

# BUILDING INFORMATION SYSTEM SERVING ADAPTATION, MITIGATION AND IMPACT ASSESSMENT THE CLIMATE CHANGE FOR NATIONAL LEVEL.

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## ABSTRACT

*For years, the United Nations has recognized the important role of databases in research on climate change perceptions " Do not have the database, all the quality rating as well as study on the environment would be not accurate and reliable. Program, software and electronic database are the legal background of any climate change research". So the information model and data organization as templates for the development and application of information technology in many countries around the world. In Vietnam, the National Committee about the Climate Change (NCCC) has been established but has not yet formed a database for the NCCC's activities. Several other ministries and departments have specialized Web of climate change, but the data connection with the NCCC fragmented, disjointed. Besides data structures between levels is not consistent with each other. The professional management of climate change-related information and data are made daily but is not modeled. With current trends, climate change data flow increasingly larger, besides also requires consistency, consistency between agencies within the NCCC and the relevant ministries as well as localities. This paper presents the results of the initial construction of the database system is standardized according to national standards and models of sharing and integrated database for operational service of the NCCC in the serving adaptation, mitigation and impact assessment for climate change for national level. One of the technologies used in their study is GIS and WebGIS.*

*Key words: Database, information system, climate change, information model, GIS.*

## 1 INTRODUCTION

The climate change is one of the greatest challenges for human kind in the 21st century. Before the present challenges, when the climate change has been affecting strictly to production, life, environment and many other fields of the daily life of vietnamese people, the prime minister issues Decision no. 43/QD-TTg for founding the National Committee about the Climate Change (NCCC) on 09 January 2012 to offer the advices helping the government, and prime minister in researching, suggesting, instructing, reconciling, combining, supervising to solve the important missions, inter-field, the national strategies about the climate change, leading, implementing the national strategies about the climate change, instructing, organizing to implement to cooperate internationally about the climate change.

Presently, the database for operation of the NCCC has not been formed yet. Some central and local departments have the major websites about the climate change but the data connection to the committee is not done yet. Moreover, the local committee about the climate change has not had the agreement about the profession and the data to the central level. The management professions of the national committee with the very great information volume, data are done daily, but not modelled yet. With the present trend, the climate change data line is bigger, and the requirements about the comprehension, consistency from the national committee, departments and the local authorities must have a model for sharing the information in the earliest time.

Since then, the mission for this research is based on the base of analyzing the profession of the national committee and the legal documents concerned for the database frame serving the national committee and the VINACLIM professional software (VIetNAm CLIMate change information system) for connecting, updating information, data serving the operation of the national committee with the departments and local authorities.

## **2 GENERAL RESEARCH**

In many last years, the climate change committee of the united nations (<http://www.un.org/climatechange/projectsearch>) aware the important role of the database in researching about the climate change with the awareness “no database all quantitative assessments and research about the climate change inexactly and unreliably. The program, software, electronic database are the legal foundations for researching the climate change, hence the information and data model of this organization is the mould for implementing the informatics application in many countries over the world. The database of this organization concentrate in some main problems: science: climate change reason, climate change effect; diminishing: decrease waste, economy, politics, accommodation: expressing the risk management, necessary acts, clear applications, technology: expressing the multi-field improvement technology. Moreover, the operation model of this organization has the similar points to the national committee about the climate change of Vietnam. This organization connects to many the technical organizations to implement the scientific researches, such as the world climate program, world research climate program, a program of flood management, disaster risk research, training to diminish the disaster risks, applying the model and tool for managing the water resource.

The database system serving operations of United nations is divided according to the regions, countries. The region is divided into many different areas: North America, Latin America and Caribbean, Africa, Europe, Asia, Oceania and the Pacific Ocean islands. Moreover, it is divided into North Pole, South Pole, small islands, developing countries, deficient countries. This permits drafting VinaClim divided into 7 different regions of Vietnam, and notes to the quick, slow development provinces, towns, inshore regions, deep in the continent, ... (source: <http://www.un.org/climatechange>)

The database system serving the operations of United Nations is divided according to the subjects, such as the accommodation subject: managing the environmental change risk, the finance subject: noticing to using the cost for promoting the economic development amicable to the environment, promoting the accommodation to the environment and the development of the industries with the low carbon content target, REDD subject (Reducing Emissions from Deforestation and Degradation), solving reducing wastes from deforestation and the environment

recession, the technology subject: managing conversion for the technologies with the trend amicable to the environment (source: <http://www.un.org/climatechange/>)

