ORGANIZATION AND MANIPULATION OF GROUNDWATER DATA BASE FILES

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An easy and flexible software package for retrieving data base files for groundwater systems and reserves is presented.

Ključne riječi: Podzemna voda, Rezerve podzemnih voda, Baza podataka podzemnih voda

Prikazana su jednostavna i prilagodljiva softwareska rješenja za pretraživanje banke podataka, hidrogeoloških sustava i zaliha podzemnih voda.

Introducton

A new comprehensive approach to the evidence and management of groundwater resources over the entire Republic of Croatia has been devised lately. The approach to the project is schematically outlined by Miletić and al. 1989. Basically, the data base comprises a wide varity of the most important data sources regarding the ground water systems. Regional geology, hydrogeology, hydrology and climate are examples of the major categories of data described in the data base file. The necessity of convenient, fast and simple approach to these data underlies, the logical organization and appropriate software for the database files of »The Register and Management of Groundwater Reserves in the Republic of Croatia«. The scheme of the organization and the guidance for the use of the software package are presented in this paper. For those interested in data base organization and application, we suggest Martin (1977) and Nordboten (1985) for further information.

Data base organization

The organization of data base files is based on the results of the project »The registar and management of groundwater reserves in the Republic of Croatia« (RMGR), which sistematically classifies strategical groundwater reserves of the Republic of Croatia for the current and future water resources management policy (Miletić and al. 1988.). By analogy with this classification, RMGR data base management software is created as a tool for a simple and flexible retrieving techniques for those who are not computer literate.

The user can easily get into the data base system, enter a search data base files, obtain results and get out from it with a minimum knowledge of computer application. The data base commands are simple, consisting of Croatian language instructions and numeric representations. A search of the RMGR groundwater data base provides a complete description of available data for a particular water area (cachment area and ground water systems). The resulting information describes the data in suffecient details to allow the user to decide whether to contact the data holder for specific details or to use existing data as a base for water resource decision making.

The ground water database comprises the following types of informations:

- Spatial distribution of water area
- Geological data – a short description
- Tectonic activities of the area
- Hydrogeology of the area
- Quantity of groundwater reserves, water use and withdrawal rates
- Quality of ground water and it's means of protection from pollution
- Sugestions for further studies
- Referential codes

There are currently over 200 files recorded in the RMGR data base. The use of software package system for retrieving the data base files is so flexible that it allows updating, appending and changing the content of each file at any time by authorizied personnel.

Guidance for manipulating with the data base files

Water resourse administrative organizations (WRO) which are classified in the original study of the Register and Management of Groundwater Reserves in the Republic of Croatia with their respective referential codes as

WRO ZAGREB	B–1000
WRO OSIJEK	B–2000
WRO RIJEKA	A–3000
WRO SPLIT	A–4000

are recorded in a seperate floopy disks capacity 1.2 MB. The names of the main directories are given according to the names of the cities where the water resorce administrations are sited. Under these main directories (for ex. B–1000) are listed all water areas compraising the main administrative unit. These areas are either the smaller catchment areas of the

tributaries or complex groundwater systems (for ex. B–1100 to B–1500). The next level which is listed under the subdirestories describe the unit groundwater system or even the distinctive water well field, which is separetly outlined inside the main administrative unit. So, there are four levels of the respective records concerning the hydrogeology and water reserves for each unit. It is plausibly represented by the series of menus in the figs 1–4.

· This guidance consists of one main menu which is recorded in every floopy disk loaded with the records of groundwater data for the above listed administrative regions. Sub-menus are prepared for each administrative regions independently.

Short procedures how to use this guidance is demonstrated in the following steps:

1. Set your monitor, computer and printer on
2. When the prompt C> appears on the screen, insert your loaded floppy disk in drive A.
   Notice: each floopy disk is labeled by the name of main cities of respective Water Resource Organization
3. When a command A> appears on the screen type RMGR (which is an abbrevation of »The Register & Management of Groundwater Reserves«)
4. MAIN MENU appears on the screen as shown in fig. 1
5. At the prompt »TYPE THE APPROPRIATE NUMBER OF WRO« type the number of water resource administrative organization. For example for WRO ZAGREB is assigned no. 1 (fig. 2)
6. MENU–1 appears on the screen
7. Choose water area or cachment areas form the menu. For example for chose no. 1 ie., WRO ZAGREB

The whole text which refers to this area will be displied on by the Editor. Use PgDn key to have a look at the entire text. For printing this text: Press F1 key until option »PRINT« appears on the screen, and then press F2 key.

8. After printing is completed Press F1 key two times and Press F4 key to QUIT the editing and to get back into MAIN MENU.
9. For cachment area for example VALLEY AND PLAIN PARTS B–1500 appears with the list of all the groundwater systems over the respective area MENU–2 (fig. 3)
10. Choose one of the cachment area, for example B–1520 ie., which is a code no. for ZAGREB AREA assigned by no. 2
11. MENU–3 appears on the screen with the list of water withdrawal locations (fig. 4). Editing and Printing procedures are the same as shown in step no. 7
12. EXIT from each step of the menu is possible at any time by typing appropriate number given in that menu for word »EXIT«.

