PARTICULAR ASPECTS RELATED TO THE MEMDUR APPLICATION INTERFACE

GABRIEL GORGHIU[1], CATALIN RISTEA[2], CARMEN LEANE NICOLESCU[3], MIHAI BIZOI[1]

[1]*Valahia University of Targoviste, Electrical Engineering Faculty, 130082, Targoviste, Romania*
[2]*Blom Romania, 130010, Targoviste, Romania*
[3]*Valahia University of Targoviste, Faculty of Environmental Engineering and Biotechnology, 130082, Targoviste, Romania*

Abstract. *The assessment of the environmental risk is a priority for the actual environmental policy which is focused on the problems arising from human impact on the environment, that retroacts onto human society by having a serious impact on "clean and green" environment. In this sense, the three years research PN2 project "Sustainable Management System of Resources Used for Monitoring and Evaluating the Environmental Risks in Order to Prevent the Negative Effects and to Manage Crises Situations - MEMDUR", has as main objective to design, develop, test and implement an advanced management system in Dambovita county, which has to assure the evaluation of the environmental risk. This paper presents one of the main components of the MEMDUR application: the interface, which consists of a menu, where, with the exception of the Map submenu, allowing opening and consulting a database with the last monitored records of environmental atmospheric parameters or main noxes. The Map submenu includes also a representation of the targeted area and the technical attributes of the objects or events registered in the critical points.*

Keywords: *risk assessment, management system, MEMDUR project, application interface.*

1. INTRODUCTION

Risk evaluation attempts to be defined as what the estimated risk actually means to people concerned with or affected by the risk. An important part of this evaluation represents the consideration of how people perceive risks [1]. For the environmental risks, the risk reduction can involve many techniques. As example, for chemicals they are presented in the draft European technical guidance document [2]. Generally, there are several ranges of approaches to risk reduction that include [1]:

a) substitution: Can the agent be substituted by another, less risky agent? What are the risks of the new agent being introduced into the scenario? Is the new agent as effective?

b) information: Providing information about the safe use and disposal of agents will try to ensure that the risks assessed are the same as what actually occur in practice.

c) education and information: it allow the public and users to choose lower risk options and force the manufacturers into the production of less risky agents.

d) limit the availability of the agent by marketing bans or limits on the production or importation of the agent (such a risk reduction technique has severe implications politically and economically and can often be controversial. The decisions are taken at a national or regional level and at an international level such agreements are difficult to obtain).

The assessment of the environmental risk is specifically developed to address health issues. It contains techniques for enhancing health impacts assessment comprehension in environmental impact assessment. Near that, the assessment of the environmental risk emphasizes scientific quantitative approaches and techniques in impact identification and

evaluation and for improving the technical background for decision-making [3]. Generally, it has to be applied starting with the stage of impact prediction and evaluation. In this case, if the environmental risk is above the considered average values and / or it reaches very high ones, it is compulsory to plan a reduction of the environmental effects and a clear monitoring system.

A series of national and transnational projects had as main objective to create methodologies and related systems for the evaluation of the environmental risk especially when a crisis situation is appearing. The cities of Targoviste and Fieni (located in Dambovita County, in the southern part of Romania), represent locations with major risk for possible environmental air crises due to their atmosphere which can be polluted by different industrial agents with dusts, gases or other noxes [4]. In the frame of the three years research PN2 project "Sustainable Management System of Resources Used for Monitoring and Evaluating the Environmental Risks in Order to Prevent the Negative Effects and to Manage Crises Situations - MEMDUR", code D11-037/18.09.2007 (http://memdur.ssai.valahia.ro), a system was created for managing spatial and temporal databases that contains the main climatic and environmental indicators with the view to assess the environmental risk and manage the potential crises situations. Practically, the project aims to design, develop, test and implement the mentioned management system in accordance with the demands required by the sustainable development on local, regional and national level [5].

2. SYSTEM COMPONENTS AND METHODS OF DEVELOPMENT

The main components of the MEMDUR system are represented by the *spatial database*, the *traditional relational database*, the *mathematical model* and the *system interface*.

The spatial database was created in *SQL Server*, containing as basic structure: tables, views and procedures / functions. The definition of spatial entities was made using *GeoMedia* [6].

