

# Introduction to Agricultural and Rural Information System (ARIS)

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**Abstract:** Agricultural and Rural Information System (ARIS) is a GIS based technology, established under the framework of the key national science technology programme “SCIENCE AND TECHNOLOGY FOR AGRICULTURAL and RURAL INDUSTRIALIZATION”.

A GIS team at Remote Sensing and GIS Application Centre under National Institute of Agricultural Planning and Projections had joint with FPT to commission the development of ARIS. The system contains pre-defined queries using user friendly Graphical User Interface (GUI) menus to support analyzing, forecast and making decision models for land use management, rural labour and some major crop disease control. Each pre-defined query provides immediate information in map and tabular formats on actual situations and potential of nature and socio-economics for agriculture and rural development. ARIS consists of GIS database and tools enabling to access, analyse and make decision on agricultural and rural management and planning at the provincial levels. ARIS was experimentally implemented in the representative provinces of 7 agro-economic zones in Vietnam.

**Keywords:** Information System, agriculture and rural development, GIS database, Decision Support.

## 1. Introduction

To this day, our agriculture has had relatively comprehensive developments with moderately good growth. However, the mass development with lack of planning, especially for the high value crops, made serious influences on the substances of ecological environment and social economy.

Comprehensive datasets and information in natural resources and environment are very important to build the strategies for sustainable development of our country and improvement of people’s living standard. Building and using database were determined from that awareness as one of the most important phases in the protection and reasonable use of these resources. GIS has been introduced in Vietnam since 1990’s and rapidly improved as effective and necessary tool of management of land use, rural labor and some major crop disease control.

The Agricultural and Rural Information System (ARIS) was established under the framework of the key national science technology programme “SCIENCE AND TECHNOLOGY FOR AGRICULTURAL and RURAL INDUSTRIALIZATION”. ARIS was built to provide the necessary information for those from the decision makers, scientist to the producers . Such information system consists of database and tools which enable to access, analyze and support in making decisions on agricultural and rural management and planning at the provincial levels. ARIS system is based on the geographic information database.

ARIS was experimentally implemented in the representative provinces of 7 agro-economic zones in Vietnam. The system was most completely developed for DAK LAK province.

## 2. Agricultural and Rural Information System (ARIS)

Agricultural and Rural Information System (ARIS) is a GIS based application. The goals are :

- Providing computerized data in map and tabular formats on actual situations and potential of nature and socio-economics for agriculture and rural development.
- Building analyzing, forecast and making decision models for land use management, rural labor and some major crop disease control .

ARIS is a product of integrating GIS and the relative database management system. ArcView GIS with its extensions (Spatial Analyst, Dialog Designer), Avenue – programming language of customization and development for ArcView, ALES- automated land evaluation software, and Microsoft Access have been used for the system development. This system is a PC-Based system. The development of ARIS was based on object-oriented programme technique, utilizing GUI technology, with the objective to produce a user-friendly system.

### 2.1 Development of ARIS

The development of ARIS is divided into two phases. This system was developed using PC ArcView, ArcInfo and also MS Access. The first phase of ARIS was more to designing the system, the database consisted of the spatial and non-spatial data. The entire requirement and the assessment study were held together with the users of ARIS. In this phase, the development of database management module was started. The second phase of this system is the development of Analysis module, Decision Making Support module and also the Data Directory module.

