

THE USE OF THE REMOTE SENSING TECHNIQUE IN THE GEOGRAPHICAL PROBLEMS OF PERU

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ABSTRACT :

This paper introduces the main problems of the natural regions of Peru which solutions are based on the use of the Remote Sensing Techniques. Problems such as deforestation, narcotrafic, colonization, evaluation of natural disasters, cartography, urban development, and fishing development are analyzed through Satellite Images, Aerial photographs which are destined to get the highest degree of information about happenings in the peruvian regions.

KEY WORDS : Geographical problems, Remote Sensing.

1. INTRODUCTION

Peru is situated at the central - occidental region of South America between 00°01'48" and 18°21'3" SL and 68°39'27" WL, its extension is 1'285,216 square kilometers of territory and 200 miles of maritime boundaries.

1.1. Geographic Characteristics

The geographic diversity of the peruvian territory is generally scheme into three natural regions: Coast, Andean, and Jungle having each of them its own particular characteristics which represent a challenge for development.

2. AMAZONY MAIN CHARACTERISTICS

Peruvian amazony has an extension of 756,865.60 square kilometers representing the 58.59% of the total extension of Peru. It has been divided in two different zones considering its altitud low jungle below 800 m. and high jungle between 800 - 3,800 m. The climate conditions, type of soils and water regime bring up the Amazony into a rich saniety of flora and fauna species. However the real richness of the amazony comes to be in the forest since that high temperature and humidity get a rapid organic matter decomposition and provide the forest nutrition waters play a very important rol since the interdependence between aquatics and land ecosystems allows the forest maintance such as the case of soo species of fish in the peruvian amazony which get nutrients from hydric regimens, on the nol of the fauna on the polinization, there is no possibility of living without this interaction. In true natural productivity will be permanent in the extent that the amazony does not change its natural state.

3. MAINS PROBLEMS OF THE PERUVIAN AMAZONY

They can be summarized this way :

3.1. Deforestation

It is a general problem not only for the peruvian but for the whole amazony there anually it is estimated that 2 million hectareas are destroyed being in Peru 300,000 has; one of the factors which contribute to its devastation are; building of communication vials, made with the porpuse of extracting natural resources cause forest destruction as it is appreciated in the vial ways Perene - Satipo, Aguaytia - Pucallpa, Moyobarba - Rioja and the valley of Chancharayó.

Perphaps if there would had been a prepared

a plan and financial aid at the state level to orient people it could had been avoided the devastation; in the same way the nature tribes who did a hight soil and forest management were displaced and replaced by colonus who clean up big areas for agriculture and harvest purposes becoming the main responsables of deforestation laten on the narcotrafic actions also contributed to it. It is calculated that they have destroyed 800,000 hectareas in the amazony. The ecologyc effects are: -Alteration of hydric regime and forests - pooring of soils accelerated - Fauna extinction - lack of natural high productivity - soils erosion causing floods and "Huaycos".

3.2. Narcotrafic

The coca plantations had incremented since 1974 up to 1980 and from 1980 up to 1990, in 1959 peruvian production was 11,000 TM in 1980 was 50,000 TM and 1990 it has been estimated in 200,000 TM. Which represents 60% of the total amazony production having Bolivia the 30% and the last 10% produced by Ecuador and Brasil. The best quality of coca leaves are attributed to Perú. For the monitoring and control of coca plantations it is of the great necessity to get precise information through remote sensing methods. The damage produced by narcotrafic reaches besides of soils erosion the ecosystems pollution, since the coca leaves transformation in PBC takes place in hidden areas of the amazony where the wastes are thrown out nivers affecting waters putting in algae etc in danger of extinction fish and with the danger of biologic chain breaking out besides of affecting to man. We considered that airport localization is a priority for this problem because of, trading is made in clandestinity from the peruvian amazony to the other countries, alternative plantations is the second task such as cacao, oil palm and rubber. Both actions require of Remote Sensing methods and equipment.

3.3. Colonization

From 1980 to 1985 there were national projects oriented to increase agropecuary, forestal and agroindustrial production and at the same time preserve resources and increase population life level, pichiz palcazu, Alto Mayo, Alto Huallaga and Madre de Dios are an example. However the had not the right planification, and were abandoned to its own conduction, with the results of bead use soils, pollution and deforestation.

3.4. Natural Disasters

The Peruvian Amazonian regions before mentioned: High Jungle with a still Rivers, intense rains and a warm weather and, low jungle with a plain land, rivers and rains and weather. It is due to these characteristics that in the High Jungle. Occurs disasters of major proportion and frequency like the case of the occurred in Chomclayacu - 1982, La Merced - 1986, Villa Rica - 1987 and the last in San Miguel, Tarapoto, in February, 1990.

Meanwhile the Down Jungle by its characteristics is more inclined to inundations (and slipping). These natural disasters are provoked by torrential rains which encountering soils deprived of vegetation and eroded ease violent inundations and slippings on lands causing deaths, injured, hundred of areas of cultivation destroyed, lot of cattle areas and tillable products.