The traditional relational database consists of three distinct sections: *(Measuring) Workstations*, *Parameters* and *Users*. The (Measuring) Workstations section has the aim of tracking the workstations, the measuring points of the workstations and the history of the measured data in the same points. The Parameters section records the parameters and their measured values, the connection between the measurements and the workstations, and the history of the data measured in the workstations points. The Users section has the role of users' management: administrator, ordinary user and guest user. The physical architecture is composed by 10 tables: *Users*, *UserTypes*, *Counties*, *Cities*, *Stations*, *StationPoints*, *StationPointsType*, *Parameters*, *Status* and *Measurements*. Different types of relationships were established in the traditional relational database [7].

The mathematical model was included as a software procedure for analyzing the pollution status, taking into account the main pollutants that affect the human health (CO, NO, NO_2, SO_2 and PM10 dusts). The measured values are compared with the hourly maximum admitted concentrations, established by the national legislation. The model incorporates source-related factors and meteorological factors and estimates the pollutant concentration from the stationary sources [8].

The MEMDUR system received the measured value of the environmental atmospheric parameters from two automatic stations located in Targoviste and Fieni. After the data validation, the system records them in the traditional relational database, applies the mathematical dispersion model and calculates the dispersion curves for each pollutant. The presentation of the curves, in a graphic format, is included in the system interface [7].

The system interface was created as a web interface, using *GeoMedia WebMap* application. It offers to the users ways to interrogate the system database where are registered the last monitored records of environmental atmospheric parameters or noxes. In addition, it can be consulted the area of interest and the technical attributes of the objects or events registered in the critical points.

3. RESULTS AND DISCUSSION

The main purpose of the MEMDUR application interface is offered by the facilities related to the consulting of the data recorded in the system database, and displaying the thematic maps, the distribution of the air-pollutants and the hourly / daily reports.

For accessing the system interface, it is necessary to open the following URL: http://quad.ssai.valahia.ro/memdur_v3/. The webpage is optimized for being displayed for the following browsers: *Microsoft Internet Explorer* and *Mozilla Firefox*. The main page of the application interface is presented in Fig. 1.

Fig. 1. The main page of the MEMDUR application interface.

The presentation page of the application (*Home* page) is the only available for unauthenticated users. All the other submenus (*Stations*, *Parameters*, *Measurements* and *Map*) require user authentication. Excepting the *Map* submenu, the others allow opening and consulting the system database where the last values of environmental atmospheric parameters or main noxes are recorded.

The *Stations* submenu presents the name, address and details related to each automatic air quality monitoring station. The station delivers representative data concerning the air quality for a specific area around the station. The area where the concentration does not differ from the concentration measured at the station, more than a specific quantity (±20%), is called *representative area* [9]. Fig. 2 illustrates a screenshot captured from the *Stations* submenu.

The *Parameters* submenu presents the measured environmental atmospheric parameters and main noxes, specifying the minimum and maximum value limits, and in case of classifying into a quality index, the thresholds being also mentioned.

Fig. 2. A screenshot from the *Stations* submenu.

