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REMOTE SENSING AND THEMATIC MAPPING OF REEFS
ITS USE FOR IDENTIFYING THE BIOTOPE SUITABLE FOR TROCHUS

by

W. Bour
Research Scientist, ORSTOM
Specialist in Remote Sensing at the
ORSTOM Centre Noumea

Summary

In order to test the possibility of using LANDSAT images for Thematic mapping of the New Caledonia lagoon, numerical data obtained from images of two reef areas have been computer-processed with a view to identifying the various biotopes. By means of on-site surveys it has been possible to ascertain which biotope is suitable for trochus, which will facilitate, at a later stage assessment of the exploitable stock.

The future French satellite "SPOT" will make this type of study even more precise, because of improved resolution. The TEMPO-Pacific project, to be implemented by France in the near future, involves the establishment of a satellite image processing unit in Noumea, which should make it possible to develop rapidly thematic maps of the area's reef formations.

1. The processing of numerical images, taken by LANDSAT satellites, in polar orbit, has been successfully used for several years in studies of the land. Since the establishment of the Exclusive Economic Zones (EEZ), this type of remote sensing has become of prime importance for coastal development but also for obtaining better knowledge of marine areas that are remote and difficult to reach. For instance, Australia is now using analysis of satellite data to study the Great Barrier Reef.
2. Similarly, the ORSTOM Centre at Noumea is planning to do thematic mapping of the New Caledonia lagoon. Computer processing of the numerical data from the image involves grouping together pixels (or elementary points) which have similar radiance on two or more channels of the LANDSAT scanner. A given colour is then allocated to each group of homologous pixels and thus it is possible to build up a picture of the area being studied by patches of colour. When these patches are the same colour, even if separated by some distance, they represent in theory the same theme, that is to say environments with very similar flora and fauna. If an environment is favourable to a given marine species, it is referred to as the biotope for that species.
3. As an experiment, the LANDSAT data concerning the coral flats and reefs in the area of Pouébo and Balabio Island (north-east coast of New Caledonia) were processed at ORSTOM/Paris, in order to identify the biotope suitable for trochus (a mollusc collected for its pearl shell). This biotope consists of coral reef flats formed of hollow slabs and broken coral.
4. Checking of the thematic images was carried out on site; and this showed that biotope suitable for trochus was indeed correctly identified in the reef areas off Pouébo. As regards the Balabio Island reef flat, by analysis of the image it was possible to distinguish several different bottom types: thick sea-grass beds, beds with scattered seaweed and white sand beds colonised by Protoreaster nodosus.
5. Subsequently, extrapolation of this technique to images covering wider sections of the lagoon should make it possible to assess the area of each biotope and, after calculating the density on site, to assess the resources that each area contains.
6. The LANDSAT pixel represents on the ground a square of about 80 m by 80 m; the area of any given theme must therefore be sufficient for it to be identified and separated from extraneous pixels. The capacity of the equipment carried by the satellite to effect this separation is thus of prime importance for the accuracy of the thematic maps obtained. The future French satellite SPOT, whose pixel will represent multi-spectral coverage for an area about 20 m by 20 m, will thus provide a particularly appropriate solution to this type of problem. The results of simulation trials using SPOT equipment, carried out in December 1983, are currently being processed.

7. The use of remote sensing for mapping purposes does not in any way eliminate the need for verification on site, quite the contrary. It is even advisable to try to establish a two-way exchange between the data-processing and the "on-site verification". The French TEMPO-Pacific project should make it possible, by means of its satellite data processing unit to be based in Noumea, to make rapid headway with studies relating to the understanding, conservation and sound management of the reef and lagoon environment, which is so important for the economic aspirations of many South Pacific island countries.
