

20. Improved land and sea monitoring

The ubiquitous surveillance capability of satellites is currently applied to monitor food production, international borders and transportation hubs by many countries. These monitoring systems, based on imagery and real-time tracking, combined with other surveillance mechanisms, contribute to detecting and tracking the cascading effects of illegal practices or accidents (e.g. tracking illegal fishing operations; spread of piracy; sea pollution and accidents impacting populated coastal areas (fisheries, tourism and ecosystems). In terms of cost efficiencies, the value of monitoring sea routes has been studied over the years and the benefits from satellite observations and navigation are deemed important. They include improved ship detection over large geographic zones, allowed by the integration of satellite imagery with other tools (e.g., aerial patrols) has brought out efficiencies in commercial shipping thanks to faster transit times (Canada, Norway), as well as a useful deterrent factor for illegal fishing (France) (Table 22.1).

This improved monitoring also applies to land planning and agriculture. In many countries there is a growing need for governments and farmers to better map their arable land. In India, the Ministry of Rural Development is leading the National Land Records Modernization Programme, which aims at awarding conclusive titles to owners for all land holdings in the country. Already relying on data from the dozen or so Indian remote sensing satellites providing high resolution data, the objective is to improve land-use planning nationally cost-efficiently, by focussing on priority areas for ground surveys using GPS receivers for ground-truthing. Launched in 2008, the modernisation and updates of land records is ongoing with the Haryana Space Applications Centre (HARSAC) (2014). In Europe, the Common Agriculture Policy provides direct aid to eight million farmers, with amounts distributed per declared square meter

of land. To improve cost-efficiencies, European Commission inspectors are using commercial precision farming products, GPS and remote sensing data, to check whether the area declared by farmers is eligible (see Figure 21.1). In 2010, the programme allowed the control of 410 000 European farmers for their area-aid applications, representing approximately 70% of the required controls for the entire European Union. Overall in the framework of the Common Agricultural Policy, around 1 000 satellite images are acquired per year, with more than 80% of these in high resolution (e.g. SPOT, IRS, Rapid Eye, etc.) the rest composed mainly of very-high resolution data (e.g. Worldview, GeoEye, Ikonos, Quickbird, etc.) (Joint Research Centre, 2012).

Methodological notes

See previous methodological notes.

Sources

Haryana Space Applications Centre (HARSAC) (2014), National Land Records Modernization Programme (NLRMP) Project, www.harsac.org.

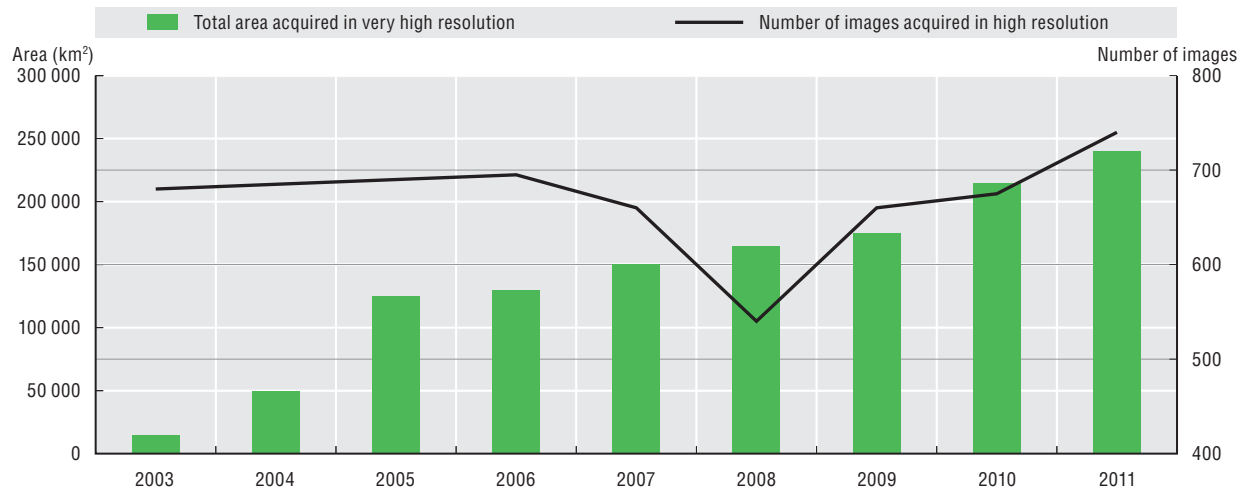
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20.1. Value of monitoring sea routes with satellites

Norway	<i>From quasi-blindness to full surveillance operational capacity:</i> Norway launched in 2010 a small satellite AISSa for a few million Kroner to monitor shipping in its territorial waters, tracking vessels over 300 gross tonnes by picking up the signals from their AIS (Automatic Identification System) transponders. The data have become essential tools for the Norwegian Coastal Administration and other governmental institutions (monitoring fisheries, oil spills, and maritime traffic), with the particular case of Svalbard where authorities suddenly were able to move from no coverage to a global coverage of all islands.
France	<i>From limited surveillance to deterrence:</i> France has set up a ground receiving station on the Kerguelen (South Indian Ocean) to monitor its Exclusive Economic Zone since early 2004. All Envisat and Radarsat-1 satellite overpasses over the area were acquired, processed, correlated with the French fishing Vessel Monitoring System (i.e. authorised fishing ships in the area are required to carry a detector onboard), and followed up by ship patrol, to protect the local stocks from illegal fishing. Since then, it has been estimated that the surveillance system has cut the number of illegal fishing incursions in the vicinity of Kerguelen Island by nine-tenths and no illegal incursion was detected since 2007.
Canada	<i>From surveillance to commercial cost-savings:</i> The Canadian Ice Services (CIS) using RADARSAT-1 data: as a result of observations over a wider geographical area in much less time than with an aircraft, CIS has been able to improve its operational efficiency over five years (1995 to 2000), the net average annual savings to CIS operations have been about CAN 7.7 million per year (CAN 38.5 million over the period). The Canadian Coast Guard (CCG), the largest direct customer of CIS products, has felt these benefits most significantly, as it can provide improved routing information to commercial shipping, which allows for faster transit times. Savings in transit time through ice-infested waters are estimated to be CAN 18 million a year. Other benefits included less damage to ships and a reduction in the need for CCG escorts. The CCG has estimated dollar savings in both operating costs and transit time for those escorts to be between CAN 3.6 million and CAN 7 million a year, depending on the severity of ice conditions.

20.2. Evolution of the European Control with Remote Sensing programme through the years



Source: Adapted Joint Research Centre (2012).



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