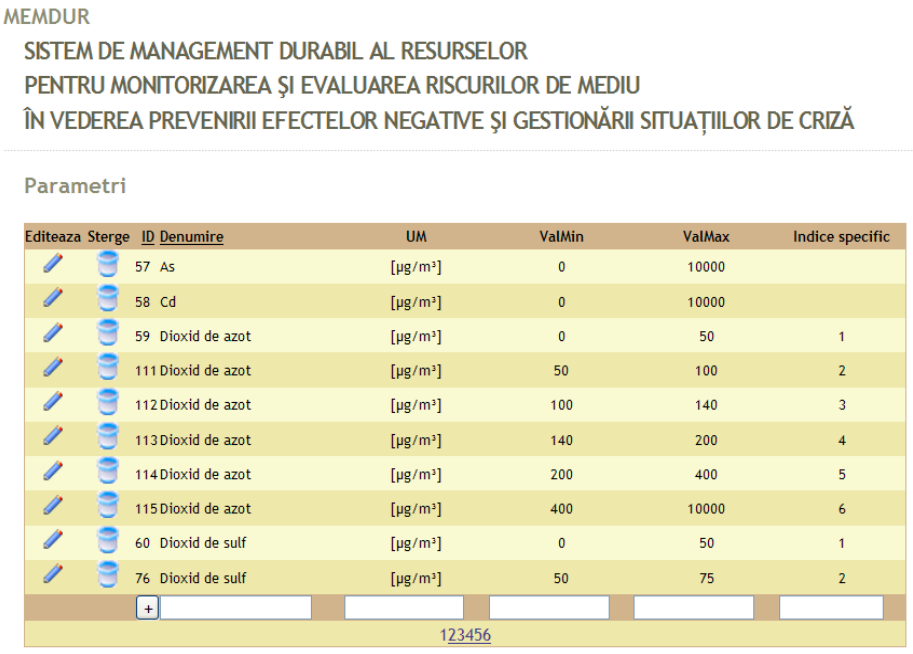

Fig. 3. A screenshot from the *Parameters* submenu.

The quality index has 5 levels and uses a scale for each pollutant from *very low* (0 value) to *very high* (maximum value). These are based on three pollutants that represent a major concern in Europe: PM10 dusts, NO_2, O_3, but there are considered other two additional pollutants: CO and SO_2, when data is available [10].

The *Measurements* submenu allows users to interrogate the system with the view to visualize the recorded data registered at a specific moment, for an automatic air quality monitoring station. The results can be displayed as grouped parameters (Fig. 4), but also for a selected parameter, using a specific *search box*.

Fig. 4. Grouped parameters results after a query made in the *Measurements* submenu.

The *Map* submenu includes also a representation of the targeted area and the technical attributes of the objects or events registered in the critical points. The related *Map* webpage is composed of the displaying area for the main pollutants, the specific toolbar, the extensible menu and the map itself.

The pollutants displaying area uses a color code specific for emphasizing the air quality index. This code consists of different levels, starting with green (excellent) to red (highest alert level). The specific toolbar allows the manipulation of regular operations in the map as: zoom, pan, selection of an area, distance measurement, information about a selected entity, classification, map scale modifying etc. The extensible menu allows locating the monitoring stations, selecting the displayed parameters, the date and the related measurements, generating the hourly and daily reports, retrieving the relevant entities

information on the graphics. Fig. 5 illustrates an image of the *Map* submenu at the moment of evaluating the iso-concentration curves calculated for carbon monoxide.