Conclusion

A simple but very flexible and useful organization of data base files containing any number of informations concerning the groundwater systems and strategic resources of groundwater is explained. The presented data base is part of the results achieved through the execution of the project »The registar and management of groundwater reserves in the Republic of Croatia«.

REGISTAR AND MANAGEMENT OF GROUNDWATER RESERVES OF THE REPUBLIC OF CROATIA


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                    WRO - Water Resource Organization

   ┌──────────────┐        ┌─────────────────────────┐
   │  MAIN MENU   │        │  1: WRO   Z A G R E B    │
   └──────────────┘        │                         │
                           │  2: WRO   O S I J E K    │
                           │                         │
                           │  3: WRO   R I J E K A    │
                           │                         │
                           │  4: WRO   S P L I T      │
                           └─────────────────────────┘

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                                                 │ 5: EXIT  │
                                                 └──────────┘
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Figure – 1

TYPE THE APPROPRIATE NUMBER OF WRO :–

WATER RESOURCE ORGANIZATION OF ZAGREB

```
┌─────────────────────────────────────────────────────────────────┐
│  ┌─────────┐                                                      │
│  │ MENU-1  │    ┌──────────────────────────────────────────────┐ │
│  └─────────┘    │ 1: WRO ZAGREB ................. B 1000        │ │
│                 │                                              │ │
│                 │ 2: CACHMENT AREA SUTLA......... B 1100        │ │
│                 │                                              │ │
│                 │ 3: CACHMENT AREA KRAPINA....... B 1200        │ │
│                 │                                              │ │
│                 │ 4: HILLY AREAS FROM ZAGREB                   │ │
│                 │    TO SLAVONSKI BROD ........... B 1300       │ │
│                 │                                              │ │
│                 │ 5: CACHMENT AREA OF THE RIGHT TRIBUTARY      │ │
│                 │    FROM THE MOUTH OF KUPA TO THE MOUTH       │ │
│                 │    OF UNA RIVER    .............. B 1400      │ │
│                 │                                              │ │
│                 │ 6: VALLEY AND PLAIN PARTS  ..... B 1500       │ │
│                 │                                              │ │
│                 │ 7: EXIT                                      │ │
│                 └──────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```

Figure - 2

TYPE THE APPROPRIATE NUMBER OF CACHMENT AREA:-

WRO ZAGREB - VALLEY AND PLAIN PARTS   B-1500

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┌─────────────────────────────────────────────────────────────────┐
│  ┌─────────┐                                                      │
│  │ MENU-2  │   ┌───────────────────────────────────────────────┐ │
│  └─────────┘   │                                               │ │
│                │  1: WATER AREA OF SAMOBOR............. B 1510  │ │
│                │  2: WATER AREA OF ZAGREB ............. B 1520  │ │
│                │  3: WATER AREA OF SISAK - SL. BROD.... B 1530  │ │
│                │  4: WATER AREA OF EASTERN SLAVONIA ... B 1540  │ │
│                │  5: FIRST WATER BEARING STRATUM ...... B 1541  │ │
│                │  6: SECOND WATER BEARING STRATUM...... B 1542  │ │
│                │  7: THIRD WATER BEARING STRATUM ...... B 1543  │ │
│                │  8: FOURTH WATER BEARING STRATUM...... B 1544  │ │
│                │  ┌──────────┐                                 │ │
│                │  │ 9: EXIT  │                                 │ │
│                │  └──────────┘                                 │ │
│                └───────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```

Figure - 3

TYPE THE APPROPRIATE NUMBER OF WATER AREAS:-

WRO ZAGREB — WATER AREA OF ZAGREB   B-1520

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┌─────────────────────────────────────────────────────────┐
│  ┌──────────┐                                            │
│  │ MENU-3   │                                            │
│  └──────────┘                                            │
│         ┌───────────────────────────────────────────┐   │
│         │  ┌─────────────────────────────────────┐  │   │
│         │  │  LIST OF WATER WITHDRAWAL AREAS      │  │   │
│         │  └─────────────────────────────────────┘  │   │
│         │                                           │   │
│         │   1: Stara loza........ B 1520 - C01      │   │
│         │   2: Gradski bunari.... B 1520 - C02      │   │
│         │   3: Sasnjak ...... ... B 1520 - C03      │   │
│         │   4: Petrusevac ....... B 1520 - C04      │   │
│         │   5: Mala Malka........ B 1520 - C05      │   │
│         │   6: Velika Gorica..... B 1520 - C06      │   │
│         │   7: Crnkovec (planned) B 1520 - C07      │   │
│         │                                           │   │
│         │                                           │   │
│         │   8: EXIT                                 │   │
│         │                                           │   │
│         └───────────────────────────────────────────┘   │
│                                                          │
└─────────────────────────────────────────────────────────┘
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Figure — 4

TYPE APPROPRIATE NUMBER OF WITHDRAWAL AREAS:-

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Organizacija i rukovanje bazama hidrogeoloških podataka

S. Tadesse i M. Heinrich-Miletić

Opisana je organizacija i mogućnost korištenje baze podataka o sistemima podzemnih voda kao i rezervi podzemnih voda na području Republike Hrvatske. Banka podataka izrađena je za potrebe projekta »Evidencija i gospodarenje rezervama podzemnih voda Republike Hrvatske«.