Sub-menu #2.2.4.4.1: paster data from IMATEL

Enter the file names (extensions only) of the file to integrate and of the file where to store the result. Only method 1 is implemented within PHYSITEL 1.0. Press "F10" to run the task.

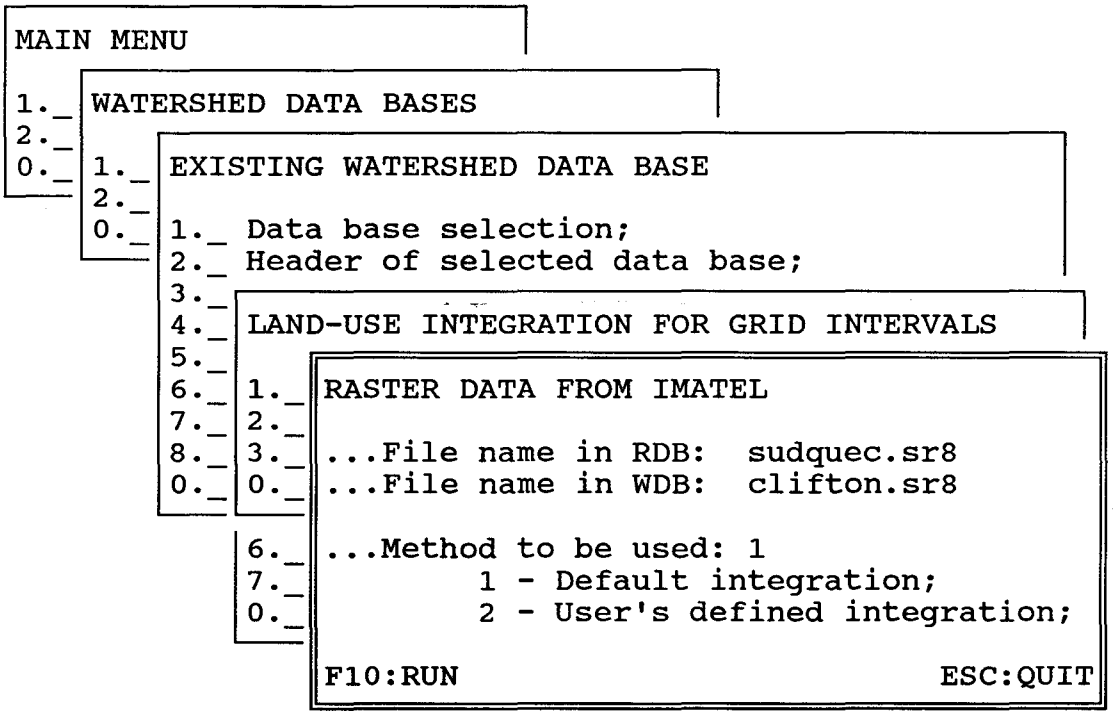

Figure 2.42 Sub-menu #2.2.4.4.1: raster data from IMATEL.

2.3.2.2.5 Sub-menu #2.2.5: display files

Sub-menu 2.2.5 (figure 2.43) lets you display most file present in WDB. Choose option 1, 2, 3 or 5 and a window appears prompting you to give the name of the file to display. It up to the user to give the correct file name. Option 4 is not implemented yet.

Option 1 will display the DEM with different colors for different class of altitudes.

Option 2 will display the file with different colors for different class of slopes.

Option 3 will display the file with 9 different colors 8 for the standard aspects plus one for flat square noted as "FL" in the legend.

Option 4 will display the mask of basin using blue for square inside the basins and black if outside.

