



Technologiezentrum

INNOVATION INSIGHT

CRIME SCENE EARTH
ORGANISED ENVIRONMENTAL CRIME:
TIME TO ACT



Dear Reader,

Those who associate “environmental crime” with mere fly-tipping in a forest are gravely misjudging the true extent of the problem. The trade in endangered animal and plant species, the illegal extraction of raw materials, illegal fishing and the uncontrolled disposal of toxic or electronic waste have become a lucrative international business from which criminal networks profit. Surprisingly, this development and the serious global consequences associated with it are barely touched upon in politics and research.

We have held many discussions with experts from international organisations such as UNEP, EUROPOL and INTERPOL. They all come to the same conclusion: the extent of and damage caused by environmental crime is increasing worldwide. Organised environmental crime is threatening our planet and its resources, undermining the rule of law and jeopardising international security.

In Innovation Insight, we highlight the current need for action and possible solutions, whilst taking the effects of the corona pandemic into account. These solutions include new technological developments as well as concrete social approaches which, in future, can act as “game changers” and significantly contribute to combating all forms of organised environmental crime more effectively.

Germany has a dual responsibility here. As a financially strong economic partner with many international ties, we are an attractive market and buyer of illegally procured goods, and therefore part of the problem. At the same time, we can tackle the root of this problem in collaboration with others, thanks to well-connected and trained law enforcement agencies, the increased use of new technologies to enforce transparent supply and value chains, and our commitment to multilateral cooperation. By doing so, we are also making an important contribution to the implementation of the sustainable development goals.

Thank you very much for your interest,



Sascha Hermann

Managing Director of
VDI Technologiezentrum GmbH

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Executive summary

From the perspective of criminal networks, organised environmental crime is an ideal line of business to be in: the profit margins for timber, wildlife, waste, fishery products or raw materials from illegal sources are high, while detection rates and penalties are comparatively low. Poverty and lack of prospects in the countries of origin mean that actors at the lower end of a criminal “value chain” can be replaced quickly. Moreover, organised environmental crime often co-occurs with other crimes such as corruption and money laundering. It is therefore hardly surprising that, according to a study published in 2020, environmental crime lies third in the organised crime rankings – directly behind counterfeiting and drug trafficking (INTERPOL et al., 2020). Its economic, ecological and social effects are considerable.



Image 1: Manifestations of organised environmental crime.

- The **illegal waste market** has profit margins of US\$10-12 billion per year. ① Less than 20% of global e-waste is officially recycled. Some e-waste is illegally transported from developed to developing countries, where treatment and disposal costs are much lower. Once there, the waste usually ends up in landfills or is recycled under poor working conditions. ② German plastic waste is exported to Malaysia, among other places, and is not properly processed there. ③ The costs for a professional disposal of hazardous waste are saved and relevant permits are not obtained.
- Globally, up to 90% of greenhouse gas emissions in the forestry sector are caused by illegal activities. The potential effects on climate change are incalculable. **Illegal logging** can result in countries which require every cent of state income in order to fight poverty losing US\$10-15 billion per year. ④ Annual losses resulting from the **illegal trade in timber** range from US\$51-152 billion, depending on estimates. ⑤ In Paraguay, African countries and the Ukraine, protected forest areas are often cleared for charcoal. Forest destruction often deprives local populations of their livelihood and threatens the existence of flora and fauna.
- **Illegal mining** results in annual losses of US\$12-48 billion. Aid organisations such as UNICEF suspect that almost 40,000 minors work in cobalt mines in the Democratic Republic of the Congo. In addition, the extraction of raw materials is linked to extensive environmental destruction: ⑥ Mercury is often used in gold mining; soils, air and water are contaminated by chemicals. ⑦ Illegal sand mining is expanding worldwide and destroying unique ecosystems, for example at Lake Victoria in Uganda.
- The annual turnover from **illegally traded wildlife** is estimated at up to US\$23 billion per year, plus further billions in tax losses. Local populations also face increased security risks due to the militarisation of nature conservation. ⑧ The international eel mafia earns more than EUR400 million annually from the prohibited export of glass eels from the EU.
- ⑨ **Illegal, undocumented and unregulated (IUU) fishing** is estimated to account for around 20% to 30% of global fish stocks. The damage caused by IUU fishing is valued at US\$23 billion per year. It is also responsible for serious human rights violations through slavery-like employment on board fishing vessels.
- ⑩ Over 60% of illegal and organised financial sources are linked to transnational environmental crime.

Global sustainable development goals are threatened by organised crime

By adopting the **2030 Agenda for sustainable development**, the member states of the United Nations established a basis for the equal consideration of all three dimensions of sustainability: social, environmental and economic. At the core of the Agenda is a list of 17 global sustainable development goals (SDGs).

As early as 2015, a study by the Global Initiative against Transnational Organized Crime found that organised crime negatively impacts all 17 sustainable development goals (Global Initiative against Transnational Organized Crime, 2015). If organised crime is not systematically recognized and addressed, sustainable development in society and the economy across the world could be delayed or even prevented. For example, each branch or aspect of organised environmental crime is an additional accelerating factor for climate change, the loss of biodiversity and global environmental damage, and thus has a direct impact on the achievement of the sustainable development goals.

Digitalisation and new NGOs are changing the game

The global consequences of organised environmental crime have been known for some time. However, there are promising new developments which could prove to be “game changers” and create a shift towards a more effective global fight against environmental crime.

New technologies offer a wide range of possibilities for pursuing criminal networks in a targeted manner, securing scientifically-sound evidence in a way that is admissible in court, and creating transparency in complex value chains:

- Thanks to advances in determining **chemical or genetic fingerprints** of wood types, it is now possible to determine where a tree grew – in some cases even down to a specific area of forest. Some of these innovative tools are already being used to bring criminals to justice.
- **Satellites and drones** are important, available and increasingly cheap technological solutions which, for example, simplify the tracking of fishing fleets and greatly increase the efficiency of criminal prosecution.
- **Block chain technology** enables companies and authorities – amongst others – to trace whether metal ores have been mined responsibly and where they have been traded and processed. Digitally encrypted blockchain certificates, which cannot be manipulated, allow quality

labels and certificates of human rights, anticorruption and environmental protection associations to be stored safely, along with the data of mines, intermediate distributors, smelters and forwarding agents.

Data generated in this way and additional digital information, which is often freely available on the internet, increasingly enable **civil society actors** to become active in this field: numerous non-governmental organisations are now using innovative scientific and forensic methods to prosecute criminal networks by securing evidence which can stand up in court. These actors – e.g. the Center for Climate Crime Analysis founded in 2018 – make use of publicly available data and new technologies and combine them with the expertise of police investigators. This often enables them to take more direct action against individual companies, states, or organisations by making their findings available to a broad public and thus supporting the work of law enforcement agencies across borders.

Why the topic is relevant for Germany

The central activities and networks of organised environmental crime are often found in developing and emerging countries. However, the topic is highly relevant for both Germany and Europe for several reasons.