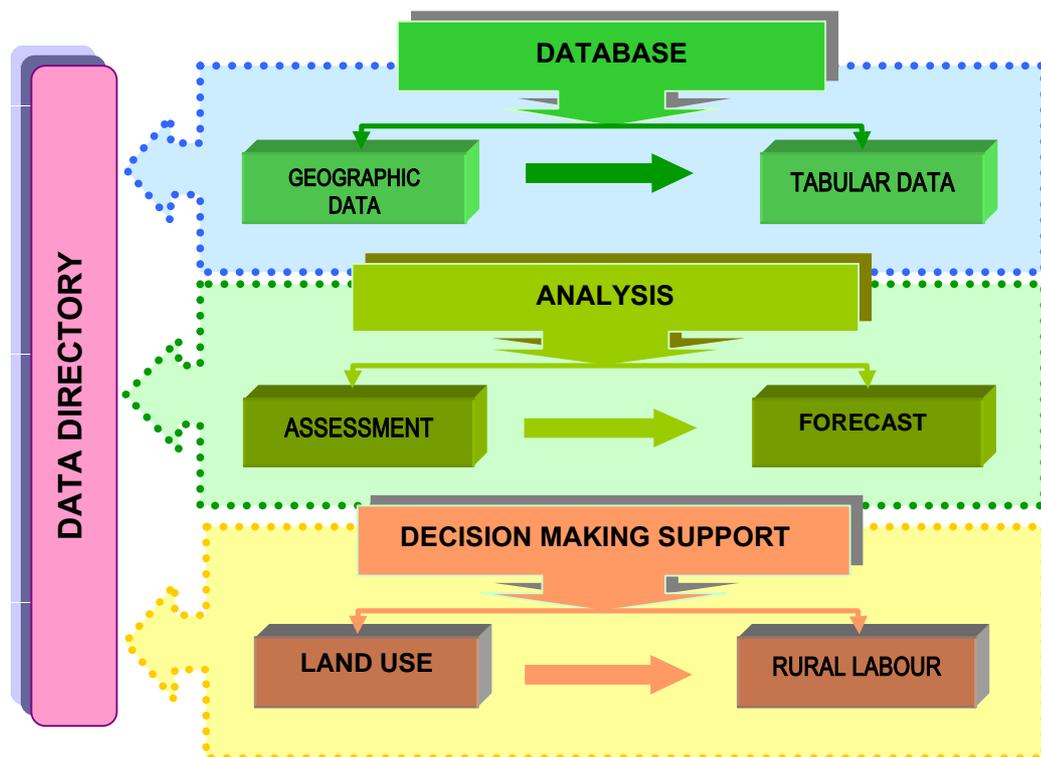


Figure 1 The hierarchy of ARIS structure

### 2.2 ARIS design

The ARIS tools are structured into four main modules. These four main modules are capable of providing the decision-makers with the tools and materials for them to make the decisions. These modules are :

- 1) Database Module
- 2) Analysis Module
- 3) Decision making support Module
- 4) Data Directory Module

### Database Module

The main objective of this module is to store, manage, provide and update information on land resource status and land use, rural labor and some major crop disease in both formats : maps and tables. This is a characteristics time-spatial multi-layer GIS database in which each component layer is allowed to change. The GIS database includes many thematic layers in professional ESRI GIS formats (ArcInfo, ArcView) and .xbase tables, that are controlled by management sub-program written in Avenue.

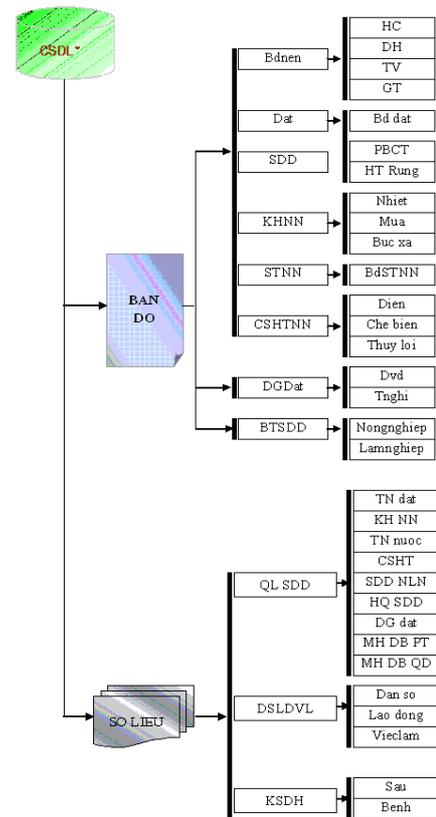


Figure 2 shows the output screen of Database Module

### Analysis Module

This module is used for providing tools to evaluate land resource utilization, rural labor, forecast population and make some major crop disease warning. There are three sub-modules supporting the module. All these sub-modules are also supporting each other. The sub modules are: Land resource evaluation, population and labor forecast and crop disease estimation.

