TRAINING ACTIVITIES OF ITALIAN DEVELOPMENT CO-OPERATION IN THE FIELD OF REMOTE SENSING

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ABSTRACT

In the present paper is presented the post-graduate training course that is organized by the Istituto Agronomico per l'Oltremare of Florence, Italy.

After a short presentation of the structure of the course two different case studies are presented as an example of the final stage.

INTRODUCTION

An adequate knowledge of available natural resources is a basic step before any rural development initiative. Problems arise in developing countries due to the lack or inadequacy of environmental information. In this context, remote sensing is an outstanding data collection tool, provided that operational interpretation methodologies are at hand.

The Agronomical Institute for Overseas of Florence (IAO) has been organizing since 1974 a post-graduate course on "remote sensing and natural resources evaluation"; the course is now at its 18th edition.

THE IAO COURSE

The IAO is a branch of the Ministry of Foreign Affairs; it was founded in 1904; in its early times its activities were centered on studies on tropical environment and agriculture; after the sixties its activity has focused upon agricultural and rural development cooperation with developing countries. Today IAO services cover different topics such as project design and implementation, training, research, consultancy, publishing, document collection and retrieval, museum and botanical collection, library.

The first edition of the remote sensing course was held in 1974; at that time the denomination of the course was "Post graduate course on aerophotogrammetry and photointerpretation for the management of natural resources", and it was organized in co-operation with the faculty of Engineering of Florence University. In 1983 the denomination was changed to "Post-graduate course on remote sensing and natural resources evaluation"; the course is now given in english and it is organized in co-operation with the Italian Remote Sensing Society (AIT).

Until today 266 participants have attended the course, 25% from 21 different foreign countries (Table 1)

Algeria	4	Greece	5
Argentina	7	Iran	5
Bolivia	5	Italy	201
Brazil	6	Morocco	1
Bulgaria	1	Nigeria	4
China	1	Paraguay	1
Chile	1	Senegal	2
Ecuador	1	Somalia	7
Egypt	2	Spain	1
El Salvador	1	Uruguay	1
Eritrea	7	Zaire	1
Ethiopia	1		

Table 1 - Participants to the IAO courses by country of origin (1974-1997)

Given its non academic format, the course has been continuously upgraded following technological innovations.

Today the course is held every two years and its duration is approximately 7 months.

The aim of the Course is to provide participants, having different academic qualifications, with a common background on remote sensing data processing and interpretation, in order to carry out natural resources inventories and evaluation, with special emphasis on the rural sector in developing countries.

The Course is subdivided into two basic modules: the first one is a series of lectures and seminars, followed by demonstrations and practical exercises. Topics cover fundamentals of remote sensing and related disciplines, as well as remote sensing applications in various environmental fields. Visits to government departments and private companies are also included.

The second module is a complete case study including a month of field work.

The first module is arranged in a series of lessons. Two multiple choice test sessions are scheduled, at the middle and at the end of the module; failure of passing these tests causes Course dismissal.

In the second module, participants work together, in a really interdisciplinary way, for the whole duration of the *stage*. The IAO staff is continuously available throughout this period to offer advice and assistance. However, the quality of the results is almost entirely dependent on the participants' own responsibility and engagement.

The case study is carried out utilizing the IAO methodology which is based upon a pragmatic and interdisciplinary utilisation of field survey and remote sensing techniques, both aerial photographs and satellite imagery, in varying proportions according to the scale of the study.

The course subjects are the followings:

Introduction

Methodological aspects of natural resources evaluation.

Fundamentals of informatics.

Cartography.

Remote Sensing

Principles of remote sensing.

Photointerpretation.

Digital image processing.

Geographical Information Systems.

Natural resources evaluation

Geology and hydrogeology.

Geomorphology.

Soils.

Climate.

Rangelands.

Forests.

Agriculture and land use.

IAO methodology: a framework.

Seminars

Cooperation projects with developing countries.

The farming systems approach.

Microwaves remote sensing.

Hyperspectral remote sensing.

Ground-based remote sensing.