Lucrative markets, middlemen and clients for illegally acquired goods are found in Europe and Germany. German and European consumers and manufacturers are directly or indirectly affected by organised environmental crime via **complex value chains which usually lack transparency**. Often, companies cannot be absolutely certain that they are not causing serious environmental problems or economic damage somewhere along their value chain through suppliers who, although they can produce apparently valid papers, nevertheless trade in goods and commodities originating from illegal sources. The lack of transparency leads to increased reputational risks for companies. Certificates and labels often offer only perceived, but not actual, security. **Critical consumers are therefore increasingly demanding greater transparency in this area as well** – and new technologies will in future be increasingly able to offer this required transparency in supply and value chains. Wholesalers, retailers and manufacturing companies in Europe and Germany should take the opportunity to help develop and test these instruments at an early stage in order to reduce the entrepreneurial risk as part of risk management.

Opportunities are also opening up for **German and European technology providers**. German companies are in a good position to offer solutions for better prosecution and preservation of evidence of environmental crime and the creation of transparency in production and supply chains, thanks to a high level

of research and development, e.g. in the fields of **remote sensing, optical technologies, life cycle assessments and environmental analyses, as well as security technologies**. However, cooperation with international actors should be sought more strongly than in the past, as our analysis has shown that innovative and effective instruments for combatting environmental crime are often developed and already being used in the develop-

ing and emerging countries affected.

Germany has committed itself to implementing the sustainable development goals. Reaching these goals is more closely linked to the fight against organised transnational crime than previously thought. A national and European environmental, economic, development and foreign policy that aims to implement the SDGs effectively can therefore not ignore the consequences of organised environmental crime, which are now visible at a global scale.

Corona intensifies environmental crime

The medium and long-term consequences of the corona pandemic are only gradually becoming apparent in many areas and are currently difficult to assess. This also applies to environmental crime. However, according to an initial assessment by experts in the various fields linked to environmental crime, the following patterns can currently be identified:

In general, difficult conditions for public life also lead to **more difficult conditions for surveillance, investigations and prosecution**. Criminal organisations know how to make use of law enforcement authorities’ reduced scope of action and can expand their activities accordingly, e.g. in the area of fishing. Experts from the NGO “Trygg Mat Tracking”, which specialises in the identification and analysis of **fishing crimes**, have already observed an increase in illegal activities in this area.

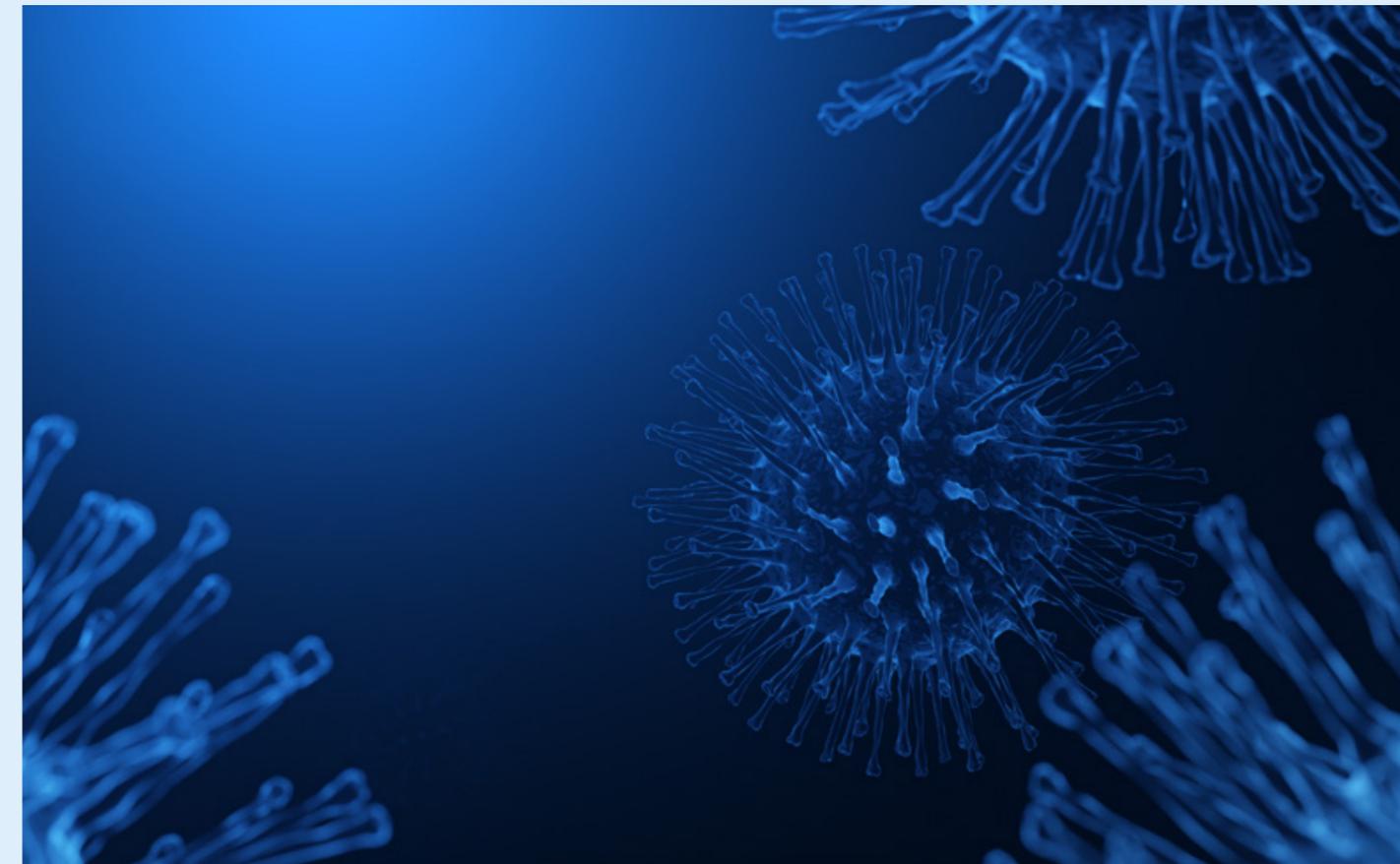


Image 2: Coronavirus.

Source: istock.com/sankai

The COVID-19 crisis has also increased or shifted **criminal activities** in the field of organised environmental crime, offering criminals new options in many value chains. For example, UNEP believes that the sudden rise in **infectious hospital waste** could lead to the increased export of such waste to countries where proper disposal takes place only on paper.

Wildlife crime is a particular focus of attention, as the - legal or illegal - trade in animals is suspected of promoting the **animal-to-human transmission of dangerous viruses**. Therefore, these trade relations are currently in the spotlight, which is inconvenient for organisations that prefer to do business undetected. On the other hand, due to the worldwide slump in tourism, many opportunities for the sustainable use of biodiversity are currently unavailable. For example, local populations no longer benefit economically and socially from neighbouring nature reserves. In consequence, illegal alternatives such as poaching are again becoming more attractive - or even necessary - for the local population. In a statement to the US Congress in the wake of the corona crisis, the African Parks organisation has therefore called for better regulation and monitoring of wildlife markets, while also focusing on public health, as a matter of urgency.

What needs to be done?

Although combating organised environmental crime in all its different aspects seems complex and difficult, there are some important starting points for increasing the level of social responsibility and internationalisation of social, political and corporate actions. Overall, it can be seen that the current COVID-19 pandemic can potentially increase the impact of environmental crime and that certain forms of environmental crime (in particular wildlife trade) also increase the risks and consequences of pandemics.