Land resource evaluation sub module helps the users to make analysis and queries, to predict the behavior of each land unit for each actual and proposed land use and present the information in visualized form. These are served as inputs for the successful and sustained plans for valuable crops

Population and labor forecast module is used to see and forecast some main criteria, namely total population, rate, population structure by sex, residence, labor quantities and qualities (literacy, training), ....

Crop disease estimation sub module helps to control, identify main diseases, and estimate the area possibly influenced by them.

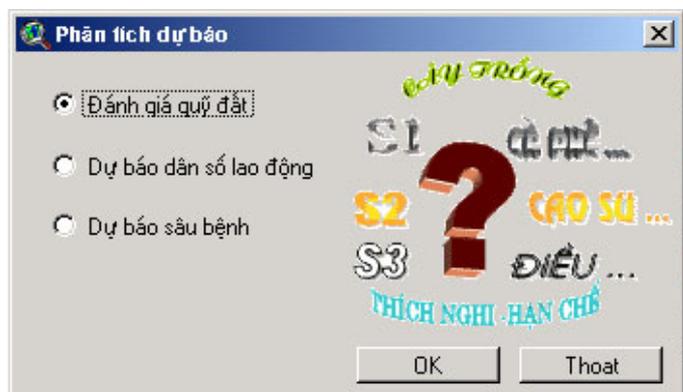


Figure 3. Output screen of Assessment Module

**Decision Making Support Module** is important to help the decision makers on food safety, land use planning for high value crops, land resource balancing and rural labor using. There are 4 submenus.

Food safety submenu allows the users to assess land capacity to ensure in-situ food safe.

Agriculture land use submenu has the main functions, likely to study land potential and set up a plan for each of major crops, establish agriculture land use scenarios.

Forestry land use submenu is used to calculate forest coverage, estimate area for planting material forest (paper, plywood,...).

Labor demand submenu is used to evaluate local labor resource for a particular land use scenario.

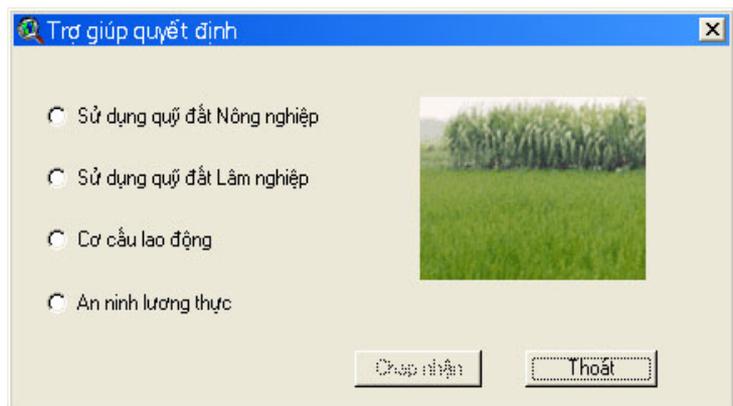


Figure 4. Decision Making Support Module

**Data Directory** Module is designed to enable the users to refer to and approach data in ARIS. By this way users know-oneseif whether those data are suitable or where to get the data.

This module has two functions: data register and data search.



Figure 5. Output screen of ARIS Data Directory

### 3. Conclusions

The Agricultural and Rural Information System (ARIS) had been founded on GIS application. The database is united, gathering almost full information in map and tabular formats on agricultural and forestry land use, crop diseases, rural labors in order to satisfy the demand in building information analyzed model and supporting decision making in the management of agriculture and rural development. ARIS provides quickly the information and tools which are needed for the decision makers in order to grasp, assess clearly and fully the real state, potentiality of the nature and socioeconomic conditions for the management and determining the agricultural and rural development policies.

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