Remote sensing applications to agricultural statistics.

Participants are requested to have an University degree, or similar qualification, in Agriculture, Forestry, Geology, Natural Sciences or other environment related disciplines. They are likely to have had academic training in remote sensing or related topics, and/or to be (or have been) engaged in work in this area in a cooperation or research project in a developing country. Previous experience with computers is also sought.

An outstanding feature of the Course is the final *stage*, which lasts three months and a half, and it's traditionally focused on a tropical or subtropical area. The objective of the *stage* is to carry out a complete resources survey, using remotely sensed data, in order to build up a geographical database to be used for land evaluation. A holistic approach to land unit inventory and classification has been used in all the recent Courses (since the XIIth), and the FAO's methodology of land suitability evaluation is also largely referred to.

TWO CASE STUDIES

As an example, a short description is given of the two last Courses (XVIth and XVIIth edition), hold respectively in Tunisia and Eritrea..

In Tunisia (1993), the study area (about 2,000 km^2) was a part of the Kebili governatorate, in the south of the country. It was a predesertic area, with a rapidly increasing agricultural activity, mainly oases. The rapid population growth and the creation of new irrigated areas is causing major environmental problems, accelerating desertification. Wind erosion and soil salinization are the main negative factors; the degradation of the natural vegetation cover, due to overgrazing by sheeps and goats, is more and more increasing the threaten of wind erosion. The *stage* was therefore oriented towards rangeland evaluation, to get a better knowledge of the relationships between the natural vegetation and its carrying capacity. A Land Unit map was prepared at the scale 1:100,000, using multitemporal TM and SPOT images, and aerial photographs; multitemporal analysis proved to be particularly useful in determining the soil humidity content and sub-surface water tables fluctuations. The field survey took one month, including observations and measurements on geology, geomorphology, soils and vegetation: hundreds of samples of soils and plants were collected. The final product was a geographical database, from which, using GIS procedures, three land suitability maps for different land utilization types were derived. Also the main thematic maps were produced, including a soil map, a vegetation map and a map of active geomorphological processes.

In Eritrea (1995), the study area was the catchment area of the upper Mareb, 30 km south of Asmara, covering about 500 km^2. This is one of the more promising agricultural areas of the Eritrean highlands, being also one of the more densely populated of the country. It includes the so-called

Tsellima plains, a large depression filled by alluvio-colluvial sediments of volcanic origin, of high potential fertility. Coming out from a thirty years long liberation war, the eritrean economy was prostrated, and the agricultural sector was reduced to the mere subsistence: the main problem was soil erosion, sometimes of a dramatic evidence. The lack of information about the environment and the natural resources was evident, and it was one of the first priorities of the new Government. The objective of the *stage* was to evaluate the suitability of the area for the main crops, to estimate the soil erosion rate in order to assist the realization of a system of small dams for surface irrigation, and to carry out a survey of the existing fuelwood biomass availability. Again, a Land Unit map at the scale 1:50,000 was drawn using TM and SPOT data, and aerial photographs. As in Tunisia, the field survey took one month, with more than one hundred of *relevés*, each one consisting of integrated multidisciplinary observations and measurements on geology, geomorphology, soils and vegetation. Also in this case the final output was a geographic database, from which several thematic maps have been derived, including eight land suitability maps, for barley, maize, sorghum, cowpea, alfalfa, finger millet and wheat under two different level of management intensity.

Both these two case studies have been carried out by the Course's students themselves, under the continuous co-ordination of IAO staff. The assistance of other specialists was limited to short periods, and the students received very few or no other external help or input: therefore, the good results obtained during these case studies are a good demonstration of the full professional qualification reached by our students at the end of the Course.

REFERENCES

IAO, 1993 - Land Unit Map of the Kebili area (Southern Tunisia). XVIth Course on remote Sensing and Natural Resources Evaluation.

IAO, 1995 - Land Unit Map of the Aini Mereb and Halhale catchment area (Eritrea). XVIIth Course on remote Sensing and Natural Resources Evaluation.