1. Understanding the causes

We need to gain a **better understanding of the economic, social and cultural causes and consequences of environmental and climate crime** in order to find more sustainable solutions for handling and protecting natural resources in affected countries. Better social and economic prospects for the local population also need to be created, so that environmental crime becomes less attractive in the future. In order to reduce the still growing demand for wildlife, the populations of target countries in Europe and Asia must be made aware of the problem. It would be important, for example, to understand culturally determined behaviour

The destruction of natural habitat that is not targeted at individual species also intensifies potentially dangerous human-animal interactions and increases the risk of pandemics. Furthermore, **illegal logging** often takes place in regions where **indigenous communities** live. Experience shows that these communities are particularly vulnerable to global epidemics. A past example is smallpox, which was introduced to America by Europeans at the beginning of the 16th century. Because they lacked immunity to the new disease, up to 90 percent of the American indigenous people fell victim to smallpox. NGOs are already calling for better protection of the health and living environment of indigenous communities, for example by denying gold-seekers and timber merchants access to indigenous lands, as they may be vectors of the corona virus.

Overall, it can be seen that the current COVID-19 pandemic can potentially increase the impact of environmental crime and that certain forms of environmental crime (in particular wildlife trade) also increase the risks and consequences of pandemics). Effectively combating environmental crime is therefore more urgent than ever.

patterns better - such as the importance of wild animal consumption as a source of life energy, strength and spirituality in Asia - in order to bring about change.

2. Improving law enforcement and strengthening cooperation

We need **closer cooperation between state and civil society actors (political decision-makers, law enforcement agencies, the judicial system, business, science and NGOs) at national and international levels** so that criminal networks and companies can be detected more quickly and cross-border prosecution is possible. Closer cooperation between the police, customs, the judicial system and environment ministries in the investigation and prosecution between the EU and target countries in Africa, Eastern Europe, Latin America and Asia plays a decisive role in combating illegal waste exports.

For organised environmental crime to be punishable, **legal frameworks at national and international levels** must be continuously developed and adapted to new challenges. For example, charcoal, although often produced from illegally-sourced wood, is currently exempt from the European Timber Trade Regulation (EUTR).

In developing and emerging countries in particular, **local authorities require financial support and better technical equipment** to combat criminal networks more effectively.

The actual extent of illegal activities is often difficult to measure; prosecuting these crimes is even more difficult. **Highly developed technologies such as block chain technology, satellite monitoring systems and big data analysis** help companies and certification organisations to analyse affected value chains seamlessly with regard to illegal transactions and goods. They also allow law enforcement agencies to secure evidence that can be used in court. NGOs operating locally can also use them to document information on crimes more easily, forward data and information in real-time, and network at a global scale. The targeted development and implementation of these technologies is therefore of great importance.

3. Addressing the causes

Despite all justified hopes in the **disruptive potential of new technologies**, the issue of environmental crime must always be viewed holistically; it is not only the biological diversity of our planet that is affected. Human rights violations, the endangerment and destruction of public goods, and massive economic damage are serious consequences of environmental crime and pose a threat to healthy lifestyles, security, and peace at a global scale. Due to the increasing militarisation of nature conservation or violent conflicts of interest between economic development and the long-term preservation of ecosystem services (e.g. the "green lungs" of our planet: the Amazon rainforest), the **development of local sustainable alternatives** to criminal exploitation of nature must be given the highest priority.

Innovations in diagnostic and monitoring technology can have a revolutionary effect if they are not simply used to enforce legal rules and regulations, but for basic research, system monitoring and impact research. They offer the possibility to quickly, almost **in real time, track the effect that measures are having**, and then adjust the measures step by step accordingly.

Targeted and **controlled testing of unconventional interventions** could lead to a better understanding of the mechanisms of environmental crime, if one is prepared to carefully analyse the underlying social science dynamics.

4. Not losing sight of the long-term effects of COVID-19

The corona pandemic has shown that the activities of organised transnational environmental crime - and the trade in wildlife in particular - have serious global consequences. The currently heightened public

attention should therefore be used to initiate a **broader public and political debate** on the manifold causes of organised environmental crime and on sustainable measures to combat it.

Particularly in the wake of the corona crisis, it is also important to pay more attention to the **risk of negative feedback effects**. Environmental and climate protection in particular are rapidly losing priority in the face of a global recession. Companies and the state will lack the money for investments that promote environmentally friendly technologies. Society's willingness to actively engage in climate protection will decline if this is perceived as a luxury problem in view of existential concerns. In the future fight against organised environmental crime, much will depend on what lessons we have learnt from the global impact of the pandemic.

Out of bounds - illegal trade in electronic waste

The use of electrical and electronic equipment is on the rise as a result of the growing world population, higher incomes, and increasing industrialisation in many developing countries. Over the past few years, millions of tonnes of electronic waste from Europe have been illegally exported to non-EU countries. This has negative consequences for environmental and human health in the destination countries. Improved coordination of the judicial system and authorities, along with the use of technological tools, aims to redress the shortcomings of current law enforcement.



Image 3: Landfill site in the metropolis Accra, Ghana.
Source: istockphoto.com/SeppFriedhuber

According to the Global E-waste Monitor, mankind produced almost 45 million tonnes of electronic waste in 2016. Europe generated 16.6 kg per capita that year. Less than 20% of the world's electronic waste is officially recycled. Some of this waste is traded internationally and illegally transported from developed countries to developing countries, where treatment and disposal costs are much lower. Once there, the waste usually ends up in landfills or is recycled under poor working conditions (Baldé et al., 2017).

The UN Conventions of Basel, Rotterdam and Stockholm are among the most important global multilateral environmental agreements on the tracking and disposal of hazardous waste and chemicals. The Basel Convention on the "Control of Transboundary Movements of Hazardous Wastes and their Disposal" in particular stipulates that developing countries must not become the destinations for such waste. Electronic waste is classified as hazardous when it

contains toxic elements such as lead and mercury (Secretariat of the Basel Convention, 2018). On a regional level, most European countries, such as the Member States of the European Union (EU), must comply with the WEEE Directive (2012/19/EU), which defines when electronic equipment is to be classed as waste or merely as used consumer goods (European Union, 2012).

Criminal networks are often involved in the improper disposal of waste. The motivation of the criminals is clear: the market for illegal waste has large profit margins of US\$10 to 12 billion per year (UNEP, 2016). This is achieved by avoiding the costs of proper disposal and of acquiring the appropriate permits. The participation of multiple actors, such as recycling companies, waste dealers, transport companies etc., throughout the value chain makes tracing and controlling the trade in waste especially challenging. Illegal activities are frequently linked with false



Expert Statement: Aphrodite Smagadi, UNEP

"It's about establishing better coordination and cooperation between so many different actors. It's something that really should be a collective discussion between the police, customs, the justice ministry, the judiciary and the environmental ministry to connect many players that have to work together."

declarations. Waste that is toxic or expensive to dispose of is often deliberately reclassified, for example as harmless waste, in order to mislead control and law enforcement authorities. This creates additional inequalities within the market, as companies which comply with environmental guidelines and ensure the health protection of their staff have greater expenses and are at a competitive disadvantage (Kischkat and Malmedie, 2018).