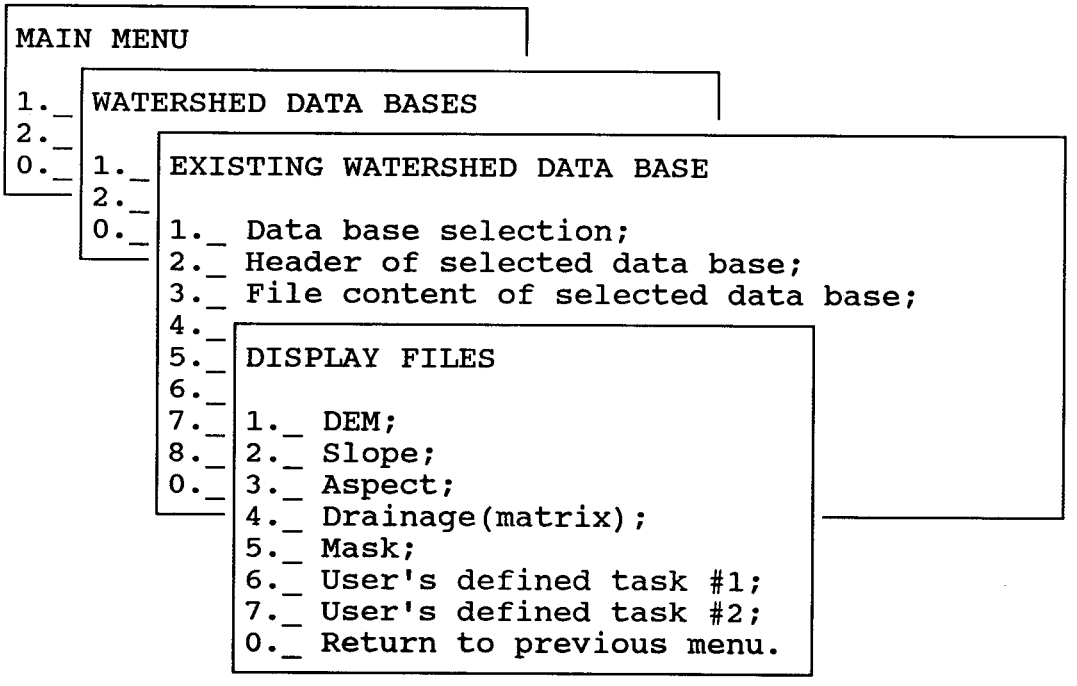

Figure 2.43 Sub-menu #2.2.5: display files.

2.3.2.2.6 Sub-menu #2.2.6: export file

Sub-menu 2.2.6 (figure 2.44) lets the user export file by changing the format of those files. PHYSITEL 1.0 can only export file to HYDROTEL.

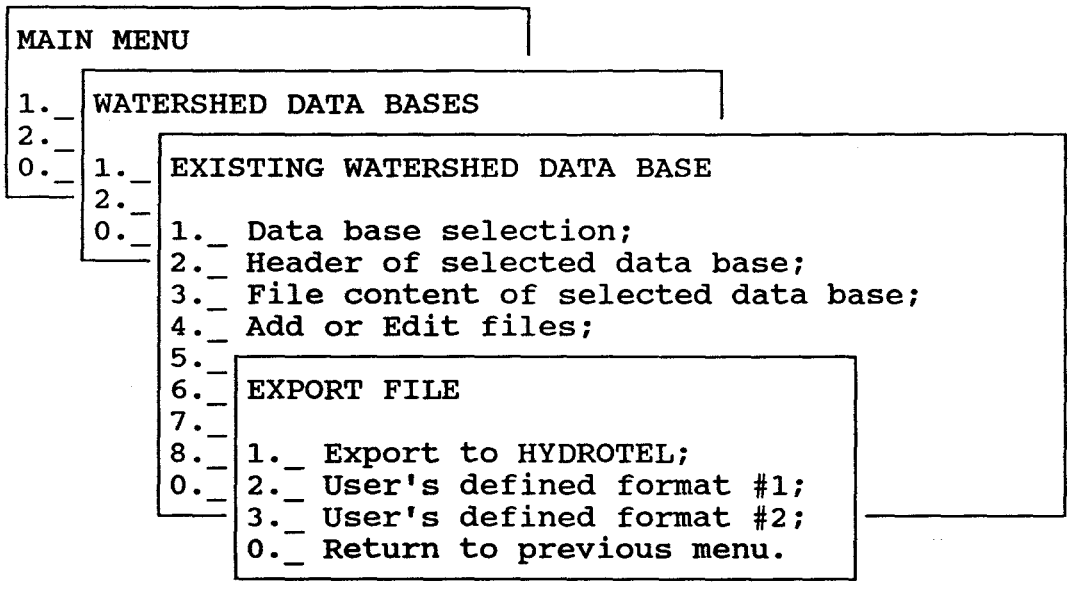

Figure 2.44 Sub-menu #2.2.6: export file.

