TRAINING COURSE

ON

SOFTWARE FOR SURFACE WATER DATA MANAGEMENT

UNDER

WORLD BANK FUNDED HYDROLOGY PROJECT

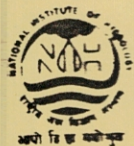ROORKEE

19-30 AUGUST 1996

HYQUAL - A WATER QUALITY SOFTWARE

BY

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HYQUAL - A WATER QUALITY DATABASE

1.0   INTRODUCTION

The data management is the very prime requirement for any type of research. To get predictions very close to the reality the true and exact data are required. A single data involves various information around itself such as: parameter name, place, date of sampling, date of analysis, name of sampler, name of analyst, purpose of sampling, time of sampling, MSL value of sampling point and climatic conditions at the time of sampling. Each and every data requires all such general information to get a real picture of nature. Once we get these general information regarding single data we step further to have various parameters of single sample. And a study requires various samples to be analyse or continuous sampling. Hence it becomes very tedious job to handle this bulk of data manually with a register. Therefore a computer based software may be very helpful to us for data management. The HYQUAL provides this facility and makes the job of data storage very easy to us.

2.0   THE *HYQUAL* OVERVIEW

HYQUAL is a water quality database for IBM and compatible personal computers running under Windows Version 3.0 or 3.1. It facilitate the storage of water quality data with tabular and graphical reports. It uses a hierarchical structure to store information. It contains following building blocks:

DETERMINAND --> SAMPLE --> SAMPLING POINT --> CLUSTER --> REGION

HYQUAL can be set up to provide standard determinand dictionaries for chemistry, microbiology, hydrology, sewage disposal, water supply and biology. Information once stored, can be accessed and used to produce tables of information or graphic plots.

3.0   INSTALLING *HYQUAL* THROUGH THE WINDOWS PROGRAM MANAGER:

3.1   The Windows Environment

HYQUAL has been written to operate under Windows graphical user interface (GUI). To start Windows from DOS type **WIN** then press **enter**. The program will take a few seconds to load but eventually the Windows "desktop" will be displayed. Figure entitled Program Manager shows a typical Windows desktop configuration.

All menu items in Windows can be selected by either clicking on them with the left mouse button, or by typing the letter that is underlined in each choice. A third way is to use the up and down arrow keys on the key board until the required choice is highlighted by the coloured light bar and then press the enter key. Some menu choice have a key combination, e.g. Alt-F4 can be used to close the currently active window.

Menu selection can also be made through the keyboard. To access the menu first tap the Alt key. One of the menu selection will become highlighted , to cycle through the menu selections use the left and right arrow keys. When the required choice is highlighted, press the enter key. Sub-menus choice can be made by moving the highlighted bar with the up and down keys and pressing enter.

3.2   HYQUAL Installation

Click on the menu option *File* in the **Program Manager** window, then on *New* in the sub-menu. A small window titled *New Program Object* should be open. Click on the option button called *Program Group* then on *Ok* button. A new dialog box called *Program Group Properties* will open. The *Description* of this dialog box is used to enter a title. The *Group File* text box is used to enter the name of the DOS file in which the details

about the program group will be stored. To set up a program group ready for installing HYQUAL, type **Hydrological Software** into the *Description* text box then press **Tab key** to move the windows curser to the *Group File* text file or click any where inside the *Group File* text box. Type **HYDRO** as the group file name. To finish the creation of the new program group click on the *Ok* box. Hence the new, blank program group window will open and the HYQUAL program can be install into it as an icon.

Now copy the original HYQUAL from floppy disk onto the computer's hard disk. To do this click on the *File* option of the menu at the top of **Program Manager** window, then click on the *Run* option of sub-menu. Put the original HYQUAL floppy disk in drive A, type **A:\HQINSTALL A: C**: into the *Command Line* box and click on the *Ok* button.

The final part of the installation process is to place a HYQUAL program icon into the program group window that has been created previously. Click on the *File* option on the **Program Manager** window then on the *New* option on the sub-menu. Select *Program Item* from the dialog box click on the *Ok* button. A new Dialog box will appear, type **HYQUAL** into the *description* box, (press the *Tab* key or click inside the box to move the cursor into it) then **C:\HYQUAL\HYQUAL.EXE** into the *Command Line* box and **C:\HYQUAL** into the *Working Directory* box. Finally click on the *Ok* button. HYQUAL will be installed as an icon in the **Hydrological Software** program group window as shown in figure titled Hydrological Software under Program Manager window. HYQUAL is now ready for running by double clicking on the HYQUAL icon.