Waste exports of electronic equipment to developing countries are usually declared as used consumer goods. In those countries, low paid workers dismantle the equipment in order to obtain the precious metals contained within. A lack of regulations and suitable disposal facilities means that "recycling" is often no more than the burning of plastics and soaking of microchips in acid. This poses a serious health threat to workers who are directly exposed to toxic fumes and hazardous substances such as mercury, cadmium and lead. E-waste landfills also compromise the food supply and water sources of local residents, as they contaminate the soil and groundwater (Reufels, 2016).

Monitoring the cross-border disposal of electronic waste from the EU to non-EU/OECD countries

The NGO "Basel Action Network" (BAN) promotes the implementation of the goals and provisions set out in the Basel Convention in developing countries, to ensure that the global right to a clean environment is observed. In its 2018 "e-Trash Transparency Project", BAN uncovered illegal e-waste exports from Europe to Africa and Asia: 314 used electronic devices (LCD monitors, desktop computers, printers etc.) from across the EU, containing components that required declaration and inspection in accordance with international agreements, were equipped with GPS trackers. The trackers could be remotely programmed and located via satellite. Where satellites were unavailable, the tracker transmitted the latitude and longitude of the nearest mobile phone mast. The GPS trackers revealed that, of the 314 devices monitored in the study, 19 (6%) were exported from their respective countries. Of these, more than half (11 out of 19, or 58%) were transported to developing countries (non-EU/OECD) and the remaining eight to other EU Member States (BAN, 2018).

Measures against illegal waste exports from the EU

Cooperation in law enforcement between the EU and destination countries in Africa, Eastern Europe, Latin America and Asia plays a crucial role in combatting illegal waste exports. An important starting point is to gather as much information as possible surrounding illegal export supply chains, such as those of electronic waste. Data obtained from GPS trackers can complement the information collected during audits and inspections. According to the European Commission's current Action Plan for the Circular Economy, regional, bilateral and multilateral measures, such as those intended to strengthen controls on waste shipments, are to be supported. In addition, promoting the re-use of products and the safe recycling of waste within the EU is to be a priority (European Union, 2020). An example of safe recycling is Fraunhofer UMSICHT's iCycle system technology, a thermochemical process which allows metals to be extracted from electronic waste both gently and efficiently (Fraunhofer UMSICHT, 2020).



Target 3.9:

Substantially reduce the number of deaths and illnesses from environmental pollution



Target 12.4:

Achieve the environmentally sound management of chemicals and all wastes



Target 14.1:

Prevent and significantly reduce marine pollution

Source: <https://www.un.org/sustainabledevelopment/news/communications-material/>

On the wrong track - illegal logging threatens our existence

Illegal logging constitutes up to 30% of global activities in the forestry sector, reaching 90% in the key producer tropical countries. This is often due to precarious living conditions on the ground and a lack or non-functionality of institutions. Activities range from small-scale logging carried out by the rural population to the criminally organised illegal trade in wood. Cutting edge technologies support environmental organisations and authorities in the monitoring and tracking of criminal activity.



Image 4: Illegal charcoal burning destroys the rain forests in Western Africa.

Source: © Hartmut Jungius / WWF-International

750 million people live in or around forests and largely depend on them for their livelihoods. Over three quarters of the world's accessible freshwater comes from the forests, and yet an area of forest the size of a football field is destroyed due to illegal logging every two seconds (INTERPOL, 2016). Deforestation is the second largest source of CO₂-emissions globally, accounting for 10% of total emissions (IPCC, 2019).

Countries that require every cent of state income to fight poverty lose US\$10-15 billion per year due to illegal logging. This is more than eight times the amount of official development assistance (ODA) that is available for the sustainable management of forests (World Bank, 2013). Annual losses resulting from the illegal trade in wood range from US\$51-152 billion, depending on estimates. "Forestry crime" encompasses illegal activities throughout the supply chain, from harvesting and transport to processing and sale. It also includes crimes which facilitate illegal logging, such as the forging of documents, corruption, and money laundering (INTERPOL, 2019).

INTERPOL lists over 30 different methods of illegal logging and recertification of illegally traded wood. Examples include: forging logging permits, obtaining permits by bribing officials (outlays of up to US\$50,000 have been known), exceeding permit quantities, hacking government websites to procure transport permits for higher volumes, and mixing illegal wood with legal wood during transport or in mills (INTERPOL, 2019).

New technologies to monitor and track illegal logging

Countries such as the USA, South Korea and European Union member states have prohibited the import of illegal wood and products made from it. Importers are required to provide evidence that their goods are legally sourced.

Documents attesting the origin and species of imported wood are relatively easy to forge. However, scientists have now developed methods to determine the tree



Expert Statement: Johannes Zahnen, WWF

"In an ideal world, forests would be protected by strict laws and effective monitoring. Unfortunately, until politicians can commit to this, businesses and society must temporarily take up the slack."

species and country of origin of imported wood: advances in determining chemical or genetic fingerprints of wood types means that it is now possible to precisely determine where a tree grew – in some cases even down to a specific area of forest. Some of these innovative tools are already being used to bring criminals to justice (Irwin, 2019) and the Global Timber Tracking Network (GTTN) continues to promote their use (GTTN, 2019). The comprehensive use of these technologies is currently prevented by a lack of reference samples with which suspicious wood can be compared. The Forest Stewardship Council (FSC) certification organisation and its partners have therefore started the "WorldForestID Project" (FSC, 2020). As part of this project, wood samples from 1,600 certified FSC-network forests are collected in such a way as to fulfil the technical requirements of different identification techniques. Each sample is precisely geo-located and transferred from tree to filing cabinet in a sufficiently secure manner for evidence to be admissible in court (Irwin, 2019).

The possibilities for monitoring endangered regions have also significantly improved in recent years. The World Resource Institute (WRI) and the Global Forest Watch (GFW) have created a platform which combines remote sensing data from NASA's satellite missions with data obtained from other sources. This allows changes in forest cover to be identified almost in real time and logging concessions to be checked (Global Solution Network, 2013).

Addressing the causes: charcoal as a case study

In 2018, forests provided approximately 4 billion cubic metres of roundwood, of which approximately half was used for fire wood or burnt to make charcoal (FAO, 2018). Globally, 2.7 billion people cook and heat using wood or charcoal. In Europe, 800,000 tonnes of charcoal, 70% of which originate outside the EU, are used for barbecues each year (Deutsche Welle, 2019). In a joint market analysis, the WWF and the Thünen Institut tested the charcoal available in the EU for wood type and origin. They found that more than 50 % of the products contained tropical wood. Unlike many other wood and paper products, charcoal is exempt from the European Union's Timber Regulation (EUTR).

Until this changes, consumers should look for the FSC seal, which stands for sustainable forest management (WWF, 2020).