Meanwhile is necessary a major grade of prevision making use of modern techniques of remote perception.

3.5. Cartography

The cartography of the Amazonia is very complex to make due to its inaccessibility and meteorological factors.

3.6. Evaluation of Natural Resources

Given the importance of the Amazonia for Peru like source of natural resources, is necessary to know its potential, but exist in this region a big heterogeneity of species, is very hard evaluate them using the conventional methods.

4. USE OF TECHNIQUES OF REMOTE PERCEPTION IN THE AMAZONIC PROBLEMS OF PERU

In the precedent chapter, it has been described the remote sensor use for alliviating this problems.

4.1. Deforestation

By means the use of technics of remote sensors, is possible to observe the problem of deforestation. By example, by means of the tare of two areal photographs or two images of satellite in different times is possible to look the grade of deforestation in this zone.

On Peru, the works for quantify the deforestation and to create action plans, are made in public entities like the National Office of Natural Resources - ONERN-, Where is monitored and elaborate maps respect to this problem which area of great utility for specialists in this area.

That is possible, thanks to the satellite images of Landsat, mainly, by its information-permits a permanent monitoring of the region.

4.2. Narcotraphic

The use Remote Sensing for fight this problem is enormously useful like we see. Police entities obtain information of organizations who resort to satellite information like (Landsat and Spot between others) for to detect landing runway, coca planting and clandestine drug laboratories.

The elaboration maps according to areal photos are an important tool to the National Police of Peru, in the fight against drugs in the Amazonia.

4.3. Colonization

The studies made by the National Office of Evaluation of Natural Resources (ONERN) in the Peruvian Amazonic (High and Down Jungle), like the study of the Evaluation of Natural Resources, Environmental Protection Plan of Central Huallaga and Bajo Mayo Valley - 1984, Environmental monitory of the Pichis River Valley - 1985, have like objective to improve the planification and ordainment of the Peruvian Amazonia.

For this side the Peruvian Agency for the Development of High Jungle (APODESA), by means the study of Land Ordainment for a sustained development, palcazu valley Oxapampa materialize an example of development in the High Jungle. These studies are based in the technics of remote perception. By the traditional method of Aerophotographs, and conventional, images of satellite, which are complemented by field verifications for to elaborate maps that make possible a better expectative of Amazonic development.

4.4. Natural Disasters

The natural disasters in the Peruvian Amazonia are due generally to inundations and slippings of earth and water (Huaycos), is for this that the prediction area of avenues is fundamental. The National Service of Meteorology and Hidrology - SENAMHI, Gubernamental Agency, is the enchanged of register meteorological dates and analyse informations arriving to the satellites GOES - E and NOAA - 7 thanks to that is posible to obtain informations like proximity of strong rains, inundations and Huaycos. By means of images was analyzed temperature, nubulosity, precipitations, winds-flow.

By other side, the National Agency for the Aeronautics and Space (NASA) who alert to Peru with informations, is interested in the project "Perception for the prevision and control of Huaycos" which was put on work in July of 1985 in the National Institute of Transport and Research.

4.5. Cartography

The use of Remote Sensor like areal photographs of Satellite are make possible.

(1) Elaboration of a cartographic Map of the Oriental Mountains of the Peruvian Andes: (High Jungle Zone), that was made with Radar Vista Lateral - SLAR due to the multiple difficulties that appreciate the traditional systems, between them that the region is covered by cloud nearly all the year. The map will permit lately elaborate the geological map at scale 1:100,000.

(2) El planimetric Map of Peru; Scale 1:250,000 made by use of images of Landsat; covering all Peru, including Amazonia.

(3) Map at scale 1:250,000 with the help of Star and the assistance of GRUMAR company in the North Jungle and Aeroservice the South Jungle.

(4) The Altimeter Map of the Amazonia to a scale of 1:100,000, which is executed in a 70% with the lateral Sight Radar - Star and the remainder 30% using the stereoscopic Radar. This work is executing in Agreement with the Interamerican Geodesic Service - IAGS.

Between the entities entrusted to execute these activities are Institute Geográfico Nacional (National Geographic Institute), The National Aerophotographic Service (SAN), the Direction of Hydrography and Navigation of the War Navy of Peru (DIHIDRONAV) and the Cataster National Program (PRONAC).

4.6. Evaluation of Natural Resources

The National office of Natural Resources ONERN was the first entity that use the images of satellite like source of information using the images Landsat make the Project of Evaluation of Aguaje Palm on the Peruvian Down jungle, in agreement with the Institute of Environmental Researches of Michigan ERIM. "The former study use information of the Landsat Satellite, identifying zones of distribution of the Mauritian palm (aguaje) in the Down jungle, which grow in hydrophilic media (ONERN, 1977).

