POINT DATABASE DEVELOPMENT FOR THE HEALTHMAPPER GIS APPLICATION IN VIETNAM

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ABSTRACT

GIS is a spatial technology widely applied in planning and management of disease prevention and control activities for regional sustainable development. In successful implementation of any GIS, database creation plays a central role. This paper describes the process of developing a standardized point database for use with the HealthMapper GIS in Vietnam based on the integrated use of existing digital data and software tools. The created point database can and should be used for training, data management and mapping purposes under the National Malaria Control Program as well as other public health programs across the country. It can also be updated as new data become available.

1. INTRODUCTION

Geographic information systems (GIS) is a spatial information technology that has been increasingly applied as a powerful tool for research, planning and management in different human activities. Among several GIS software packages currently available to users, especially for health professionals, HealthMapper is a PC based user-friendly GIS software developed by the World Health Organization (WHO) since 1995 to support worldwide public health programs (WHO, 2001). It continues to be upgraded and new versions are provided. To take full advantage of the software, training programs at different levels have been developed in different parts of the world.

In Vietnam, the training sessions on the use of Healthmapper GIS have been started in recent years, and the National Malaria Control Program is planning to introduce it as a tool for surveillance and planning at the district level. So far, digital maps of provincial, district and commune boundaries have been prepared as shape files. However, point database files are not available that limit the efficient use of the software.

This paper describes the integrated use of software tools and existing data to build a HealthMapper point database of health facilities and communes in Vietnam. The work aimed

to produce the following point database files: a) Provincial capitals, b) District capitals, c) Provincial and district hospitals, using the same points in a) and b), d) Communes (as centroids of available commune polygons). The database files are imported into HealthMapper and linked to the software buttons.

The availability of point maps with provincial, district capitals, commune centroids and health facilities will add an undoubted value to the software. It will offer the possibility to create thematic maps based on point data and to use graduated symbols to display different indicators. Moreover, the availability of dot maps with health facilities will be useful for other public health programs.

2. DATA, SOFTWARE AND PROCEDURE

2.1 Data

To create the required Healthmapper point database of health facilities and communes in Vietnam, different digital data sources including point data at the provincial and district levels in Mapinfo format and polygon data at the commune level in Arcview format were utilized. These digital data come from the National Atlas developed by the Ministry of Science, Technology and the Environment (MOSTE, 2000) and Healthmapper 2.4 core database.

2.2 Software

The required database files were created by an integrated use of the GIS, spreadsheet and database management software packages including Mapinfo 6.0, Arcview 3.2, MS Excel 97, MS Access 97 and HealthMapper 2.4 (Eastman, 2001; ESRI, 1996, 1999; MapInfo, 2000; Microsoft, 1996; WHO, 2001).

The HealthMapper GIS combines three components including a standardized core geographic database, a user-friendly data management and a simple mapping interface.
The system is based on the same mapping engine (MapObjects 2) used for ArcView by the Environmental Systems Research Institute (ESRI). As such the system is compatible with ArcView in so far as the geographic database which is in Microsoft Access and the digital base maps in ArcView Shapefiles can be taken and used separately with ArcView GIS. This is particularly useful if further advanced analyses are required (WHO, 2001).

2.3 Procedure

The work procedure includes the steps of data input, data query, data export, data editing, data import, and data output. The collected data were entered into the working directory on the hard disk and then queried, exported, edited, imported, and presented using different software tools available in the above mentioned software packages.

3. RESULTS AND DISCUSSION

The point database files created for use with the HealthMapper GIS are listed in Table 1.

Table 1. Characteristics of point database files

No.	Level	Format	File name
1	Province	Arcview	pointpro.dbf, pointprov.shp, pointprov.shx.
2	District	Arcview	pointdist.dbf, pointdist.shp, pointdist.shx.
3	Commune	Arcview	pointcom.dbf, pointcom.shp, pointcom.shx.
4	Type 1 (province)	Access	VN.mdb
5	Type 2 (district)	Access	VN.mdb

In the table we can see the created spatial data stored in ArcView shapefile and their associated attributes in dbf format. The health facilities of type 1 and 2 files for provincial and district hospitals, respectively have an MS Access format. The point database at the provincial level consists of 61 points for the capitals of 61 provinces (Figures 1-2).