75% of the world's charcoal is produced in Africa, where approximately 80% of households use it daily for cooking. Particularly during dry periods (droughts), local farmers rely on charcoal production to sustain their families (Hilse, 2017). Working conditions are poor and charcoal kilns inefficient, requiring up to 12 tonnes of wood to produce 1 tonne of charcoal (Earthworm Foundation, 2018). In contrast, modern production sites in Europe only use 2.5 tonnes of wood to make 1 tonne of charcoal, and produce heat and electricity as by-products (CARBONEX, 2019). Furthermore, many Africans, particularly those in rural areas, still cook on open fires. This is not only detrimental to their health but also inefficient. To address this, the WWF and its Congolese partners have developed a clay oven which uses only half as much charcoal as an open fire (Hilse, 2017). The success of such projects depends not only on technological and economic progress, but also on understanding households' ability to adjust to cultural, technological, social and economic changes (Brüntrup et al., 2017).

Producing and using wood more efficiently is of prime importance if we are to end the ruthless exploitation of forests and the criminalisation of the forestry sector. Wood, in its capacity as a renewable energy source, could go from being a problem to a symbol of hope for sustainable development in Africa.



Target 6.6:

Protect and restore water-related ecosystems, including forests



Target 13.2:

Integrate climate change measures into national policies, strategies and planning



Target 15.2:

Promote the implementation of sustainable management of all types of forests

Illegal mining of raw materials - how an unchecked hunger for natural resources destroys the environment

Global consumption of natural resources has significantly increased in recent decades. According to the International Resource Panel (IRP), it will more than double by 2060. Consequently, the illegal mining and trading of minerals and precious metals has become a lucrative line of business for criminal networks. Monitoring the global supply chain of raw materials will require both innovative digital technologies and improved governance structures which ensure compliance with social and environmental standards.



Image 5: Environmental damage caused by an illegal goldmine in the rainforest.
Source: istockphoto.com/ChrisEllis85

Between 1970 and 2017, the annual global extraction of materials, including non-metallic minerals (e.g. sand) and metals (e.g. gold, cobalt and coltan), increased from 27 billion tonnes to over 90 billion tonnes. Material intensive megatrends such as urbanisation and digitalisation, and a world population set to reach 10 billion people by 2060, could result in a further rise in the consumption of raw materials to 190 billion tonnes by 2060 (IRP, 2019).

The unchecked hunger for natural resources does not only benefit international mining companies and the governments of countries rich in natural resources. In many developing and emerging countries, mineral resources are extracted in informal, small-scale mines, which, according to World Bank (2019) estimates, sustain the livelihoods of 80 to 100 million people globally. However, whilst these workers only earn a few euros a day, the majority of the profits go to intermediaries and local investors. For example, in the Democratic Republic of the Congo (DRC), which accounts for some 50% of global cobalt and 60% of the world's coltan production, mines are largely controlled by militias (Amnesty International, 2016).

Since the beginning of the 21st century, the illegal trade in resources has become increasingly lucrative for

international organised crime networks. According to a joint study by the United Nations' Environmental Programme (UNEP) and INTERPOL (2016), illegal mining results in annual losses of US\$12 to 48 billion. This can be partly explained by the lack of transparency surrounding international raw material supply chains and the absence of international cooperation regarding the prosecution of criminal networks. Furthermore, the line between informal small-scale mining and illegal mining of resources is constantly moving.

The enforcement of social and ecological standards poses a particular challenge in the grey area where informal and illegal mining meet. Aid organisations such as UNICEF suspect that almost 40,000 minors are working in cobalt mines in the DRC (Amnesty International, 2016). The mining of raw materials is also linked to extensive environmental damage such as the loss of biodiversity and valuable land surface, and the chemical contamination of soils, air and water (Lorenz, 2017).

Supply chain transparency via innovative technologies

Increasing the integrity and transparency of international raw material supply chains and stopping the illegal trade of raw materials requires technological



Expert Statement: Reinhold Gallmetzer, Center for Climate Crime Analysis

“Cross-border exchange of technologies and data and cooperation between NGOs and law enforcement agencies will be a deciding factor in ensuring the successful prosecution of organised environmental crime.”

solutions which can trace materials from the mine via the refinery to industrial production.

The German Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe, BGR) has developed a method to determine the origins of coltan ore using geochemical signatures (BGR, 2019). The composition of coltan varies depending on the area it was extracted from, creating unique signature profiles, not unlike human fingerprints. Ore samples can now be compared with profiles contained in the BGR's database in order to determine the legality of their origins (Meyer, 2019).

Another possible and widely discussed approach is the use of blockchain technology. The Berlin-based start-up Minespider has developed a blockchain solution which allows industrial end-users to determine whether ore was mined responsibly and how and where it was traded and processed. Digitally encrypted blockchain certificates, which cannot be manipulated, allow quality labels and certificates of human rights, anticorruption and environmental protection associations to be stored safely, along with the data of mines, intermediate distributors, smelters and forwarding agents (Minespider, 2019).

However, one fundamental shortcoming of the approach is that it depends on sellers providing accurate information. As such, the use of blockchain technology cannot guarantee beyond all doubt that ore has been obtained from a legal source (Jungblut, 2019).

Technologies which enable the reliable tracing of raw material deliveries play a major role in stopping illegal mining. Digital technologies designed to analyse and connect large amounts of data, thereby permitting the effective surveillance and evidence-based prosecution of illegal activities, are also important. Digital crowdsourcing-platforms are becoming increasingly significant for the exchange of data between NGOs working on site and international law enforcement agencies, as is the verification of data. This approach allows non-governmental actors to support law enforcement agencies via their knowledge and networks (CCCA, 2019), for example in tracking the causes of environmental damage.

The future of informal mining and the possibility of resource efficiency

The small-scale mining sector is one of the most important sources of income in many developing and emerging countries. It provides possibilities for economic growth which could contribute to meeting the goals set out in the 2030 Agenda. It is therefore all the more important that tamper free certification systems for supply chains are used to insure that minimum standards are adhered to and that local populations can benefit from the wealth generated by raw materials. To that end, pressure is being increasingly exerted by both national and international lawmakers. For example, the EU's Conflict Minerals Regulation, which aims to stop the illegal trade in tin, tantalum, tungsten and gold, will come into force in 2021.

Responsible raw materials policies and an increased investment in resource-saving technologies and goods could lead to a reduction in the per capita use of raw materials in the future. Sustainable recycling of raw materials should also be pursued more consistently, for example by developing innovative recycling procedures for electronic waste or using materials which may be easily reused.



Target 8.3:

Promote development-oriented policies that support decent job creation



Target 15.1:

Ensure the conservation of terrestrial and inland freshwater ecosystems

Wildlife crime - a threat not only to biodiversity conservation

According to the Global Assessment of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), global biodiversity is decreasing dramatically. Along with climate change and the overconsumption of natural resources, the illegal trade in wildlife poses one of the biggest threats to animal and plant species. Cutting-edge technologies, such as innovative DNA analysis methods, help to combat the illegal global trade in protected and threatened species.



Image 6: An armed anti-poaching unit on patrol in South Africa.
Source: istockphoto.com/Snap2Art_RF

Up to a million animal and plant species are threatened with extinction, according to the IPBES' Global Assessment Report on Biodiversity (IPBES, 2019). In Africa, tens of thousands of elephants and over a thousand rhinoceroses are killed by poachers each year to meet the high demand for ivory and rhino horn. Global attention is particularly focused on Chinese wildlife markets, where the trade in endangered animals flourishes. The animals are sold as delicacies, status symbols, or for their dubious "medicinal" attributes; for example, ground rhino horn and pangolin scales are said to have healing properties (UNODC, 2016).