Intergovernmental Panel on Climate Change - IPCC is the scientific body responsible for assessing the risks on the climate change caused by human activities. This panel was founded 1988 by World Meteorological Organization and United Nations Environment Program, these two organizations belong to United Nations. One of the major activities of IPCC is to issue the specific reports on the subjects relating to implementing the international agreements on confirming the ability of changing climate damaging UNFCCC, implementing UNFCCC (United Nations Framework Convention on Climate Change) leded finally the Kyoto Protocol, IPCC bases the assessment mainly on the scientific documents issued and assessed similarly. IPCC only opens to receive the member nations of WMO and UNEP. The reports of IPCC were quoted widely in the conference, the seminars relating to climate change. The international community admitted this panel on the foundations, precise, and full competence to solve the technical aspect to climate change. The database of IPCC includes the following groups: a/ home page: including the important reports, most topical in activities of IPCC and the updated news about the organization activities such as the scholarship program, on the whole meetings, statistics report of the organization, the meeting result, b/ organization: the organization structure, history, secretary board, c/ human resource: groups working in IPCC, d/ Meeting schedule, e/ Documents for the meetings, f/ Documents and data issued, g/ News and press information, h/ Links to other boards, i/ Contact information (source: <http://www.ipcc.ch/index.htm>). The database structure of IPCC needs for consideration when researching the database suggestion for VinaClim.

International Energy Agency IEA (<http://www.iea.org/textbase/pm/index.html>) is one of the important cooperation organizations of the climate change program of United Nations. The database is built in this organization with the database on the policies and methods on the following objects: a/ nations applying the policies, methods, b/ competence: the administrations where the policies are built or applied, choices available in the central towns, regions, nations, state/area and super nations, c/ the policy year done, d/ present state of the policy. There are the following choices: ended, being implemented, being planned, and replaced (where the policies are replaced directly by another policy), e/ policy type: detailed for each policy being planned or done, f/ Technical object and policy. Particularly, in the database of this organization with the specific target on the national policy in the energy field leading reducing the climate change in the member nations. The database structure of IEA needs to be considered when researching the database suggestions for VinaClim.

The similar research was done in Russia (source: <http://www.climatechange.ru/node/74>). The product of this project leads: a/ To help supplying, updating, generalizing the high quality information to all individuals, organizations noticing to climate change, introducing the methods, tools assessing the effects, accommodation methods that the international community did, b/ to help the managers, planning in making the policies relating to climate change; c/ to help promoting the social awareness on the policies that the town has been implementing in the climate change implementing the international and national duties; d/To supply the updated information for the domestic, foreign enterprises on the activities meeting the climate change in the cities in Russia. Presently, Russia has the fair perfect database system specializing on climate change.The

### 3 RESEARCH METHOD

#### 3.1 Approach method

VinaClim is built on the approach method stated in the research work (Bui Ta Long, 2006) on the Environmental Information - Model System. Therefore, these systems are built to accommodate the different environment information and with the mathematic models, VinaClim software is suggested in this research including the modules: database management module, WebGIS module, module containing the environment model bank, module showing the estimation result on the model, module for reporting, statistics.

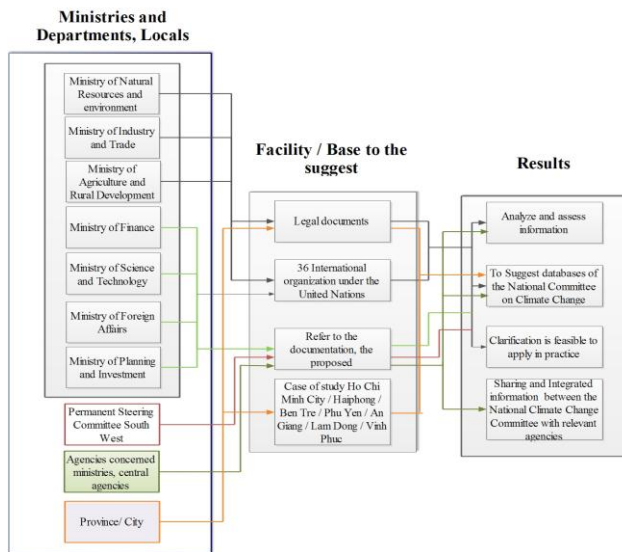


Figure 1. Methodology framework of database suggestion for VinaClimm

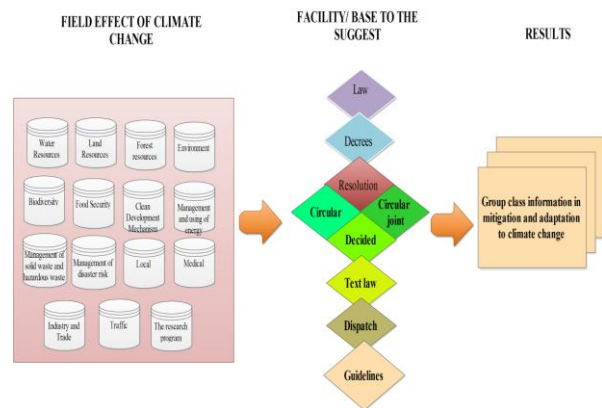


Figure 2. Methodology framework for information class layers for VinaClim

#### 3.2 Integration method

Integration concept in VinaClim is understood as combination and connection of the systems (also called block) and the subsystem in the system. Four blocks suggested in the first edition include: environmental database, GIS and mathematic model. The remaining block includes the sub-blocks, middle of the blocks, the sub-blocks have the constrains. VinaClim system treats the information from many sources: the state management body, scientific research base and users divided into the rights. Changing the information in VinaClim means that the system must supply the tools to ensure laying out and quoting the data, finding means that the system must ensure the routine of finding the results based on the queries and showing the results under the convenient form for users. Unification assessment means that the system must advance the unification mode to issue the reports, statistics from the data source saved.