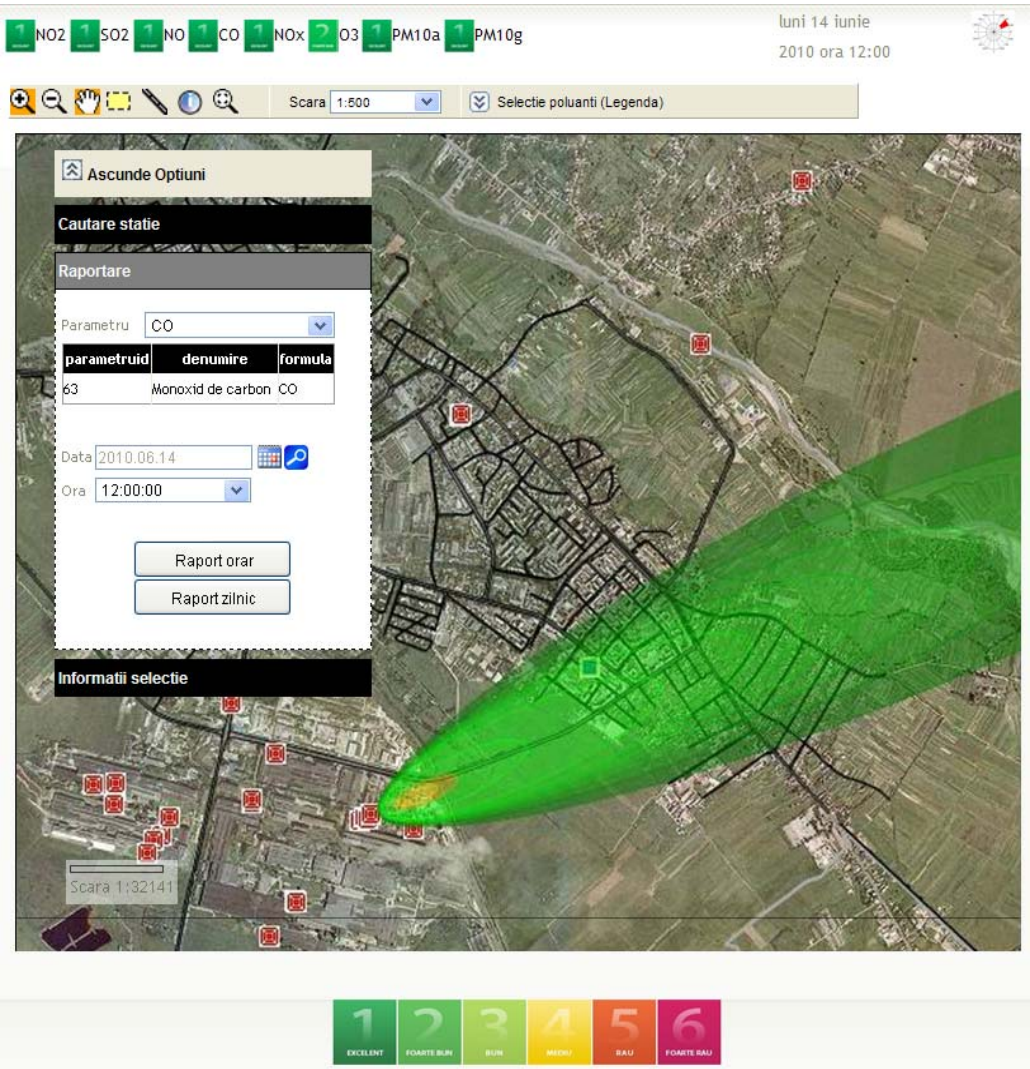

Fig. 5. An image captured from the *Map* submenu when evaluating the iso-concentration curves calculated for carbon monoxide.

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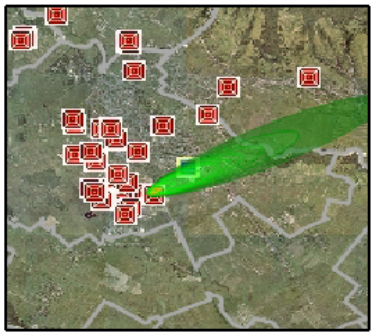
Information Reports can be obtained using the specific buttons included in the extensible menu. The hourly report for the previous query is presented in Fig. 6.

RAPORT DE INFORMARE

Statia de masurare: DB1 - Targoviste
Adresa: Vlad Tepes, Nr. 6
Amplasare: In curtea interioara a centrului de asistenta sociala „Sfânta Maria”



Sursa de emisie: CT gaz - cazan nr. 1
H [m]: 25
Intreprindere: SC Mechel SA
Adresa: 1

Directie vant: 23.96 o

Parametru masurat: CO
Data masuratorii: 6/14/2010 12:00:00 PM
Valori masurate:

UM	Valoare minima	Valoare curenta	Valoare maxima	Indice de risc
[mg/m3]	0	0.08	3	1*

Acest raport este furnizat cu titlu informativ. Situatia reala poate sa difere fata de situatia raportata, in masura in care modelul utilizat ofera informatii aproximative, partial datorate parametrilor de intrare limitati si partial datorate simplificarilor aferente modelului.

* Legenda indice de risc

Fig. 6. Hourly information report.

4. CONCLUSIONS

Having the main aim to design, develop, test and implement a management system in Dambovita County, that has to assure a clear evaluation of the environmental risk, the MEMDUR system was created to identify the components that can monitor the main pollutants in the atmosphere and assess their movement. In this respect, the system allows to visualize the distribution of the measured pollutant concentrations (at a fixed concentration) and proposes thematic maps resulted by the integration of the measured pollutants data, function of time.

The system interface allows opening and interrogating the database with the last monitored records of environmental atmospheric parameters or main noxes. It is based on an experimental model that contains technology widely used in GIS applications.

The system development has taken into account the implementation of modern solutions like: scalability, fast response time, development of new procedures, easy authentication and security aspects, using of specific platforms and Open source applications.

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