However, wildlife trade not only endangers biodiversity, it also poses a threat to human health. According to experts, a lack of hygiene and frequent direct contact between wildlife and humans at Chinese wildlife markets create ideal conditions for new infectious diseases to jump species, resulting in zoonoses such as Sars and COVID-19 (Diamond and Wolfe, 2020).

The European Union plays an important role in illegal wildlife trade, considering the quantity of illegal wildlife products traversing its borders (UNODC, 2016). The trade in these products is very attractive to organised smugglers and dealers, its high profits being offset by low detection rates and small fines. INTERPOL

estimates an annual turnover of up to US\$23 billion in illegally traded animals (UNEP, 2016).

The Washington Convention (aka CITES) regulates the international trade in approximately 5,600 endangered and protected animal species and 30,000 plant species. According to evidence, 7,000 of these species are still being illegally traded (UNODC, 2016). This number may well increase further: the international research study "Global wildlife trade across the tree of life" predicts that approximately 3,200 currently unlisted animal species could be traded illegally in future, based on their physical appearance and relatedness to illegally traded species. The findings of the study suggest that species which are related to or strongly resemble illegally traded species are particularly vulnerable to illegal trade. The authors of the study therefore call for a more proactive approach towards illegal wildlife crime than simply protecting species which are already threatened (Scheffers et al., 2019).

DNA-based tools for biodiversity conservation

Currently, taking effective action against global illegal wildlife trade is a challenge for nature protection and law enforcement agencies, as the origin of an animal can seldom be reliably determined. For example,



Expert Statement: Andrea Frey, AJF Advisory

“The challenge when fighting the illegal trade in endangered animal species lies in connecting agencies with each other and in using digital solutions to better understand supply chains.”

criminals can make false claims (e.g. purport that animals caught in the wild are the offspring of animals already in captivity) or forge documents (e.g. CITES import documents).

As part of the "FOGS" Project (Forensic Genetics for Species Protection), financed by the Federal Ministry of Education and Research (BMBF), scientists from the Alexander Koenig Zoological Research Museum (ZFMK) are working on a solution to reliably identify illegally traded animals using DNA. DNA contains unique molecular markers which provide information about an individual's origin and parentage. The new DNA-technology developed as part of the FOGS project will allow this theoretical knowledge to be put into practice. The difference to previously used forensic methods lies in the coupled analysis of two markers, enabling the attribution of an individual to a certain species and a specific population within that species. The information concerning the markers is saved in a publicly available online database and made accessible to agencies, research institutions and breeders. A key challenge of the process is obtaining comprehensive data samples in a timely manner and generating them cheaply and fast, as the markers must be recorded for each species individually and precisely (FOGS, 2020).

Deploying high technology to combat poaching

The detection rate of illegal wildlife trade can be increased using cutting edge technologies. Park rangers in Africa are increasingly using infrared and night vision cameras as well as drones to speedily reveal the presence of poachers in national parks and protected areas. However, many national parks in developing countries cannot afford this high-tech surveillance equipment. They already lack basic necessities such as cars and radio units, as well as the means to adequately remunerate their rangers (Schlindwein, 2019). Despite the benefits that technology has brought to the prosecution of poachers, poaching can only be reduced if its underlying causes are better understood and addressed.

Successfully addressing the causes of illegal wildlife trade

Increasing the number of armed and trained anti-poaching patrols in African protected areas leads to a marked decline in poaching (IPBES, 2019).

However, it also causes a higher security risk for the residents of surrounding villages. The militarisation of conservation has led to an increase in violence and murder – people who were simply collecting firewood have been shot, and many rangers lose their lives to the brutality of the financially strong and organised poachers (Schlindwein, 2019).

Not-for-profit conservation organisations such as African Parks, which take direct responsibility for the restoration and sustainable management of protected areas in partnership with governments and local communities, offer important support on site. The organisations consider the interests of local communities and allow them to profit from the national parks both financially and socially. Benefits include the creation of jobs, basic health care and education in sustainable wildlife management, amongst other things (African Parks, 2020).

To reduce the rising demand for wild animals, it is also important to develop awareness among European and Asian end users. The COVID-19 pandemic could be an international wake-up call which may lead to the end of the illegal trade in wildlife. Educating consumers and sustainably improving the livelihoods of people living in protected areas could not only safeguard biodiversity and the functionality of ecosystems, but also ensure the rule of law and people's security and health.



Target 15.7:

Take urgent action to end poaching and trafficking of protected species of flora and fauna



Target 17.1:

Strengthen domestic resource mobilization, including through international support to developing countries

Ending illegal fishing - violations of marine conservation and human rights

The strain on already vulnerable marine resources is increasing due to illegal, unreported and unregulated fishing (IUU). It is estimated that approximately 20% to 30% of global fish stocks are illegally harvested and that IUU fishing results in annual losses of US\$23 billion. Illegal fishing practices are strongly associated with high proportions of forced labour. A combination of data solutions, modern technology and international cooperation could contribute to solving these problems.



Image 7: Installation of a vessel monitoring system.
Source: Photo by Remora XYZ <https://www.remoraxyz.com/pilot>

The damage caused by IUU fishing is valued at US\$23 billion per year (Lindley and Techera, 2017). The most serious infringements against marine protection policies, fisheries law and human rights occur in Asia, according to the IUU Fishing Index (The Global Initiative and Poseidon, 2019). However, Europe also carries a particular responsibility: the lack of import quotas and duties makes the European Union an attractive market for international fish and seafood (European Union, 2020) and therefore an important trading partner with the power to influence the fisheries policies of other countries.

The fisheries and shipping sectors have traditionally been difficult to monitor, as the ability of authorities to supervise activities on the open sea is limited. It is therefore worth examining where fishing controls

would be most effective. According to INTERPOL, illegal activities occur along the entire supply chain: this includes the preparation (e.g. the creation of shell companies and the regular change of flags), the catch (e.g. forced labour and insufficient documentation of the catch), and the subsequent sale (e.g. falsification of custom declarations and bribing of officials etc.) (INTERPOL, 2018). Transshipment, in which the catch of one ship is transferred to another ship on the open sea, plays an important part in this process, as it helps to conceal the provenance of sea food. For example, the Russian ship MV NIKA changed its flag and name seven times between 2006 and 2019 and was only apprehended due to intensive cooperation between Indonesian and Panamanian authorities, according to a report by Global Fishing Watch (Bladen, 2019a). Under these circumstances, it is unclear to which extent



Expert Statement: Duncan Copeland, Trygg Mat Tracking

“Information and data must be shared between different governments and other stakeholders. But expertise and cooperation on the analysis of the data is crucial if we are to understand and combat fisheries crime.”

sustainability labels such as the Marine Stewardship Council can guarantee that wild fish stocks declared to be sustainable were not caught illegally. Experts estimate that up to 60% of wild caught fish labelled as “sustainable” wrongly carry that designation (Warner et al., 2013).

