REMOTE SENSING AND GIS, TWO MAJOR TOOLS FOR THE ENVIRONMENT MANAGEMENT AND PROTECTION, CARTOGRAPHY OF NATURAL DISASTERS

A. MISSOUMI - K. TADJEROUNI - M. CHIKH - L. TIDJANI
National Center of Space Techniques, Division of Geomatics - Algeria.
Email: missoumi@cnts.dz

REMOTE SENSING AND GIS, TWO MAJOR TOOLS FOR THE ENVIRONMENT MANAGEMENT AND PROTECTION, CARTOGRAPHY OF NATURAL DISASTERS

We will limit ourselves to the risk of forest fires for which we tried to show through two experiments undertaken in the west of Algeria that GIS combined with data from the Algerian micro satellite ALSAT1, are effective management tools and in constant evolution.

THE RISK OF FOREST FIRES

In Algeria, for a total surface of 2.4 millions square km, in best case the forest does not cover more than 1.790.000 hectares, which represents less than 1%.

We can note the heavy tribute paid by Algeria considered by specialists as the part of fire. More than 30.000 hectares are destroyed on average each year and it is impossible to remain indifferent facing what is being undergone by the plant cover that threatens the ecological balance.

THE PART OF FIRE

The main reasons of the regression of the plant cover can be identified as follows:
- the demographic growth,
- the abusive exploitation of forests for a strategic and economic objective,
- the intensive grazing and fires.

INDEX CHART OF FIRE RISK

<table>
<thead>
<tr>
<th>INDEX</th>
<th>CHART</th>
<th>OF</th>
<th>FIRE</th>
<th>RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEGEND</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO RISK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW RISK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH RISK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERY HIGH RISK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FIRST ANALYSIS

A comparison between the synthetic chart of fire risk obtained, and that of the fires already recorded in the studied forest provides an element of appreciation of the limits of the IR index from which the pieces were ignited in the past.

SECOND ANALYSIS

By superimposing the same chart with that of the forest infrastructures, one could highlight the inadequacy of the defence equipment distribution of the Forests against Fires in the most significant sectors.

THE FIRE RISK INDEX MODEL

FIRE RISK INDEX CHART

BASE CHARTS

DERIVED LAYERS

SYNTHESIS CHART

MODELING

FIRST ANALYSIS

A comparison between the synthetic chart of fire risk obtained, and that of the fires already recorded in the studied forest provides an element of appreciation of the limits of the IR index from which the pieces were ignited in the past.

SECOND ANALYSIS

By superimposing the same chart with that of the forest infrastructures, one could highlight the inadequacy of the defence equipment distribution of the Forests against Fires in the most significant sectors.
To provide a cartography which constitutes an essential precondition to a policy reasoned as regards urbanization in forest.

To help with better specifying the priorities of establishment or maintenance of the infrastructures, and thus a better definition of the maintenance and investment plans.

This study, has as main objectives:

**IMPACTS**

**SATELLITES FOR THE ENVIRONMENT**

- **Alsat-1**
  - **Earth observation Microsatellite**
  - **Physical Dimensions**: 60 x 60 x 60 cm
  - **Mass**: 90 kg
- **Mission**
  - **Design life**: 5 years (nominal)
  - **Launch**: November 28, 2002
  - **Orbit**: Circular (heliosynchrone)
  - **Altitude**: 686 km (nominal)
  - **Inclination**: 98.23°
- **Earth Imaging System**
  - **Imaging mode**: Push-broom
  - **Multispectral imager**: 2 banks overlapping @ 5%
  - **Spectral bands**: NIR, Red, Green
  - **Swath width**: 600 km
  - **Number of Pixel**: 10200
  - **Resolution**: 32 m
  - **Max Image size**: 600x560 km
- **Imagery Storage Memory**
  - **SSD**: 2 x 512 MB SDRAM
  - **SA1100 (redundancy)**: 128 MB SDRAM
- **Transmitter**
  - **Downlink**: 2 x High rate transmitters operating in S band @ 8 Mbit/s

**REMOTE SENSING AND FOREST FIRES**

**CONTRIBUTION OF ALSAT1**

Evaluation by Alsat-1 of the damage caused by the typhoon which stroke the area of Manila (THE PHILIPPINES) November 30, 2004.

- Flood caused by the typhoon which stroke the area of Manila (THE PHILIPPINES) November 30, 2004.
- Evaluation by Alsat-1 of the damage caused by the tsunami of December 26, 2004.

The Alsat-1 images can also bring light on the evaluation and the analysis after a fire: the cartography of the zones burned as well as very precise statistics on the most affected times.

**PERSPECTIVE**

The capacity of the GIS to integrate multi-sources data and particularly remote sensing images that conceal a very important informative potential must be explored in the next phase of this work.

- to simulate the fire propagation taking into account the vegetation nature, the direction and wind force, the importance and the slope orientation, etc.
- to show that it is possible from aerial resources satellite data to estimate the inflammability index of the land cover and thus to build up a cartography depending on the inflammability risk.

**CONCLUSION**

GIS and remote sensing resources found already in Algeria their applications in the field of management and environmental protection.

Let us recall in this context which financial means are more easily available to cure the damage than for their prevention.

Also, it is not enough to concede efforts and time against forest fires, it is especially necessary to try to cure the evil with the source. For this, the impacts of the public awareness campaigns must be to be neglected.

The Alsat-1 imagery can also bring light on the evaluation and the analysis after a fire: the cartography of the zones burned as well as very precise statistics on the most affected times.
Finally, if there are men for whom

"the tree does not hide the forest",

it is well those which are in charge of the management
and the protection of this natural resources, in order to
benefit from them better while preserving its longevity.