4.0 WORKING WITH THE HYQUAL

4.1 Starting and Logging on

HYQUAL is started from within the Windows environment by double clicking HYQUAL icon. Select *System* from the menu by clicking on it or press *Alt-S*, then select *Logon* from sub-menu to display the dialog box for **User Information**. Enter a valid user name and password by clicking in the appropriate text box and then typing the required entry. Then click on appropriate user group category. Finally click on the *Ok* button.

4.2 Setting up Sampling Point

Before we store any information, set up a structure. To do this go through the following steps:

1. Define Region:
Select the *System* from main menu and then choose *Regions* from sub-menu. The region is used to describe the geographic area from which the water samples are taken. Type region code of up to 9 characters and then region name of up to 29 characters long. The region code indexed alphabetically in HYQUAL. When the region code and name have been entered , select the *Save* command button. The procedure can be repeated until all the required regions have defined. The region name can be changed by double clicking on region code the region code can be changed by *Delete* command. Click on the *Exit* command button when all the entries have correctly entered. The output can be saved to a disk file by selecting *File* from the main menu and *Save as* from sub-menu. Close the output window before continuing.

2. Define Cluster:
Cluster types provides a general description of a sample source, e.g. a lake , river or sewage works. Select *System* menu and choose *Cluster types* from the sub-menu to display Cluster Type Details dialog box. Enter a short code (up to 9 characters) and a full name (up to 29 characters) into the code and name text boxes, then select the *Save* command button. The cluster name can be changed by double clicking on cluster code, the cluster code can be edited by *Delete* command. Click on the *Exit* command button when all the entries have correctly entered. The output can be saved to a disk file by selecting *File* from the main menu and *Save as* from sub-menu. Close the output window before continuing.

3. Determinand Types:

Determinands are the physical properties of the sample being measured, e.g., oxygen content, alkalinity, temperature etc. Select *System* menu and choose *Deteminands* from the sub-menu to display Determinands Details dialog box. Enter a short code (up to 9 characters) and a full name (up to 29 characters) into the code and name text boxes, then select the *Save* command button. The procedure is repeated for each entry. Standard upper and lower limits to sample values and levels can be included if required.

TUTORIAL:

Set up a short list of determinands using the table below:

Code	Determinands Name	Units Limit	Upper Limit	Lower Limit	Safe
BOD	Bio. oxy. demand	mg/l	30.0	0.0	3.0
pH	pH	-	10.0	3.0	8.0
Temp	Temperature	^0c	25.0	0.0	22.0
TDS	Total dissolved solids	mg/l	1000.0	0.0	1000.0
DO	Dissolved Oxygen	% Sat^n	100.0	0.0	80.0
NO_3	Nitrate	mg/l N	20.0	0.0	5.0
Cd	Cadmium	mg/l	0.00	0.0	0.001
Fe	Iron	mg/l	5	0.0	0.2

4. Define Sample Type:

This describes the kind of measurements being made at a particular sampling point, e.g. quality, flow of rainfall etc. Select *System* menu and choose *Sample types* from the sub-menu to display Sample Type Details dialog box. Enter a short code (up to 9 characters) and a full name (up to 29 characters) into the code and names into respective text boxes, and click once, in the determinand list box, on each of the determinands required for the sample. To unselect a determinand click on it again. When all the determinands are selected click on the *Save* command button. The procedure repeated for each sample type defined or edited and then click on the *exit* command button.

TUTORIAL:

Code	Sample Type Description	Determinands
Discharge	Discharge from sewage treatment tank	BOD, pH, Temp
Pump	Outflow from mine pumping station	Cd, Cu, Fe, Pb
Quality	River water quality	All determinands

5. Define Cluster details:

Details about each specific cluster can be entered after all the information about regions, cluster types, determinands and sample types have been defined and stored. Select *System* menu and choose *cluster* to open Cluster Details dialog box. This menu choice allows a specific cluster of sampling points to be described. Choose the Region first then Cluster Type from list boxes levelled Region and Cluster type by clicking on them, then enter a code and a name for the new cluster. Select *save* to complete the operation.