International data exchange

Affordable monitoring technologies providing authorities with information in real time are an important requirement in the fight against illegal fishing. Fishing activities in marine protected areas can now be detected due to the automatic identification system (AIS), the use of which has become standard in the shipping industry, and the AI-assisted interpretation of ships’ movement patterns (VDI Technologiezentrum GmbH, 2018).

Another possible approach to tackling IUU fishing is that set out in the United Nations’ Food and Agriculture Organisation (FAO)’s Agreement on Port State Measures (PSMA), which came into effect in 2016 and has been ratified by 86 states and the EU (World Economic Forum, 2019). As all fish catches eventually have to be disembarked, the agreement focuses on ports: signatory member states are required to obtain and verify information about a ship’s cargo and share it with other states before allowing the ship to enter a port. Data exchange in real time between member states and different authorities within a state therefore also plays an important part in this approach.

AIS signals, satellites and drones are important, available and increasingly cheap technological solutions that simplify the tracking of fishing fleets and thereby increase the efficiency of authorities. For example, the US Coast Guard was able to detect 68 violations against fisheries law during a patrol in 2019 (Bladen, 2019b). Due to improved data analysis, an eightfold increase in the detection rate during the control of suspicious vessels was observed compared to 2018 (Long, 2019).

Tracing technology enables transparency for micro-enterprises

In the future, new, cheaper and energy saving transponders will enable the recording via AIS technology

of smaller ships. Currently, the high-power transmitters used for AIS are still relatively expensive. Shipping vessels of less than 300 gross register tons are therefore exempt from the obligation to use AIS. However, as approximately 50% of global fish catch is taken by small scale-fisheries (Long, 2019), these must be monitored in order for the fight against IUU fishing to be successful. The Costa Rican start-up “Remora Fishing Traceability” is currently testing technically simplified procedures which would enable even small one-man businesses to accurately and fully document their fishing routes and catch-history (Remora, 2019).

Tracing technologies play a key role in fighting illegal fishing, as they enable law enforcement agencies to gather evidence on criminal activities that will hold up in court. They further allow certification organisations to ensure and demonstrate that sustainability standards are being upheld, thereby gaining the trust of customers.

Ultimately, the complex “fish value chain” should be carefully analysed in its entirety and made transparent. In addition to the fishing activities carried out at sea, the possibility of tracing the financial flows of suspicious actors should be examined in order to efficiently combat illegal fishing.



Target 8.7:

Eradicate forced labour, modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour



Target 14.4:

End overfishing and unregulated and destructive fishing

Social science perspectives and governance approaches to environmental crime

Environmental crime is finally being targeted by the international community. International and criminal law institutions and regimes have refined their methods, non-governmental organisations (NGOs) are launching large-scale campaigns, technology is providing brand new diagnosis and prosecution tools, and light is being shed on supply chains that had long been shrouded in obscurity. Are the days of environmental crime numbered? From a social science perspective, it would seem expedient to draw attention to some frequently neglected aspects of environmental crime, and to warn against relying all too heavily on technologically optimised methods of law enforcement to combat them (Challender and MacMillan, 2016). In the following pages, we will examine the societal framework conditions and momentum behind environmental crime. This will allow political measures to be realistically assessed as to their effectiveness and side effects, and the necessity of further, supplementary intervention options to be considered.

Neglected perspectives on environmental crime

The cultural and anthropological dimensions of many forms of environmental crime do not appear to get the attention that they deserve. Even the ethnological literature has relatively little to say about why people ascribe healing properties to powdered rhinoceros horn, for example. Evidently, such beliefs are deeply rooted in history and form a part of cultural identities and social practice. At best, they can be changed through education and punishment, but this is a process that tends to take decades. Consider, for example, the mutilation of women's feet in China: dating from the 10th century, the process was banned in 1911 and outlawed by Mao Zedong in 1949, and yet it is alleged not to have disappeared until the end of the 1990s, despite great pressure from the state. To condemn such values and practices as atavistic is not constructive - every culture is atavistic. Is there any rational explanation for the Germans' love of barbecue charcoal, some of which is illegally produced in Nigeria or Paraguay from protected forest areas (WWF, 2018)? Campaigns to stigmatise, educate or manage demand only have a limited impact (Moorhouse et al., 2017) and may indeed have the opposite effect where people feel that their cultural identity is under attack. In order to bring about change, it is important for us to better understand the various layers of meaning that are ascribed to



Image 8: German preference for barbecue charcoal or traditional Chinese medicine - Cultural identity makes it difficult to change environmentally harmful activities.

Source: © PantherMedia/Snapic.PhotoProduction; © Thomas Macholz/WWF

something like the consumption of a wild animal, for example as a source of life energy, strength, spirituality, status, aesthetics, masculinity/femininity, etc. (see, for example, Burgess, 2016).

Whilst the literature on the prosecution of environmental crimes refers to the market nature of criminal transactions and global supply chains, it does not take their implications seriously enough (Wehinger, 2011; Dewey, 2016; Heuser, 2019).

For example, bans essentially create supply shortages and thus drive up profit margins. A prominent example is the Chinese government's ban on the import of ivory products from 2005 onwards. According to studies, the number of seizures increased rapidly, but at the same time the price in China quadrupled between 2006 and 2013 (Zhou et al., 2018). Globally, the price of ivory has, on average, increased tenfold between 1989 and 2014 since the CITES ban on ivory (Sosnowski et al., 2019). This means that criminalisation creates economic incentives for trade, sometimes even offering the prospect of monopoly profits. It brings the discovery mechanism of the market into full swing: the search for market gaps, new alliances, trade routes, innovations, investment opportunities. Furthermore, criminal transactions are system-building. They form permanent, quasi-reliable structures that can be used for their members and the social environment as equivalents to (in developing countries often weak or eroding) institutions of order and care: from credit rings, community funds, crypto-social benefits and crypto-retirement provisions, up to "special economic zones", intergenerational stabilization, and the (naturally disastrous) socialization and education of children and young people.

Illegal markets are also stable, because the (usually volatile) transaction form of exchange is underpinned by relationships of trust, personal reputation and family and ethnic roots and obligations. On the other hand, illegal relations can fall back on a method that is available to the modern state only at the risk of delegitimizing its actions: the use of violence, fear, and terror. This makes criminal networks highly socially embedded and resistant.

Finally, illegal market actors have various forms of organisation at their disposal, between which they can switch relatively pragmatically (in contrast to their legal opponents): In areas that are initially still lawless, hierarchically consolidated organisations (syndicates, cartels) can develop, which are replaced by smaller, horizontally interwoven groups, alliances and networks when criminal prosecution starts to evolve. These operate in secrecy and are more difficult to prosecute. If the political framework conditions change, they can in turn rearrange themselves back into syndicates or transnational consortia.

Overall, this means that illegal markets are far more adaptable and innovative than the law enforcement literature would like to admit. Legal pressure leads to "balloon effects" (Friesendorf, 2005): Criminals evade prosecution, retreat into the niches and cracks of the economic system - but do not disappear. An unpleasant expression of this ability to change is the technological arms race that criminals have always engaged in with law enforcement agencies. The metaphor of breaking up illegal markets is deceptive. Environmental crime is changing faster than its prosecution.

