

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



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THE RISK OF FOREST FIRES

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 ALSATI, are effective management tools and in constant evolution.



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INTRODUCTION



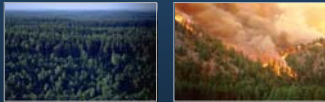
In Algeria, for a total surface of 2.4 millions square km, in best case the forest does not cover more than 1.790.000 hectares, which represents less than 1%.

THE PART OF FIRE

Algeria pays a heavy tribute 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 main reasons of the regression of the plant cover can be identified as follows :

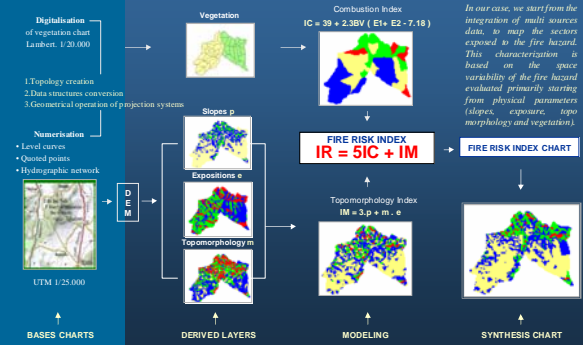
- the demographic growth,
- the abusive exploitation of forests for a strategic and economic objective,
- the intensive grazing and fires.



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FIRE RISK INDEX MODEL



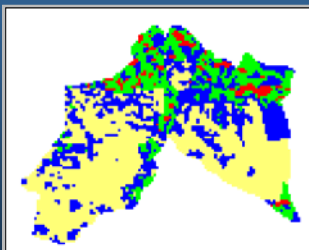
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FIRST ANALYSIS

□ 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 limit of the IR index from which the pieces were ignited in the past.

INDEX CHART OF FIRE RISK



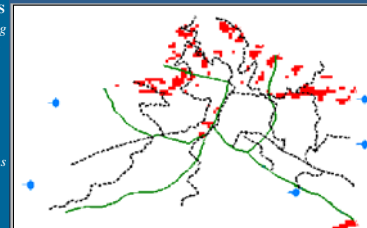
- LEGEND**
- NO RISK
 - WEAK RISK
 - HIGH RISK
 - VERY HIGH RISK

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GIS AND FOREST FIRES

SENSITIVES ZONES – FIRE FIGHTING EQUIPMENT DISTRIBUTION CHART

SECOND ANALYSIS
□ By superimposing this 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.



- LEGEND**
- WATER POINT
 - PATHWAY
 - PARA FIRE
 - VERY HIGH RISK

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IMPACTS


This study, has as main objectives :

- 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.

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SATELLITES FOR THE ENVIRONMENT

The Algerian satellite Alsat-1 is a member of a constellation of micro satellites of 7 countries (Algeria, China, Nigeria, United Kingdom, Thailand, Turkey, Vietnam). It is within an international programme of earth observation for disasters mitigation and management (DMC - Disaster Monitoring Constellation).



ALSAT-1 Earth observation Microsatellite

Physical
Dimensions 60 x 60 x 60 cm
Mass 90kg

Mission
Design life 5 years (nominal)
Launch 28 November 2002 @ 6h50
Orbit Circular (heliosynchronous)
Altitude 686km nominal
Inclination 98.23°

Earth Imaging System
Imaging mode Push-broom
Multispectral imager 2 banks overlapping @ 5%
Spectral band NIR, Red, Green
Swath width 600km
Number of Pixel 10200
Resolution 32m
Max Image size 600x560km

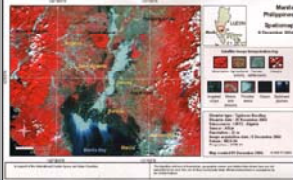
Imaging Store Memory
SSDR 2 x 512 MB SDRAM
SAI 100 (redundancy) 128 MB SDRAM

Transmitter
Downlink 2 x High rate transmitters operating in S band @ 68Mba/s

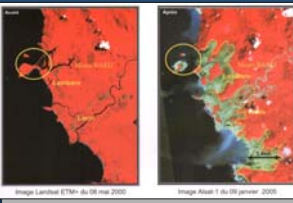
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CONTRIBUTION OF ALSATI

Contribution of ALSATI in the DMC.
Floods caused by the typhoon which stroke the area of manilla (THE PHILIPPINES) November 30, 2004.



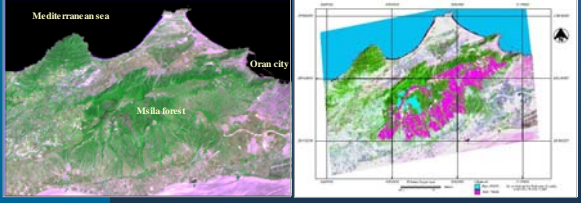
Evaluation by Alsat 1 of the damage caused by the tsunami of December 26, 2004, INDONESIA



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REMOTE SENSING AND FOREST FIRES

Very great repetitivity of satellite passes on the same zone, and the capacities of programming of the satellite ensure of the homogeneous imaging on very large territories. The information thus extracted from the satellite images will enrich the data bases considerably feeding the GIS, by reducing the long ones and expensive campaigns ground surveys. To ensure a good prevention policy of forest fires, the follow-up in the time of the evolutions of the land occupation makes it possible to include/understand and manage the environmental modifications.



The Alsat1 images can also bring lightings 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 zones.

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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 terrestrial resources satellite data to estimate the inflammability index of the land cover and thus to build up a cartography depending on the inflammability risk.

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CONCLUSION

GIS and remote sensing moreover find 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 are not to be neglected.

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