#### 3.3 Building the database

Combing building the database for VinaClim is based on the research base for many works of the foreign authors, particularly from the work research [4]. Based on this work, it is done to

build the block diagram for the object groups noticed in the environmental block. GIS and the mathematic model. The professional database suggestion is based on the frame of figure 1, the information layers are shown on figure 2.

## **4 RESULT AND DISCUSSION**

### **4.1 Professional database suggestion of the national committee**

It is done the research and suggested the professional data base of the NCCC in the contacts with 10 local departments concerned on the legal documents issued, in which it is stipulated clearly the functions, missions of the departments in the committee, combined to the reference the contacts of United Nations Committee on Climate Change and the International Organizations. For the ministries, Ministry of Natural Resources and Environment (MONRE), Ministry of Industry and Trade (MOIT), Ministry of Agriculture and Rural Development (MARD), interpret the contacts, relationships of the international organizations to support to solve the problems meeting the climate change, implementing the requirements and the aids for Vietnam, to support to implement the production clearer, the firm development strategy, the national environment action program for implementing the environmental policy in the strategy of reducing the natural calamity risks, eliminating hunger and reducing poverty, lack of food. With these ministries, there were the professional suggestions of the ministries and building the database for the ministries based on the issued legal documents.

For the region, the suggestions for the database on the reference for the researches on the climate change in the provinces, towns in implementing the action plans meeting the climate change in Hai Phong, Lam Dong, Ben Tre, Phu Yen, Vinh Phuc, defining the process on assessing the climate change influence, choosing the priority solutions, coupling the climate change problems in the development strategy plan of the province on the branches, horizontally and vertically.

For Ministry of Finance, Ministry of Foreign Affairs, Ministry of Technology and Science, Ministry of Planning and Investment, Southwest permanent steering committee, central departments, there are the clear relationships of the international organizations and the database based on the suggestions and references.

### **4.2 Suggestions on the information layers**

In this research frame, it was built the information layers in reducing and meeting the climate change: water resource, environment resource, land resource, food security, clean development mode, biological multiform, energy usage management, solid waste and harmful waste management, natural calamity risk management, forest resource usage exploration state management, health, industry and commerce, traffic, influence of climate change to region, technology deployment and research program.

Information layer group is built of the report is based on the legal documents passed by Government for separate field, part, the construction process for the information layer group ensuring obliging the regulations of Government, Environment and Resources Ministry on Decision no. 357/QD-TCMT on 9 May 2012, for construction, standards for data, integration for data and developing the environment database system.

The content of the reports constructs the information layer fully and specifically for branches, fields that noting to the solutions to reduce and meet the climate change.

The information layer groups built help the managers, scientists see generally the influences of the climate change to the risk management to couple the problems on the risk management, climate change on the programs, plans of the socioeconomic development timely and effectively to ensure the firm development target.

### 4.3 VinaClim software construction

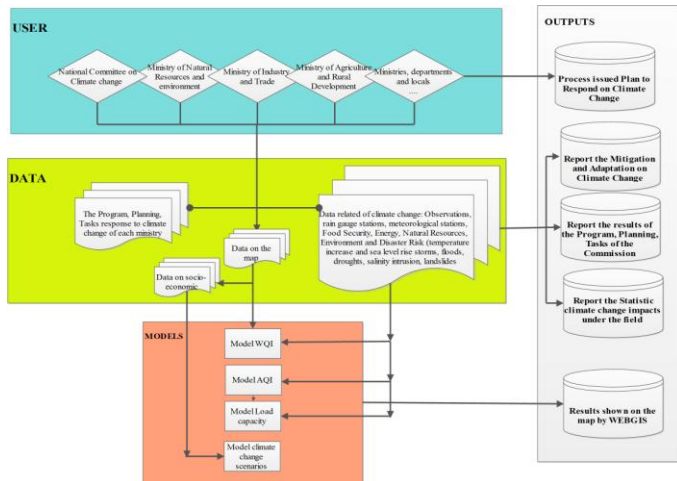


Figure 3. Schematic of operation of the generator scenario for VinaClim Figure 4. VinaClim modular structure

## 5 CONCLUSION

In this research, it is firstly formed the professional base for the national committee on the climate change, the information layers are constructed on the systematically theory foundation and legal base analysis and many domestic and foreign researches concerned. Version 1.0 of VinaClim is made. In the next time, the result will be taken the opinions and completed. The authors thank the sponsor of the scientific and technical research program at state level KHCN-BDKH/11-15 helping implement this research.

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