TUTORIAL:

Region	Cluster Type	Code	Cluster Name
East	River	RH	River Hindon
East	River	RK	River Kali
East	STW	STWM	S.T.W. of M. Nagar
East	STW	STWR	S.T.W. of Roorkee
North	River	RG	River Ganga

This dialog box is also used to enter sample point details. It can also be used to modify the determinand consent levels for a specific sampling point.

6. Sample Point Details:

Select *System* from the main menu and *cluster* from sub-menu. First select the required cluster by double clicking on its code name in the cluster codes list box and then click on *New SP*. A dialog box named, Sampling Point Details will appear, this dialog allows the user to record a description of a sampling point. Select the *Save* command button. Repeat the process until all the required sample points have been set up then choose *Exit*. To edit the sample point details first select the region and cluster type from the cluster details dialog box.
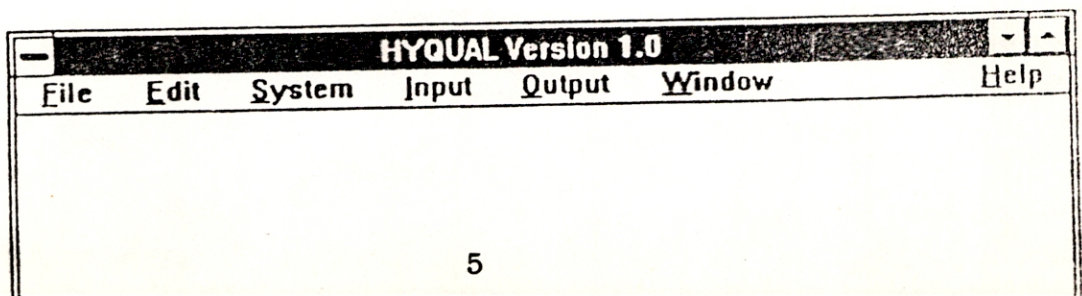
TUTORIAL:

Enter the following sampling points:

Region	Cluster Type	Cluster Code	Sampling Point	Sampling Type
East	River	River X	RX1	QUALITY
East	STW	STW A	STW1	DISCHARGE
East	River	River Y	RY1	QUALITY
East	River	River Y	RY2	QUALITY
North	River	River Y	RY3	QUALITY
North	STW	STW B	STW-B1	DISCHARGE
North	Lake	Lake A	Lake A1	QUALITY
North	Mine	Mine 1	Mine 1	PUMP

4.3   Samplers, Analysts and Laboratories:

The *System* menu offers three choices, *Samplers, Analysts* and *Laboratories,* that lead to dialog boxes for entering the relevant information.

4.4   General Sample Information and Sample Editing:

When a sample point has been defined and saved, information about samples for that point can be entered. Choose *Input* from main menu and *New Data* from sub-menu to open the Select a Sample Point Dialog box. Use the appropriate list boxes to select a region, a clustertype, a cluster and a sampling point in that order then click on the *Sample* command button. A dialog box, named General Sample Information will appear having general information options for a sample. The determinands for the sample are entered by clicking on the *Determinands* button to display a dialog box titled Dterminands Detail for the Sample. After entering the detemminands click on the *Save* button for that dialog box and again on *Save* button for the General Sample Information dialog box.