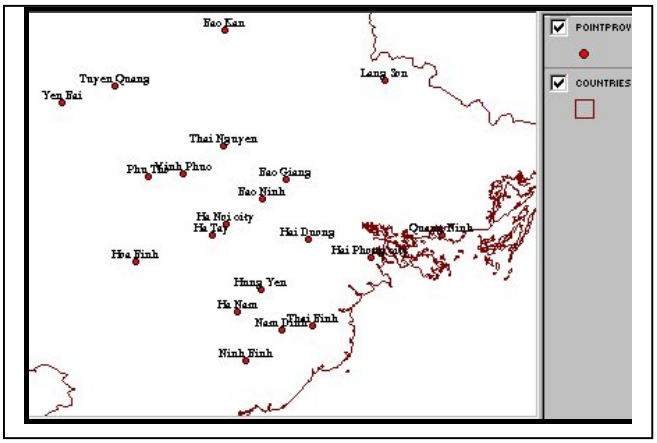

Figure 1. Map portion showing provincial capitals in Vietnam

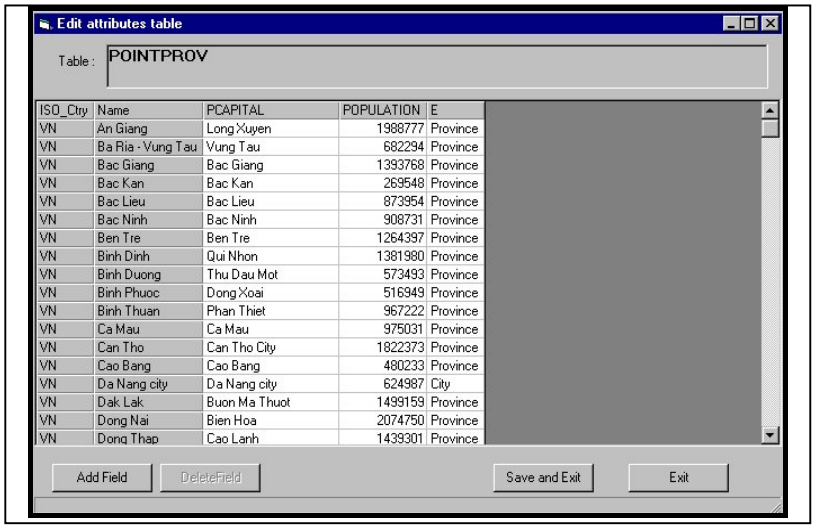

Figure 2. Attribute table at the provincial level

The created attribute table contains basic fields and allows quick data entry of both numeric and string data in the mapping interface. The use of point database for thematic mapping presents an advantage that one can use both size and color to represent the magnitude of the value instead of using only color.

A sample of graduated symbol map based on the provincial database is shown in Figure 3.

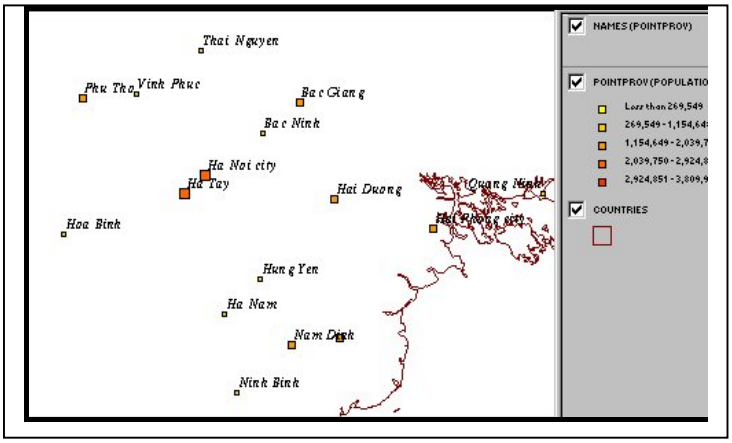

Figure 3. Graduated symbol map showing provincial level populations in Vietnam

The point database at the district level consists of 601 points representing the capitals of 601 districts in Vietnam (Figure 4).

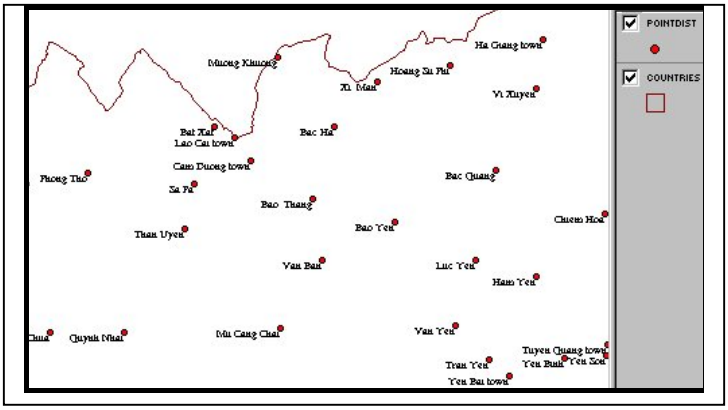

Figure 4. Map portion showing the location of district capitals in Vietnam

The size of district populations can be mapped using graduated point symbols (Figure 5).

