

**DEVELOPING ENVIRONMENTAL INFORMATION SYSTEM USING WEBGIS
TECHNOLOGY OF A CASE STUDY IN THE CAN THO CITY, VIETNAM**

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ABSTRACT: The strategy of information technology application and development for the branch of resources and environment in Viet Nam is aiming at the purpose of computerizing the administrative system of the Government regarding natural resources and environment protection for a preparation to E-Government, which may facility people, organization to approach information of natural resources and environment.

In order to achieve the above target, it is must be build and integrate databases of all fields related to natural resources and environment as well as ensure the national standards of data. Besides, it is should be also build computer tools to support the information storage and share.

This paper is to introduce some results of research in building WINSCAN Software (Web gIs environment information management Software for Can Tho). The purpose of WINSCAN is to provide necessary information for environment project manager of researchers, organization and legal authorities. WINSCAN plays the role of public information center for improving understanding of environment to people. The advantage of WINSCAN is the application of WebGIS technology to display environmental information linking to electronic map with remote accessibility

The paper carried out for the past time at the Vietnam national university of Hochiminh city, under funding support of the Can Tho environmental monitoring center.

1 INTRODUCTION

Nowadays, Web GIS is a prospective research and application direction in Geographic Information System (GIS) and represents an important advancement over the traditional destop GIS (to be installed in personal computer). In developed countries, Web GIS was applied in governmental agencies, educational institutions. Web GIS based software have been built for the satisfaction to the diversified needs in life.

The increasing popularity of the internet, from on-line surfing to e-commerce to interactive chatting, has made Internet anintegral part of our society. Internet Gateways are mostly available anywhere and the diversified contents of World Wide Web (WWW) made the accessibility, information exchange and development easier. Many scientific applications, publications and other sectors were modified and changed for the suitability to Internet Applications. In such a manner, Internet also makes the change on storage, share and application of GIS.

It might be said that Internet enables the GIS users to easily access to GIS data from various data supply sources. In addition, Internet enables the popularity of the results of GIS analysis and spatial information to readers at an amount larger than traditional GIS. Through Web GIS

technology, users may be capable of a direct access to spatial information or information browse and links from Websites at their homes. Also, everyone may set up an online browse or raising online analysis questions and at free of charge of spatial subjects and without any investment for any GIS Software.

In environmental sector, upon nearly 20 years (1980-1999), Environment Protection Agency of the United States of America developed the environmental information system ENVIROFACT that enabled the display of the environmental information in associated with map of which the remote access permitted. The results deemed to be the motivation for several studies deployed in many countries worldwide and amongst are Vietnam.

2 REVIEW OF PREVIOUS STUDIES

For the past time, the studies of information technology application in environmental management were deployed at some institutes, research centers and big universities in Vietnam. Although all in the initial phase, the results of the study were applied into environmental management assignment and contributing to increase the efficacy for state administration assignment in respect of environment. Amongst there were informatics products CAP / [1]-[2],[5], www.envim.com.vn/ and ENVIM / [4]-[5]. Technology for carrying out such software could be briefed as a integration of Geographic Information System (GIS), environmental database and mathematical models processing environmental data into a sole tool for user.

In the work [3], an information model proposed, to be called INSEM (Information System for supporting Environmental Management), this is an integrated information system assisting environment management assignment of which database management system is selected as MS SQL Server (managing monitoring data on water environment, air, meteorology, hydrology, and so on), GIS data inherited traditional software such as mapinfo, arcview and transport models of evaluating air and surface water pollution. INSEM has targets facilitating the environmental information interpretation; the assistance on the analysis of environment information; the supply of tools for analysis, and the assessment of various scenarios.

In work [4] executed the upgrade of INSEM into a new version called ENVIM (Environmental Information Management software). Conceptual model of ENVIM is presented on Fig. 1.

ENVIM integrates databases on environmental monitoring data with traditional GIS layers such as the layers of administration, rivers and streams, etc. The key modules of ENVIM including: data management module; module of analysis, query and report preparation; module model (Fig. 2); WEB module, ENVIM enables the prompt performance of environmental reports with the comparison to Vietnamese environment standards. In addition, the software enables the emulative calculation giving the influences of socio-economic activities over environment pollution within a regional scale.