The political framework for the prosecution of environmental crime is becoming increasingly precarious both in developing countries and in the realm of international cooperation. Environmental crime often takes place in the context of weak statehood, where the boundaries between business, politics and justice are blurred by patronage. Ethnic conflicts, religious fundamentalism, the financing of terrorism and money laundering are also connected with environmental crime. Added to this is the change in international relations. Multilateralism is in crisis (Acharya, 2018). International negotiations and agreements are losing their validity; they are increasingly being replaced by geopolitics, threats, deals and tactical economic moves. Under these circumstances, there is no longer any guarantee that states will unite to protect public goods such as wildlife, fish stocks or forests and implement international agreements at national level.

The fight against environmental crime is won or lost on the ground in the communities and municipalities of the supplier countries. However, in those places, the main problem is not environmental crime, but poverty, inequality and lack of livelihoods (Duffy et al. 2016). In these local communities, many people are dependent on environmental goods; one person's crime is another's subsistence. External appeals and interventions are seen as a form of cultural imperialism. This defensive attitude is becoming all the more apparent as nature conservation organisations and parks are increasingly carrying out "green land grabs" (Hübschle, 2017), excluding the local population from the protected areas and driving the "militarisation of nature conservation" (IIED et al., 2015; Duffy 2019). The local population may then get the impression that parks are "exceptional areas" where laws no longer apply and that "the wild animal is valued more highly than black rural lives. As a consequence, conservationists and law enforcers are viewed with disdain and struggle to [obtain] cooperation" (Hübschle 2017).

Conservation solutions can work only if they are developed with, for and by the local population and provide a livelihood for them. This is a necessary, but not the only, prerequisite for successful crime prevention, as local authorities remain dependent on weak national political systems and global economic interrelations. Development researchers who work with local communities admit that they are at the beginning of the learning curve (Roe and Booker, 2019); they also emphasize that, currently, only 15% of the resources invested by the international community of states into combating illegal wildlife trade are allocated to cooperation with local communities (Booker and Roe, 2017).

Complex governance constellations are created through the combination of cultural routines, economization, global exploitation chains, competing narratives and international cooperation.



Image 9: Teaching in an African school.

Source: © PantherMedia/Monkeybusiness

Hard “governmental interventions” in particular often lead to unintended effects. A warning example is international drug policy, especially – but not only – in the USA. Since the early 1970s, state actors have intervened massively in the USA at various political levels and in various settings. The conditions for effectiveness were optimal: the awareness of the population and the media was high, the penalties were draconian, and the financial resources of the prosecutors were copious. Finally, the “War on drugs” was even conducted with paramilitary equipment and rigour, even within the territory of supplier countries such as Mexico, with devastating consequences for their populations and political institutions. Ultimately, however, it resulted less in a containment of the problem than in a shift (towards synthetic drugs, drug addicts in the middle classes and rural areas, and dark net online trafficking) (Realuyo, 2020; International Drug Policy Consortium Publication, 2018). Why should we feel confident that the fight against environmental crime will not lead to similar paradoxical effects if its means of intervention, power and efficiency are increased?

The above-mentioned factors and framework conditions must be kept in mind if innovative technologies are to be used sensibly and new effective levers against environmental crime are to be developed and tested. This might also mean questioning and testing approaches to environmental protection that have been deemed appropriate for many years.

Levers of action to combat environmental crime

It is now time to mobilise the various social sciences to engage in research on environmental crime. Research on jurisprudence, international law and criminology with its focus on criminal prosecution and its newly awakened technological “solutionism” (Morozov, 2013) is not sufficient (especially since, in Germany, environmental crimes play almost no role in criminological literature, see von Lampe and Knickmeier, 2018). Anthropology, sociology, psychology, economics and development research must be brought together with law enforcement agencies and engineers to develop measures.

Desperation over environmental pollution and species loss drives the search for “silver bullets” and tough law enforcement measures. However, tough interventions are problematic in that they shake up the entire system of a criminal supply chain, and the dust of disruption then prevents causal links from being observed. What is needed are measured, scientifically controlled trial interventions (Ayling, 2013). Experts should change individual framework conditions and then observe the results of this intervention in order to develop hypotheses about the system dynamics and effectiveness.

In this context, the innovations in diagnostic and monitoring technology described in the previous chapters can have a revolutionary effect if they are not simply

used for enforcement, but more specifically for basic research, system monitoring and impact research. They offer the possibility to quickly (almost in real time) track the effects of measures taken, learn from them and then adjust them step by step, incrementally.

Systems theory emphasizes that in the case of wicked problems, it can make sense to intervene counter intuitively or even in a paradoxical way (Willke, 2005). This could include, for example, flooding a market with secured ivory in order to trigger a supply shock and price collapse. Counterfeiting Rhino horn based on horsehair would be a similar strategy (Nuwer, 2019). It is also possible to try to manoeuvre criminal practices into the sidelines by “snobbification”, i.e. by making the product even more expensive and exclusive, thus forcing low-cost suppliers (whose secrecy code prevents them from giving any exclusivity/quality guarantee) out of the market. For example, by far the most expensive caviar (at least 4,000 €/kg) is currently produced on Chinese farms and sold exclusively to Michelin-starred restaurants which rely on sustainable production and CITES seals of approval as part of their image (Deuber, 2018). Furthermore, some (but methodologically insufficiently validated) experiments have already been conducted on the legalisation of illegal wildlife trade using breeding farms. This evidently enabled trade in crocodile skins or vicuñas to be reduced; however, the situation seems to be less transparent with regard to the legalisation of rhinoceros horns. Even more controversial is the discussion about hunting grounds used for trophy hunting of rare big game, which could potentially make illegal hunting unnecessary and create sources of income for the indigenous population (Cooney et al., 2017).

Options for supply management (breeding, fakes, trophy parks) are being fought against by NGOs. Two things are clear, however: their impact can only be assessed on the basis of pilot trials. Test bans are learning bans and hardly benefit the environment. And legalisation is in principle an obvious way to transform a dirty but not substitutable service into a source of income for the local population. In development research, there are examples from illegal waste processing where it has been possible to transform illegal and highly health-endangering waste dumps into semi-public utilities with significantly higher standards of hygiene, social benefits and economic stability (IGNIS, 2015).

Globalisation, in particular, might offer the best weapon against environmental crime in one specific respect: Western values often spread rapidly in developing and emerging countries, especially in high-income and consumer-oriented milieus. This includes (in addition to hip-hop and McDonald’s) the Western image of animals, which, although rightly labelled as unnatural and belittling, is undoubtedly also beginning to alter

the perception of animals in Southeast Asia. In China today, dogs are pampered just like in the West and are consumed less and less frequently. Disney films have probably had more of an impact in this regard than well-meant rational campaigns designed to reduce demand, the effect of which has yet to be proven (Veríssimo and Wan, 2019). (Incidentally, the idea that the Pixar films “Finding Nemo” and the sequel “Finding Dory” both boosted sales of clown fish and palette doctor fish is considered disproven [Veríssimo et al., 2019]). Many markets for illegal environmental goods will probably become increasingly immune in the future through methodically directed marketing.

Targeted and controlled testing of unconventional interventions could contribute to a better understanding of the mechanisms of environmental crime, if one is prepared to carefully analyse the underlying sociological dynamics.

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