Program Manager

File   Options   Window   Help

Accessories   Main   Utilities   Games

Program Manager

File   Options   Window   Help

Hydrological Software

HYQUAL

Accessories   Games   Main

HYQUAL Version 1.0

File   Edit   System   Input   Output   Window   Help

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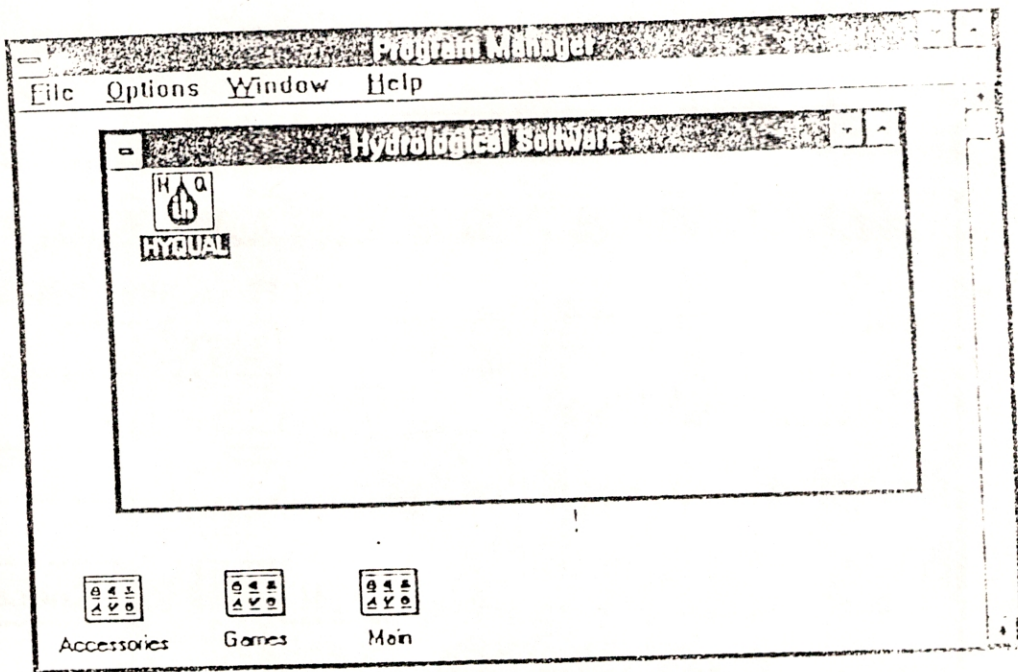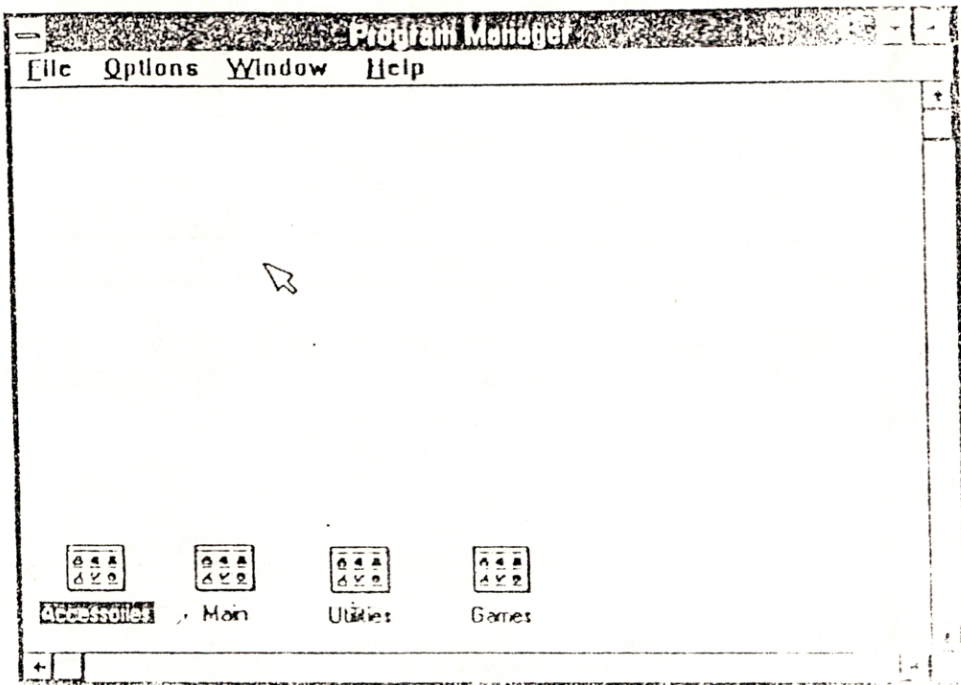
User Information

User name	[ ]
Password	[ ]

User group
- ○ Manager
- ● Group A
- ○ Group B
- ○ Group C

[New] [Detail] [OK] [Cancel]

Region Details

Code [EAST]

Name [Eastern Region]

Region codes
```
EAST
NORTH
SOUTH
```

[Save] [Delete] [Output...] [Cancel] [Exit]

Output Data Selection

Code list
```
EAST
NORTH
SOUTH
```

[First] [Last] [Reset]

First code [EAST]

Last code [SOUTH]

