

Building GIS Database for Web Atlas of the Tay Nguyen Region in Vietnam.

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Extended Abstract

The Tay Nguyen region or the Central Highlands of Vietnam comprises the 5 provinces of Gia Lai, Đắk Lak, Kon Tum, Đắk Nong and Lam Dong. It covers a total area of about 54641.1 km.sq. Population is 5.460 million in the year 2014. The region is composed of series of contiguous plateaus that wedged between coastal provinces to the east and nearly 400 km border with Laos and Cambodia to the west. The region has a geopolitical importance for Vietnam not only the economic - social development, but also the national security.

In the period of 2011 -2015, the Tay Nguyen 3 Program was established with the four main objectives: (1) Evaluating of the natural resources and environment, economics, culture and society of the Central Highlands after 20 years, since the program Highlands 2 was ended in 1988. The result is used as basics to propose and build arguments for the sustainable development program of the Central Highlands, phase 2010 - 2020 and vision to 2030. (2) Providing a database for the regional economic development planning. (3) Transferring new technologies for these provinces to create products and goods for the improvement of the economic efficiency and environmental protection. (4) Studying and warning of natural disasters, and building solutions to prevent associated damages. Therefore, building GIS database and Web Atlas for the Tay Nguyen region is one of the main sub-projects of the Program with the main objectives are: (1) to design and develop geographical database on natural conditions, resources,

environment, socio-economic and humanities; (2) to construct the Atlas using Web GIS.

The database for the region is built based on the following source data: (1) The national digital topographic maps for the region, constructed from 2003 to 2008 at scales of 1: 25,000 (377 sheets), 1: 50,000 (105 sheets), 1: 100,000 (35 sheets), and 1: 250,000 (10 sheets); (2) The meteorological data over the 30 years of the Tay Nguyen; (3) Statistical Yearbooks of the five provinces for the period 2005 to 2014; (4) The population census data from 2005 to 2010; (5) The research studies and thematic maps results from this Program; (6) The available maps from the last two Tay Nguyen programs.

All the topographic maps were updated and converted from the DGN format to ArcGIS geodatabase using the ArcGIS Data Interoperability tools. The maps at scale of 1: 250,000 were merged to constructed the entire region map (5 provinces), whereas the maps with scale of 1: 100.000 and 1: 50.000 were compiled each entire map for each province. All map layers at scale 1: 25.000 and 1:10.000 are remained in form of the toposheet .

A total of 172 thematic maps were edited, converted in the standard format for storage. ArcMap software was used to separate, combine, and group the data layers. It is also used to transform the coordinate system, transfer the entire contents of the data for all region and provinces. For each province, these data was grouped by themes and spatial format. The thematic database are organized into four groups: Natural conditions with the maps of geology, mineral resources, climate, hydrology, soils, information on natural disasters and environment. Group of Sociology Humanities consists of the maps of history, administrative, urban space, population, labor, ethnic groups, healthcare and education. Economic and Infrastructure database comprises the maps of Industry, Agriculture - forestry – fishery; Commerce – tourism, Finance – insurance, Traffic – Telecommunications and Land use map. The theme” Spatial development planning into the year of 2025” includes the following map layers at scale of 1: 250,000, Tay Nguyen region land use planning; Industrial zones planning, Agricultural development planning, and map of Urban planning at scale 1: 50.000.

All the maps in Tay Nguyen geodatabase in Arc Server Manager are transformed in to web map and used to link to Web Atlas. Atlas construction toolkit includes Visual Studio 2010 software, ArcGIS Desktop, and ArcGIS Server. Atlas is designed to support three different users communities: *Internet Community Use, Provincial analytics, and Administrator*. Atlas has friendly, clear, easy to use interface with many functions for multimedia techniques.

The general functions for users are zoom in, zoom out, panorama, move, turn on, off the map layer content, search for attribute information, measure the distance, view slideshow media, chart and printing. Atlas also includes the advanced functions for professionals users from provincial departments and agencies. They are the tools of data processing, presentation, creating new maps, adding new feature, objects, editing and updating attribute data, exporting report for decisions making...

Atlas will be released on the Internet with high stability, security and information about Tay Nguyen region.

This work is fulfilled in the framework of the project code TN3/T22, supported by the Tay Nguyen 3 Program.

References

- Bui Ngoc Quy, Nguyen Cam Van, Nhu Thi Xuan (2009) Application of Electronic Atlas for Land Management in Hanoi, *Journal of Science*, Volume 5, No3, ISSN 0866-8612.
- Nguyen Cam Van, Pierre Brabant, Sonia Daracq (2004) Atlas CDrom: Trois Atlas Environnementaux au Vietnam, Provinces de Backan, Thai Nguyen, Lam Dong. IRD Edition, France.
- Vietnam Academy of Science and Technology (2013) National Science and Technology program for Tay Nguyen socio - economic development (2011 - 2015), Hanoi.