

AUTOMATIC CARTOGRAPHY LIKE A SUPPORT FOR THE DEVELOPMENT OF AGRICULTURE

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Abstract

The dynamic of the actual development of agriculture requires of specialized maps like base for inventory, plannification and evaluation of land in production, in order to develop solid bases in a sustain agricultural system.

Automatic cartography is very important as a tool of work and allow us to develop cartography in this areas, by the elaboration of automatic maps for phisical inventory, soils, pasture and large scales maps.

The development of this cartographic base of this area under cattle explotation give the fundamental components that could be integrated to a Geographical Information System in agriculture, necessary to check, manage and handle our available resources.

Introduction

To make that the agricultural production supported on automatized cartographic bases may be integrated to a Geographic Information System (GIS), was the fundamental objective of our work.

Data over agricultural is very extensive and there is a lot of information that it generates and demands to manage simultaneously, and is priority to use automatization of thematical data in order to give producers a useful tool of work, to make easy the manage of resources that he has.

As a result of our work was created a trilogy of automatized thematical maps beginning with an easy, quickly and up to date cartography, structured and integrated with a base of alphanumerical data and interest information that includes map of soils, hydric, topography, location and land use evaluation: all this data will be efficient and operative that demands the actual agricultural economy.

The work comes like a necessity of our cattle enterprises in order to have a useful inventory for the areas evaluation and the efficient handle of its resources.

To develop our work we chose an enterprise in the Havana province one of the more important of our cattle economy.

Physical Geographical Characterization for the cattle enterprise "El Cangre".

The cattle enterprise "El Cangre" has an aproximated area of two hundred square kilometers an it is in the south-east of La Habana province. From the morphographic point of view the area is hilly up to two hundred and twenty eight meters and gets lower from north to south to a lower hill plane that has 30-32 meters of height.

The hydric net presents two aluvial planes: the flood plain and the first fluvial terrace, that is not present in the upped part. The surface drainage is big. Sedimentary rocks hold soils type ferrosols.

The temperature is quite regular for the whole zone with an annual of 24,4 celcius degree. The rain presents a raining period from May to October and dry one from November to April. The annual average is over 1 400 mm. The predominant wins come from the east and north east.

The Physical Inventory Map of Pasture for the cattle enterprise "El Cangre" scale 1:25 000 (1991)

The physical inventory map of pastures was created from a topographic base scale 1:25 000. The digitization of the contents of the thematical typical base was done through DAAC programm of GEOCUBA in an ARISTO equipment.

The process of the digitization files was done through the graphic system AUTOCAD release 10, and included the follow elements that made the final base:

- hydrography (for the control allocation of water resources)
- communications (in order to know the communication access to units and the develop of it in the area)
- towns (in order to evaluate the social economic potencialities)
- unit's limits, farms, forage areas, dairy-farm, etc (for the control administration of the units) and
- land use (for the evaluation of the enterprise's productive activities).

The conversion of the alphanumerical format files to a graphic format was done trough to AUTOLISP programm [4].

Remote sensing information was obtained from aerial multispectral survey that covered the green zones (540 nm), red (660 nm) and near infrared (840 nm) of electromagnetic spectrum. From this information we obtained the author's originalls for the digital and analogical photointerpretation and the necessary

information to obtain the vegetation index [2] and create the evaluation scheme of the agricultural units.

In the process were used color compositions in the optical analogical equipment by the Multispectral Projector MSP-4C and in the digital process through the software for digital processing of image of the TELEMAT's system (GEOCUBA).

In this classification some pastures with high proteic value and good physiological shape, like Glycine (*Neonotonia wrightii*) were classified up to the specimen level. Accurate identified in the red and near infrared zones showing the stationality of the crop even in dry season, because the aerial survey was done at the end of the dry season in Cuba, April month. Others pastures offered few differences in its spectral response, like for example Estrella (*Cynodon nlemfuensis*), Guinea (*Panicum maximum*) and Bermuda (*Cynodon dactylon*). So we had to make optical-analogical photointerpretation.

The physical inventory map of pastures is the most important of the trilogy and shows a detailed description of the ubication and composition of each unit, specifying what are their destination: if they are dairy-farm, improving areas or other cattle zones, numbers that identify these units, type of pastures (sometimes even up to specimen classification), the marabu (*Dichrostachys cinerea*) and bushes invasion in the pastures and the disposition of "proteic zones" (that includes proteic zones of Glycine, *Leucaena* (*Leucaena leucocephala*) and others pasture's association), the area occupied by the farmers inside the limits of the enterprise with their own crops, the location of water sources, the routes access, non agricultural zones, potential zones, forage areas, and areas of forest reserve. In order to represent all this phenomena were used patterns (screen) from the AUTOCAD's library.

Each land use has his own area (in ha), and was created a data bank with the program TELEINVENT [1].

Finally the process of the map had a size of approximately 3 000 000 bytes.

The map plotter was done on an automatic draw table WILD-TA-10 through the plotting files created in AUTOCAD, further interpreted by interface PLOT.

The map is complemented with the studies and the diagnosis of the pasture's available in the units which is shown in figure number one. Through the statistic process of the radiometric information obtained from the optical densities of the multispectral negatives. This information allowed obtain the vegetation index for these units and evaluate the state of each of them and make available evaluation of the green materia in the grassing for a dry (or non-raining) season (period of more restrictions in the disponibility of grass for animals in pastures). With this information the producers may estimate which are their reserve and how much they should invest in incomes like fodder, molasses and others.

This enterprise made his inventory on the base of these results. Hence was evident a quality and how rapidly was obtained the information, over the automatized cartographic bases avoid unnecessary lost of time and resources.

The automatized map of soils for the cattle enterprise "El Cangre" scale 1:25 000 (1993)

By a similar technology was created the map of soils of cattle enterprise of "El Cangre".

The bases were obtained through the digitization of genetic soil's classification map, scale 1:25 000 (1980) created by the Institute of Soils, of the Ministry of Sciences and technology by traditional methods.

We have included the legend of the map with all characteristics of types of soils in the area in the enterprise and the limitations factors for each.

The automatized map of regionalization of pastures for the cattle enterprise "El Cangre" scale 1:25 000 (1994).

The automatized map of Regionalization of pastures for the cattle enterprise "El Cangre" scale 1:25 000 (1994) was created from the basis from the soil's automatized map. In it are different regional units in order to give a proposition of the specimen of graminaceous and leguminoes more recommendable for the enterprise. This analysis is based in the study of regionalization of pastures in Cuba [3] in which were analyzed the factors that had influence in the establishment and development of different specimen introduced in the country.

Conclusions.

These works constitute a useful and efficient manage of the agricultural resources of an enterprise, evaluated by the obtained results and the own opinion of the managers.

We had integrated all thematical information on automatized cartographic base, embryo for a livestock 2GIS task in which we are in with the objective to make advances in our agricultural economy based in an informatic technology effort as demands the actual world economy.

References

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