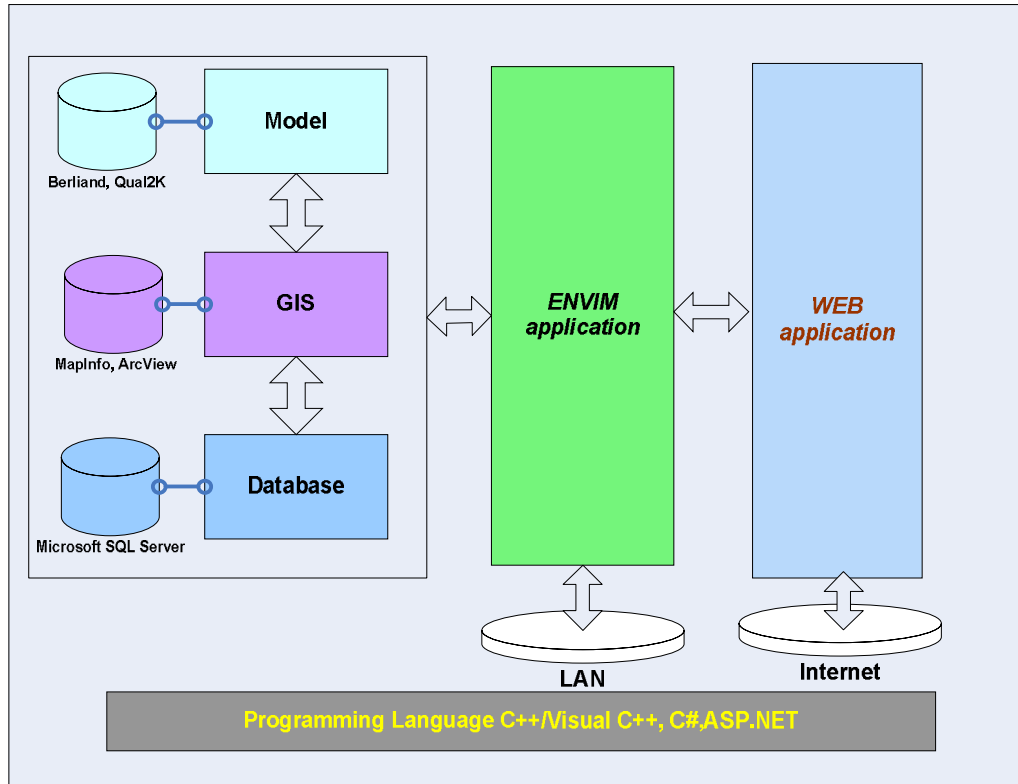


Figure 1. Conceptual model of ENVIM

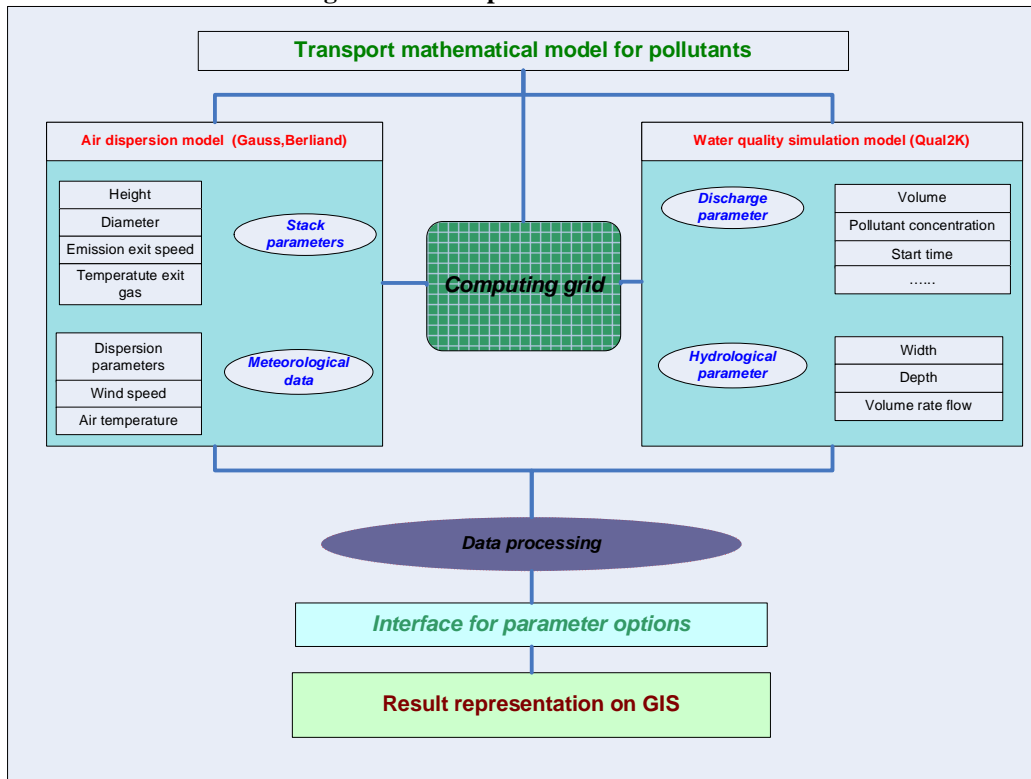


Figure 2. Environment quality model that integrated in ENVIM.