[OK] [Cancel]

```
┌─────────────────────────────────────────────────────────┐
│ ─                      untitled.txt                  Insti│↑
├─────────────────────────────────────────────────────────┤
│ HYQUAL V1.0                                               │
│                                                           │
│                          Regions Report                   │
│                                                           │
│  Code         Name                                        │
│  ─────────────────────────────────────────────────       │
│  EAST         Eastern Region                              │
│  NORTH        Northern Region                             │
│  SOUTH        Southern Region                             │
│                                                           │
│                                                           │
│  Institute of Hydrology                          Fri Jul  │
│                                                         ↓ │
│ ←                                                       → │
└─────────────────────────────────────────────────────────┘
```

```
┌──────────────────────────────────────────────┐
│ ─                  Save As                     │
├──────────────────────────────────────────────┤
│  Save As Filename :          ┌──────────────┐  │
│  ┌────────────────────────┐  │     OK       │  │
│  │ UNTITLED.TXT           │  └──────────────┘  │
│  └────────────────────────┘                    │
│  d:\hyqual                   ┌──────────────┐  │
│  Directories                 │   Cancel     │  │
│                              └──────────────┘  │
│  ┌────────────────────┐↑                       │
│  │[..]                │                         │
│  │[data]              │                         │
│  │[hyqdata]           │                         │
│  │[output]            │                         │
│  │[-a-]               │                         │
│  │[-c-]               │↓                        │
│  └────────────────────┘                         │
└──────────────────────────────────────────────┘
```

```
┌──────────────────────────────────────────────┐
│ ─          Cluster type's information    ▼ ▲  │
├──────────────────────────────────────────────┤
│  Code    ┌──────────────┐    ┌──────────────┐ │
│          │ MINE         │    │    Save      │ │
│          └──────────────┘    └──────────────┘ │
│  Name    ┌──────────────────┐┌──────────────┐ │
│          │ Mine Pumping Statio││   Delete     │ │
│          └──────────────────┘└──────────────┘ │
│  Cluster types               ┌──────────────┐ │
│  ┌────────────────────────┐  │   Output...  │ │
│  │LAKE                    │  └──────────────┘ │
│  │MINE                    │  ┌──────────────┐ │
│  │RIVER                   │  │   Cancel     │ │
│  │STW                     │  └──────────────┘ │
│  │                        │  ┌──────────────┐ │
│  │                        │  │    Exit      │ │
│  │                        │  └──────────────┘ │
│  └────────────────────────┘                    │
└──────────────────────────────────────────────┘
```

Determinand Details

Code `Cd`   Name `Cadmium`

Determinand

```
BOD
Cd
Cu
DO
Fe
NO3
Pb
pH
```

Details

Measure unit	`mg/l`
Upper limit	`0.005`
Lower limit	`0`
Safe level	`0.001`

Comment `.`

Buttons: Save, Delete, Cancel, Output..., Exit

Sample Type Details

Type code `QUALITY`   Name `River water quality`

Sample type codes

```
DISCHARGE
PUMP
QUALITY
```

Determinand codes

```
NO3
PO4
Cd
Cu
Fe
Pb
Zn
```

Select all   Deselect all

Re-Order determinands

Buttons: Save, Delete, Output..., Exit

Re-order determinands

Determinand list

```
BOD
Cd
Cu
DO
Fe
NO3
Pb
pH
```

New order

Add >>

<< Remove

Add all >>

OK   Cancel

Cluster Details

Cluster Code
```
RIVER X
```
```
RIVER X
```

Region
```
EAST        ▼
```

Cluster Name
```
River X
```

Cluster type
```
RIVER       ▼
```

Sample points
```
RX1
RX2
RX3
```

SP determinands

Save

Delete

New SP

SP detail

Exit

Determinand consent levels

Sample point   RX1

Determinand details

Code: BOD   Name: Biological oxygen demand

Determinand
```
BOD
pH
Temp
```

Details

Upper limit   `20`

Lower limit   `0`

Safe level   `3`

Update

Exit

Sampling Point Details

Code   `RX1`

Name   `River X sampling po`

Elevation (m) `0`

Include daily flow ☐

Catchment basin

Code   `          `

Area (km²) `0`

Grid reference:
```

```

Comments
```

```

Sample type
```
QUALITY          ▼
```

UTM coordinate

Zone   `0`

Easting   `0`

Northing   `0`

Hemisphere `0`

Address
```

```

Save

Delete

Cancel