2.3.2.2.6.1 Sub-menu #2.2.6.1: export to HYDROTEL

Sub-menu 2.2.6.1 (figure 2.45) ask for the name of the file to export, the path of the mew file and the type of that file. We recommand to store the new file in a directory different then RDB or WDB. Press "F10" to perform the task.

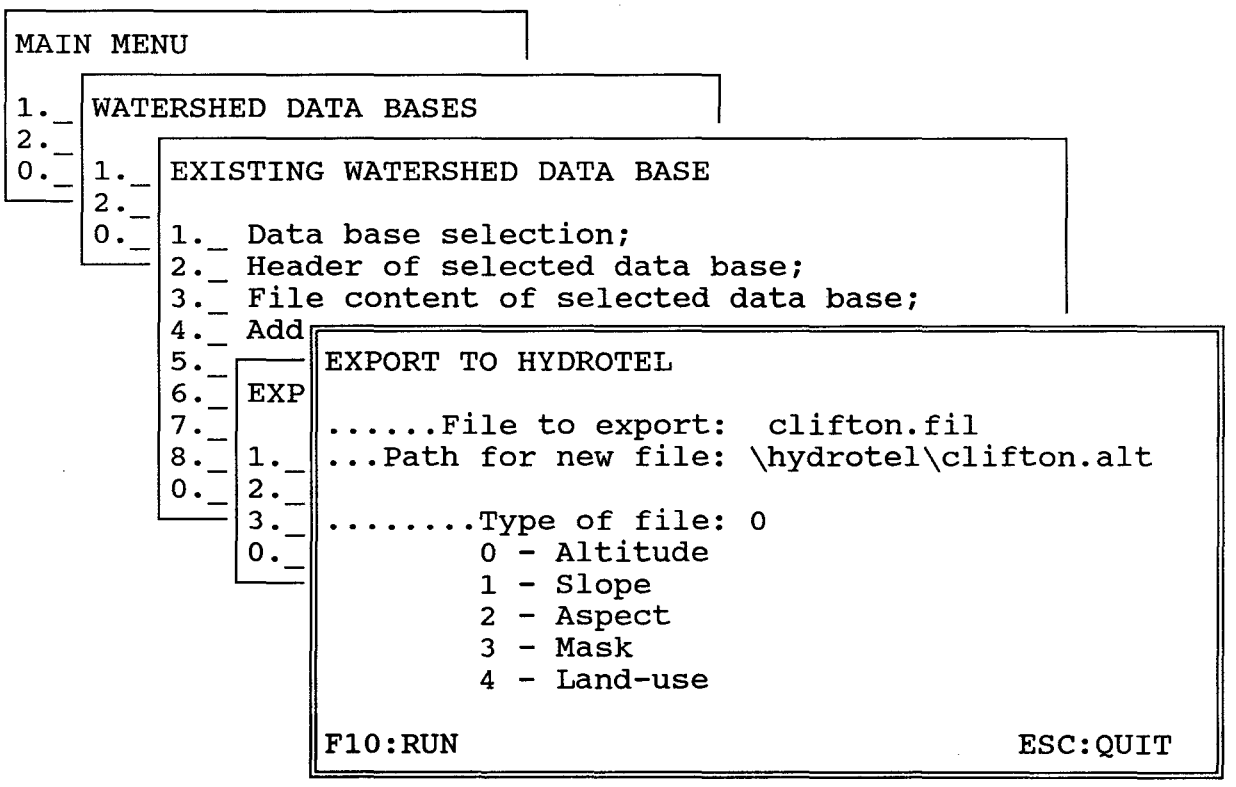

Figure 2.45 Sub-menu #2.2.6.1: export to HYDROTEL