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Tech vs Environmental Crimes

by Lorenzo Colantoni

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Environmental crimes are on the rise, damaging communities, ecosystems and entire nations as never before. Yet, we may finally have the technological tools to address them – instruments which however require substantial political and social support to be effective.

Consolidated offences like illegal logging or poaching are increasing and witnessing the growing involvement of organised criminal groups. Others, less common, are spreading, also pushed by the rising demand for natural resources: illegal mining of critical minerals, fishery crime or forest fires driven by agricultural production. Interpol, UN agencies such as the UN Environmental Programme (UNEP)[1] and the UN Office on Drugs and Crime (UNODC),[2] police forces from Europe and the rest of the world, as well as the vast majority of NGOs[3] all believe that

[1] Christian Nellemann et al., *The Rise of Environmental Crime. A Growing Threat to Natural Resources Peace, Development and Security. A UNEP-INTERPOL Rapid Response Assessment*, 2016, https://wedocs.unep.org/20.500.11822/7662.

[2] UNODC, *UNODC Approach to Crimes that Affect the Environment*, 2021, https://www.unodc.org/documents/Maritime_crime/UNODC_Approach_to_Crimes_that_Affect_the_Environment.pdf.

[3] Lorenzo Colantoni, Giulia Sofia Sarno and Margherita Bianchi, *Fighting Environmental Crime in Europe. An Assessment of Trends, Players and Action*, Rome, IAI and AMBITUS, May 2022, https://www.iai.it/en/node/15483.

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we are facing an unprecedented wave of environmental crimes.

And yet, we are witnessing crucial policy developments, such as the inclusion of environmental crimes in the top priorities in the next five-year cycle of the European Multidisciplinary Platform Against Criminal Threats (EMPACT),[4] or the growing action in countries like Brazil or Vietnam against environmental offences. There is mounting awareness at the local and international levels, particularly on the economic and health impact of such crimes. Above all, there is an unprecedented development of new technologies that is allowing enforcement agencies, NGOs and other players to dramatically expand their action: a mix of new satellites, software, drones, sensors and other tech that could prove crucial in combating environmental crimes.

The rise of new technologies

The new technologies involved are wide-ranged and often vary depending on the specific sector of application; satellite imagery analysis is one of the most effective tools available, but has limited use in cases of wildlife trafficking, for instance. Sensors can detect suspicious noises or illegal access in protected areas and warn authorities, but in remote locations alerts cannot be provided in real time.

Generally speaking, the key technologies employed are satellite imagery (including both optical photos and multispectral, that is, those that see light spectra outside human vision), drones (from commercial, small-sized ones to advanced models), interconnected sensors (a network of audio, video or other sensors, usually linked to an internet connection and artificial intelligence, AI), as well as a varied range of apps (from those tracing agricultural commodities, to those linking police officers to central, specialised environmental units).

New developments concerning these technologies are twofold. On the one hand, in the past ten years, we have witnessed an astounding new availability of hardware: the entry into operation of the Sentinel satellites in 2016 significantly expanded the availability of free satellite imagery, for instance, while drones have a reach, an image definition and an ease of use hard even to imagine a decade ago. At the same time, the software has developed as well: platforms like Skylight combine transponder data from trawlers with a specific kind of satellite images (synthetic-aperture radar, SAR) through AI to detect vessels performing illegal fishing almost in real-time. Other platforms, like Forest Watch, Google Earth Engine and GIS software, have also significantly expanded the capabilities of those working on action against environmental crimes.

These technologies provide two kinds of benefits: first, they significantly decrease the costs of monitoring or enforcement activities compared to traditional methods. Patrolling mountainous areas in Sumatra is for instance much easier and quicker when

[4] Europol website: *EU Policy Cycle – EMPACT*, https://www.europol.europa.eu/crime-areas-and-statistics/empact.

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rangers are supported by consumer-level and relatively cheap drones, such as those sold by companies such as DJI and Parrot.[5] Technologies can also achieve tasks that would have been impossible in the past: multispectral satellite images can now identify illegal water abstraction from farms and mines using the evaporation rate of water, with great accuracy.[6] Other technologies, such as the digital tracing of commodities, are the backbone of new policies; the EU Deforestation-Free Regulation (EUDR), which demands tracing seven key commodities entering Europe, would have likely been impossible without the satellite imagery provided by, among the others, the Copernicus programme.[7]

The need for political and social support

New technologies however do not exist in a vacuum. Despite their significant contribution, actual and potential, they will need to overcome a number of obstacles to be fully effective. While some of such obstacles are technical (satellite images with better resolution, longer-range drones will clearly be more efficient, for instance), it is the political, legislative and judicial, and social aspects that are the most critical.

Lack of political support, or direct political opposition to the application of technologies can undermine their development. Indonesia has a history of denying satellite evidence (particularly in relation to illegal forest fires to expand palm oil production),[8] while the Bolsonaro administration frequently opposed the findings of the Brazilian space agency regarding deforestation in the Amazon,[9] which delayed the expansion of particularly effective tools, such as the anti-deforestation Brazilian system DETER. Instead, countries that received significant political support for the new technologies witnessed their rapid expansion, greater efficiency of action, and a relevant decrease in costs. This is for instance the case of Costa Rica, whose Centro Nacional de Información Geoambiental (CENIGA)[10] is now the backbone of all environmental proceedings in the country.