The point database at the commune level consists of 10204 points representing the centroids of commune polygons in Vietnam (Figure 6).

Figure 5. Graduated symbol map showing the district level population in Vietnam

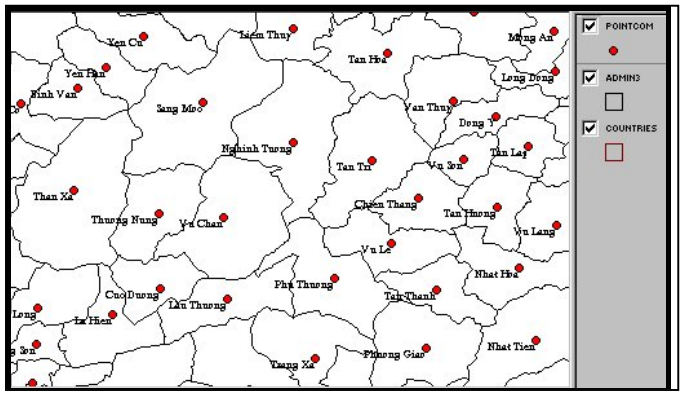

Figure 6. Map showing distribution of communes in Vietnam

The health facilities at the provincial level named Type 1 and those at the district level named Type 2 are represented by 61 and 601 points respectively. These point databases have been imported and linked to the health facilities data button in the mapping interface of Healthmapper 2.4 (Figures 7-8).

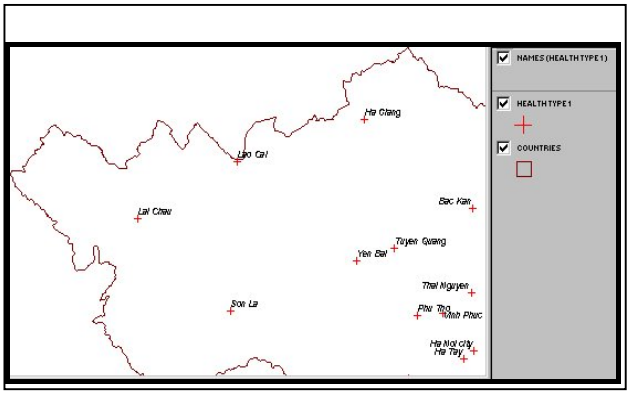

Figure 7. Map portion showing provincial health facilities (Type 1)

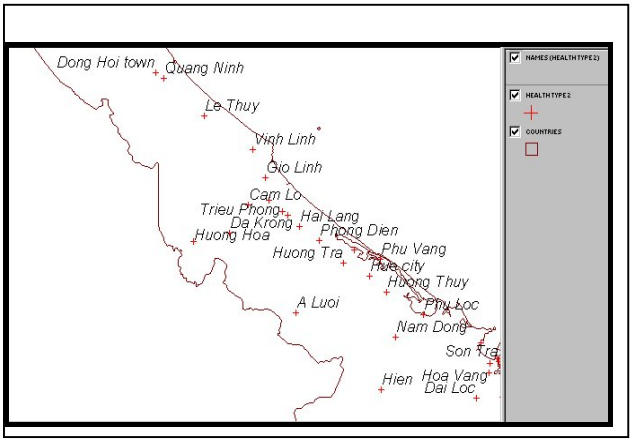

Figure 8. Map portion showing district level health facilities (Type 2)

4. CONCLUSIONS AND RECOMMENDATIONS

A healthmapper point database has been efficiently set up through a relatively simple procedure using different existing data sources and popular computer software packages. It represents locations and attributes of provincial, district capitals, commune centroids and health facilities Type 1 and Type 2 in Vietnam.

These baseline data are useful in thematic mapping and health data management. They can be displayed using data buttons and menu available in the mapping interface and data management of Healthmapper GIS.

It is recommended that the created database files be used for GIS training, mapping and data management in malaria control and other public health programs and be updated as new data become available.

5. REFERENCES

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