



DETECTION OF ILLEGAL IRRIGATION

Legal framework

Regarding to Article 1.2 of the Water Law, *“Surface freshwater, as well as renewable groundwater, all of them integrated in the hydrological cycle, constitute a unit resource subordinated to the general interest, that is part of the State public domain as public water domain”*.

“The right to private use, consumptive or not, of public water domain is acquired by legal provision or by administrative authorization” (Art. 25.1 Water Law).

“In exceptional drought circumstances, of severe aquifer overexploitation, or in similar state of necessity, emergency or coincidence of anomalous or exceptional situations, the Government, by means of Decree of the Council of Ministers, after hearing the Basin Authority, may take, to overcome those situations, the necessary measures in relation to the use of public water domain, even when it was subject to authorization” (Art. 58 Water Law).

The special characteristics of satellite images make them a unique tool to detect, in real time, irrigated exploitations without administrative authorization.

Especially efficient is the integration of satellite images with the plots included in the Register and Catalogue of Private Waters of a basin.

The second greatest pressure over the ecologic state of the EU (in 16 member States) derives from the excessive extraction of water (*Water Blueprint*, 2012).

Practical case: Illegal irrigation in overexploited aquifers

Due to the severe situation reached in the aquifers of the La Mancha Plain at the end of the 80s, in June 1989, after resolution of the Hydraulic Works General Directorate, the Campo de Montiel aquifer was declared overexploited.

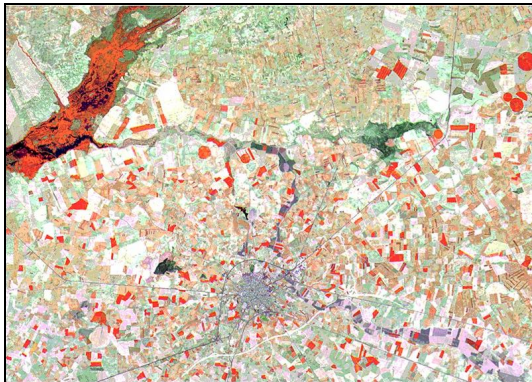
Moreover, the Government Board of the Guadiana Basin Authority, in December 1994, declared the La Mancha Occidental aquifer as overexploited, and its area was extended after agreement in August 2008.

This declaration of overexploitation, involves the establishment of an exploitation regulation and its consequent monitoring.

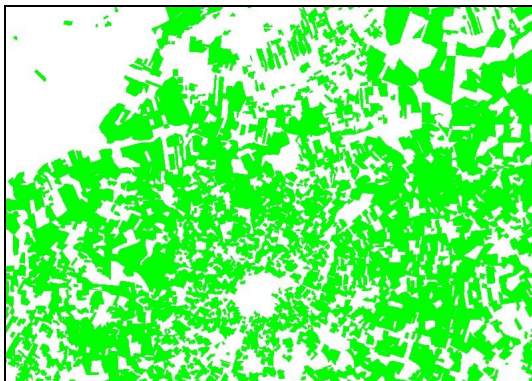
In this context, satellite images are useful to carry out the control of the exploitation regulation, as well as to detect the exploitations without administrative authorization, allowing the Guard Service to visit the exploitations, when crops are still in growth.

In the work carried out in the Upper Guadiana Basin, during July and August 2002, a total of 775 plots were visited, within the overexploitation perimeters, covering more than 10.500 Km².

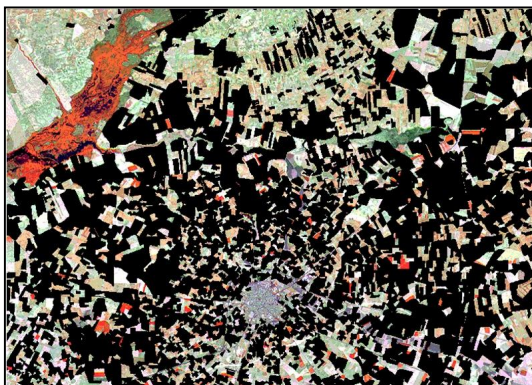
The exploitations detected without administrative authorization extracted around 11 Hm³, what meant 14,5% of the total amount of water extractions for the irrigation of herbaceous crops in the area. In economic terms, this 11 Hm³ extracted mean around 3 Million Euros evaded.



Infrared colour image of the surroundings of the Tablas de Daimiel with irrigated crops in red.



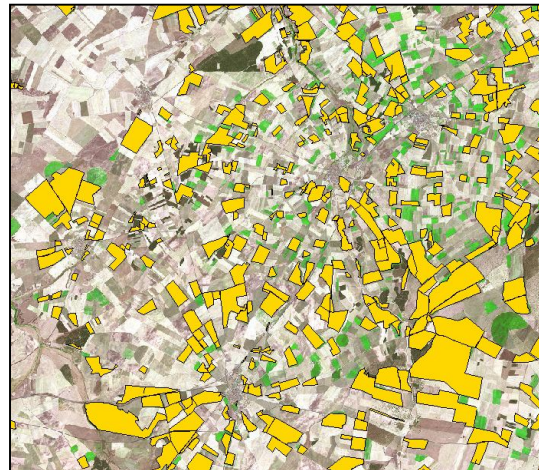
Plots with administrative authorization (Alberca) in the surroundings of the Tablas de Daimiel.



Integration of satellite image and Alberca plots. In red, plots extracting water without administrative authorization.

Practical case: Rights registered in the Duero

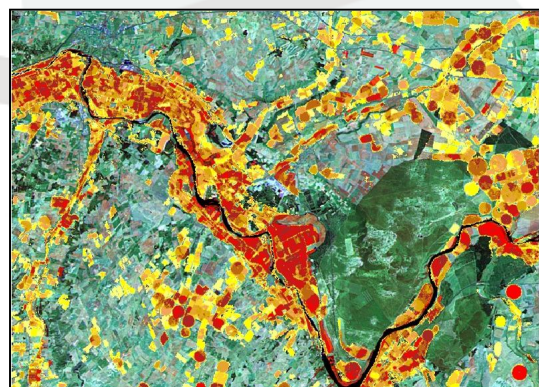
The Alberca Program in the Duero Spanish basin has shown, comparing the surfaces with documented rights and those appearing irrigated in recent satellite images, the existence of exploitations watering without the corresponding authorization.



Surface included in Alberca (in yellow) over a SPOT image (year 2005). In green, surface irrigated without administrative authorization.

This problem is especially important in the case of exploitations irrigated with groundwater that spread in the central area of the Duero basin. These exploitations were legalized until 1986 outside the frame of the Basin Authority. Today, it seems clear that, at least in the Duero, the complete fitting with the new administrative situation has not yet taken place.

The Remote Sensing analysis over last 10 years has allowed defining the irrigated surface existing in the Underground Water Masses (MAS) and the frequency of irrigation at the plot scale.



Irrigated surface (1998-2008) in the central area of Duero basin. In yellow, areas irrigated only one of the last 10 years. In red, those irrigated the 10 years.

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