In some cases, opposition stems from the relevance of economic interests involved in environmental crimes: commodities like avocados, lithium and nickel have a strong interaction with environmental offences, but are crucial resources for producing and exporting countries. In several instances, corruption and conflict of interests among high-level politicians prevent the development of efficient

[5] Lorenzo Colantoni and Alessio Sangiorgio, *Agriculture and Deforestation. How to Reduce the Impact of the EU's Agricultural Imports on Global Forests*, Rome, IAI, April 2024, p. 34, https://www.iai.it/en/node/18381.

[6] Aldo Madariaga, Antoine Maillet and Joaquín Rozas, "Multilevel Business Power in Environmental Politics: The Avocado Boom and Water Scarcity in Chile", in *Environmental Politics*, Vol. 30, No. 7 (2021), p. 1174-1195, DOI 10.1080/09644016.2021.1892981.

[7] Lorenzo Colantoni and Alessio Sangiorgio, *Agriculture and Deforestation*, cit., p. 31-35.

[8] Dyna Rochmyaningsih, "Wildfire Researcher Deported amid Growing Rift between Indonesian Government and Scientists", in *Science*, 12 February 2020, https://doi.org/10.1126/science.abb2763.

[9] "Amazon Deforestation: Brazil's Bolsonaro Dismisses Data as 'Lies'", in *BBC News*, 20 July 2019, https://www.bbc.com/news/world-latin-america-49052360.

[10] See CENIGA website: https://ceniga.go.cr.

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tools for crime detection (as in the case of palm oil).[11] Furthermore, when the technology is produced abroad, it may be perceived as a "foreign influence" and looked upon with suspicion; this is frequently the case with satellite images, which have been accused by national politicians of being manipulated by the foreign institutions or companies producing them, which can contribute to judges rejecting their employment as evidence in court.

Another issue relates to insufficient legislative and judicial frameworks. In several cases, laws and regulations, as well as judicial practice, evolve at a much slower speed than technologies. As a consequence, the use of the latter is impeded by strict rules that do not consider new features: for example, most laws for commercial drones in Europe do not allow for flights that are not in the line of sight with the operator, despite the fact that most models now have accurate 360-degree sensors and a range of up to 10-12 kilometres. AIs are barred from being used as evidence in most courts in Europe and beyond, despite their vast employment against deforestation or illegal fishing, and judges are also generally wary about using satellite images in environmental cases.[12]

The social factor is also key. While remote sensing technologies offer tools for monitoring the environment directly from central offices, cooperation with local communities and officers is still essential – and often disregarded. Data acquired from drones or satellites require further proof taken from the ground, which in turn necessitates collaboration from local communities and officials who should be trained and, above all, not corrupted. Tracing mechanisms for agricultural commodities can be tricked by farmers, if they perceive that this goes against their interests or that they are treated unfairly. In some cases, remote sensing (especially drones and satellites) is perceived as a form of privacy violation or surveillance, and thus resisted against.

Above all, technologies support enforcement, but do not provide a definite solution to the root causes of crime (international demand for illegal goods, lack of land tenure for indigenous communities, corruption, lack of economic alternatives etc.). Their deployment must thus be complemented by ad-hoc measures to address such problems.

How to empower technologies

A few adjustments in the approach towards new technologies by players working on action against environmental crimes could significantly empower their deployment. First, it is crucial to abandon the idea of "technofix", that is, that technology alone can solve a problem. In almost all cases, such tools play a role (often a significant one) within a process that however requires a set of other measures to be ultimately

[11] Hans Nicholas Jong, "Palm Oil Giants Face Corruption Charges as Indonesia Probe Widens", in *Mongabay*, 20 June 2023, https://news.mongabay.com/?p=270016.

[12] Lorenzo Colantoni, Giulia Sofia Sarno and Margherita Bianchi, *Fighting Environmental Crime in Europe*, cit.

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successful.[13] Anti-deforestation, almost real-time satellite monitoring is effective, for instance, but requires specialised, quick-to-deploy police units, a solid civil society and economic alternatives for local communities to be fruitful.

In this sense, it will be equally important to avoid the still widespread silos mentality, that is, the idea that technological, social and political developments are on separate tracks. Only a comprehensive and coherent approach, where the interactions among the three dimensions are considered, can be effective: regulations on the trade of agricultural commodities (such as the EUDR) require an understanding not only of new tracing systems, but also of how these interact with price fluctuations of such goods, the changing living conditions of farmers and the political situation of key producing countries.

Finally, it is critical to approach these technologies in a non-ideological way, avoiding the cultural barriers they often face. In several cases, tools such as satellite imagery or drones are perceived as either too expensive or too complicated to use; however, in most cases, free alternatives, new software and consumer-grade tools have already overcome most of these obstacles. It is key that even local units or administrations, small community-based NGOs and other players can access them, not only to increase their reach and mainstream their use, but also to prevent political and social opposition.

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[13] We discussed specifically the case of India in another Commentary by Alessio Sangiorgio: "Earth Observation and Law Enforcement: Satellite Monitoring Against Crop Burning in Northwestern India", in *IAI Commentaries*, No. 25|14 (March 2025), https://www.iai.it/en/node/19740.

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