3 APPLICATION MODEL PROPOSAL

In Vietnam, one of the major restrictions on building up the policies, decision making with respect to environment in Vietnam is the shortage of reliable environmental information/data or information to be untimely supplied or not to be properly processed. All these reveal the information technology study works, the establishment of environmental database in Vietnam becoming urgent.

To be a province directly under the Vietnamese government in 2004, Can Tho city currently is the center of industry, commerce, tourism, education and science-technology of the Mekong delta plain region, the important transport hub regionally and internationally. However, environmental management assignment in Can Tho City has not yet been computerized to keep pace with the requirement of environment management at this stage. Such a management method reveals a lot of limitations on exploiting data and making the planning, the variation monitoring and the environmental report preparation difficult.

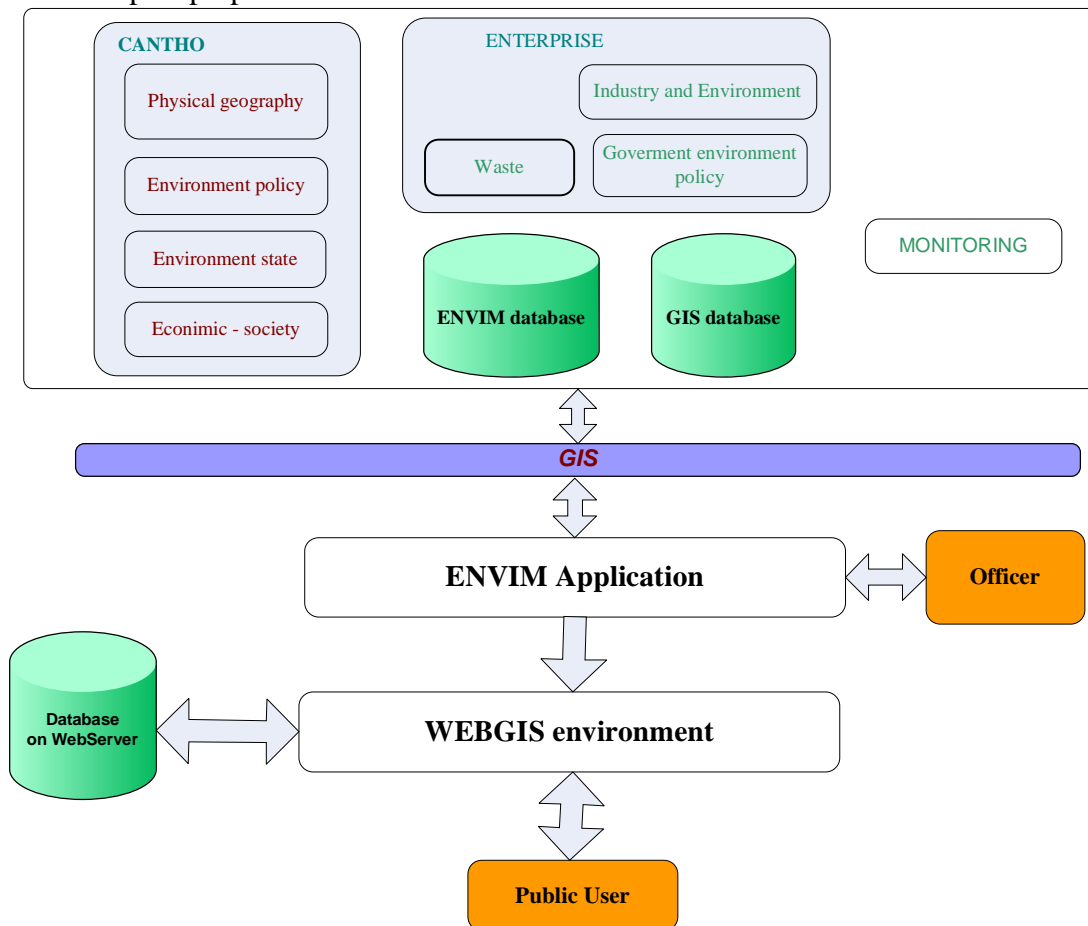


Figure 3. Conceptual model for WINSKAN software

Within the scope of performing the project “The application of Geographic Information System in monitoring environment of Can Tho City”, the authors of this article proposed the so-called environmental information system WINSKAN (Web gIs eNvironmental information technology Software for CAN tho). WINSKAN is the environmental information system for the storage, management and analysis of environmental information and data in relation to Can Tho

city. Purpose of WINSCAN is to provide the required information to environmental project managers or researchers, legislation authorities and organizations. WINSCAN may also play the role of a center for public communication in respect of the enhancement of the awareness of environment. WINSCAN could be built, maintained and allocated through various communication techniques / fig. 3/. The key modules in WINSCAN software including:

- **Environmental monitoring data module:** liable to the management of all data pertaining to environment monitoring such air, surface water, underground water, waste water, emissions pollution monitoring.
- **Environmental monitoring report module:** automatically releases the statistical reports of monitoring data in various criteria.
- **Enterprise management module:** managing enterprises, production situation, utility situation of resources, chemicals and fuel, to name just a few. This module is also gather and make the reports in terms of discharge and exhaustion situation of enterprises, discharge and exhaustion situation in excessive of Vietnam environmental standards for enterprises.
- **News management module:** managing news of environmental management, natural resources, political – socio – economic news and government regulations in terms of environment.
- **Administration management module:** managing the subjects participating in use of the system, administrator account supply, and so forth.

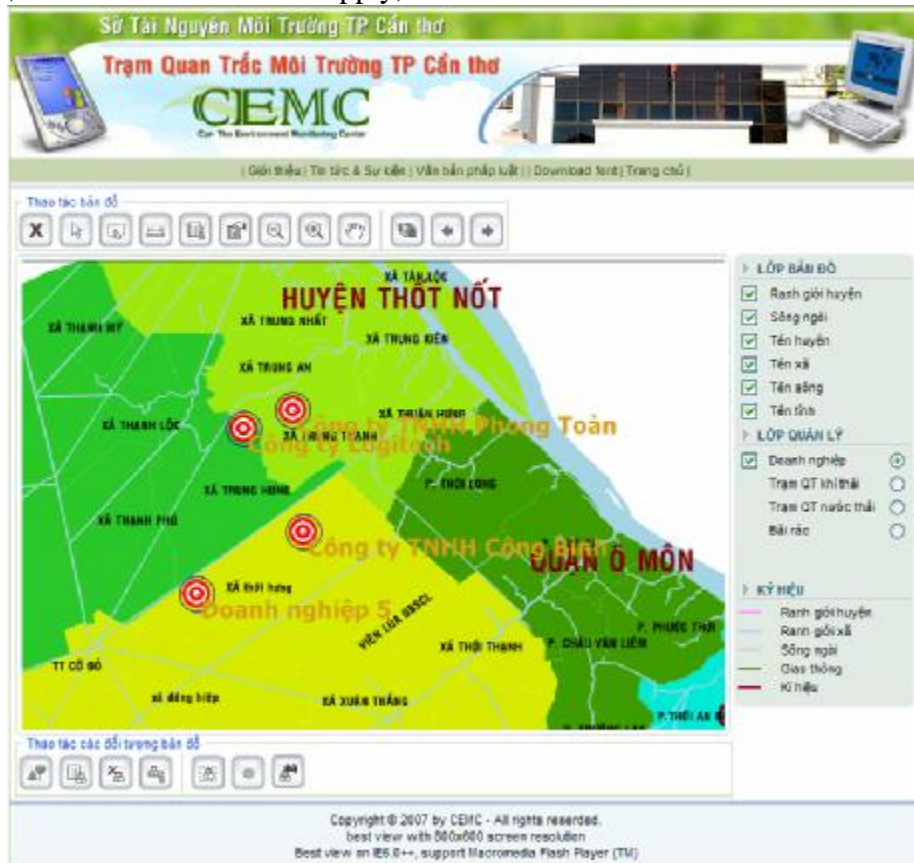


Figure 4. Main interface of WINSCAN

The new features of the WINSCAN in comparison with our previously products are indicated as follows:

- Web GIS technologies applied into WINSCAN enable the integration of environmental information data flows and providing the prompt access to websites of the program.
- The essence of the WINSCAN system is the Geographic Information System (GIS) containing environmental data changing in line with time, the user may see and access websites with map in associated with environmental information such as monitoring sites of water and air pollution and sewage sources, and so on.
- The design approach in module enables the management of variety of information (but concerning to environment) helps local environment managers update and exchange information and data easily.
- WINSCAN provides the direct accessibility to the spatial information or information browse and links from the web browse. The user may seek the online information relevant to monitoring as well as enterprise in the area of district or commune, etc. This solution helps user get many online answers and at free of charge of spatial subjects without any cost to be spent for any GIS software.

4 CONCLUSION

In this study, WINSCAN is developed to serve environment managers in respect of employing environmental information more effectively by the application of WebGIS technologies.

The product of the project helps environment management authority to get a modern management instrument. The decisions to be adopted in the assistance of WINSCAN will be more rapidly and better to the extent of scientific foundation. The project performance will help enhance the managerial ability through the breakthrough in new thoughts.

Development orientation of WINSCAN is the integration of several environmental data and the provision of environmental information to various subjects in need of environmental information. Furthermore, WINSCAN is in the need of more opinions of government in all levels in Mekong delta provinces so that it would become an environmental information system at regional scale.

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