Likewise, specialists of ONERN say the information of satellite Landsat, represent a potential tool for the future forestal studies in the Amazonic Region (ONERN, 1981).

There are more environmental problems in the central jungle. There are an agreement between ONERN an special project pichis palcazu to make the Ecological Vigilance System of using mainly the Landsat System.

5. CHARACTERISTICS OF THE PERUVIAN COAST

The Coast comprehend an extension of 160,597.4 km², which represents the 12.5% of the country extension. Its wide vary between 75 to 100 km, its main characteristic is the shortage of precipitation, except the north zone of the country that surpass the 500 millimeters, its physiographic characteristics: Desert, little hills and Valleys. The region presents a general slope toward the Pacific Ocean crossed by 53 rivers of temporal regime, related with the rains in the Andean region and some basin receptors on the high mountains of perpetual snow. The valley conformed by the river basins, are poles of development, these separated by extensive dry plains covered by sand. In front of the Peruvian coast there is the Pacific Ocean, where is yielded a great displacement of oceanic masses that crop out from the depths, meanwhile is yielded by one of the more intense photosynthesis generator of life and origin of abundant plankton, given to Peru an enormous potential in the world.

6. MAIN PROBLEMS OF THE PERUVIAN COAST

They are next :

- Urban Development
- Natural disasters
- Fishing development

6.1. Urban Development The bigger metropolis are in the coast and its development without adequate planning become centralist and chaotic cities.

6.2. Natural Disasters The main geographical basin of development is Río Rímac basin where is placed Lima, capital of Perú, and where occur geomorphologic process producing natural disasters of great magnitude like the occurred in "El Pedregal", Chosica.

6.3. Fishing Development The insufficient scientific and technological knowledge of hydrobiologic resources exploitation in sea water, constitute a factor that contrasts with their enormous fishing potential of Peru, so the fishing sector requires the support of new technology.

7. USE OF TECHNIQUES OF REMOTE PERCEPTION IN THE PERUVIAN COAST

7.1. Urban development

In 1985, the Cataster National Program in the great coastal metropolis, by the means of the use of air photographs (1:17,000 aprox.) that give great information for the inventory, planning and future development.

7.2. Natural Disasters

The geographical basin of Rimac River was analysed by the project "Erosion in Rimac River basin by means of teledetection" 1991 consisting in evaluate the erosive conditions of the basin with traditional methodology of geography like observations, cartographic and statistical analysis of satellite images, therefore the essential aspect of the project was the use of technics of digital prosecution of a satellite image of Landsat T - M.

The preliminary results has permitted establish a zonification of the types and erosive potentialities in the basin that is well adjusted with the reality, this classification was done by automatic methods as by visual methods considering images treated digitally, analysis of photogrametric carts and thematic maps existing that has been served to give reliability to the study.

7.3. Fishing Development

The fishing sector has put first attention to the preservation and national exploitation of the same resources fixing volumes of capture and fishing zones and has been necessary modern techniques of information (*).

Also, the "Centro Peruano de Estudios para el Ecodesarrollo Marino" (ECODEMAR) Peruvian Center for the Marine Ecodevelopment is accomplishing the project". Biological Fishing Reconnaissances of feasible areas for sea culture.

8. CHARACTERISTICS OF PERUVIAN "SIERRA"

The sierra is constituted by 388,175.9 km² representing a 30.2% of Peruvian land. Have great heights like the snow-covered Huascarán with 6,767 m., its deserty topography deeply eroded by rivers in avenue which originate the hydrographic systems of the Pacific and Atlantic Ocean.

Its climate is varying the local characteristics due to its relief so irregular and by the position and the chain of mountains. The temperature depends of the altitude of the place and the rains vary between extreme limits (100 mts. to 1000 ml. by year) and constitute an agrarian zone.

9. MAIN PROBLEMS OF THE PERUVIAN SIERRA

They are the next :

9.1. Rural Development

In this region was precised too, an inventory of use of the land.

10. USE OF TECHINCS OF REMOTE PERCEPTION OF THE SIERRA RURAL DEVELOPMENT

The Cataster National Programa PRONAC has extended to the modern Rural Cataster like operation of surveying and mapping giving the fundaments for a dynamic system of information over the land likewise to tare decosions.

11. CONCLUSIONES

- The data obtained by Remote Sensing had been used during many years in Peru, with the objetives of investigating the evaluation of Natural Resources, Cartography, Climatology, Natural Disasters, Urban and rural studies.
- Digital image processing has received great interest from our scientific community because the aplicacion of this technology have increased in several field of knowledge.
- The Cartography of the peruvian territory has been completed in about 100%; through Remote Sensing methods and the National chart 1:100,000 finished with images of SLAR radar.
- The development of innovate applications and methods in Remote Sensing, will provide effective alternatives to conventional methods of land use management, environmental analysis, resources evaluation, and education in Remote sensing. Thus, the San Marcos National University will have a strong background in research and in the application of new technology (GIS) to research survey and management problems.

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