Cooperation Programme between Latin America, the Caribbean and the European Union on Drug Policies

The Silent Destruction:

Environmental impacts of drug production and trafficking and State responses in Latin America and the Caribbean

Funded by the European Union

COPOLAD

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CREDITS

This document has been prepared within the framework of COPOLAD III Cooperation Programme between Latin America, the Caribbean and the European Union on drug policies.

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June 2024.

Cover photo: Access path to plots. V. Martínez (COPOLAD, 2024).

This publication is funded/co-funded by the European Union. Its content is the sole responsibility of FIIAPP and does not necessarily reflect the opinions of the European Union.

COPOLAD III is a consortium formed by:

Collaborating partners:

The Silent Destruction:

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EXECUTIVE SUMMARY

In the last decade, interest in the environment and climate change has increased significantly in development and government agendas at the global, national and subnational levels. What was once considered a marginal issue has become as important as the economy and the welfare of the people, making it a public policy priority. In terms of drug policies, the close relationship between the illicit drug trade and environmental impacts has become evident, as have the negative effects that, in some cases, can also result from the measures taken to reduce supply and respond to the problem of drug trafficking.

This report, which focuses on Latin America and the Caribbean, aims to identify the environmental impacts associated with illegal drug production and trafficking, as well as those associated with State responses within the framework of drug control enforcement. Its content offers a strategic perspective that analyses and proposes alternatives in order to avoid, reduce or compensate for these environmental impacts. Through this study, COPOLAD III seeks to continue strengthening the development of public policies on drugs, identifying challenges, options and possible solutions.

Based on *Strategic Environmental Assessment*, with a systemic approach and a broad review of the available evidence, this report shows that the illegal drug trade has multiple and significant environmental impacts, especially when considering its convergence with other illegal economies and environmental crimes, as well as its impact in the life

1. COPOLAD III. Cooperation Programme between Latin America, the Caribbean and the European Union on Drug Policy. *Study on the environmental impacts of illicit drug production and trafficking activities and drug supply reduction interventions in LAC*. (GARZÓN V., Juan C. et al), April 2024.

of communities and the impact on their rights. This not only affects the countries where illegal drugs are produced, but also an increasing number of transit countries.

At the same time, this report shows that, in some cases, the actions taken by States to contain and reduce the supply of illegal drugs, through forced eradication, interdiction and alternative development, among other responses, have also had direct and collateral impacts in the environment.

The good news is that there are multiple opportunities and mechanisms for change that can enable drug policies to mitigate these environmental impacts and contribute to the restoration and conservation of the ecosystems that have been affected.

The report is accompanied by a Methodological Guide, whose main objective is to provide conceptual and instrumental guidelines and tools that can be preliminary inputs for the National Drug Observatories in Latin American and Caribbean countries in designing and implementing research and analyses that are more specific to this topic.

Main findings and conclusions:

1. The environmental impacts of the illegal drug trade are significant, especially when considering its connections to other illegal economies and environmental crimes. Its convergence with environmental crimes and the laundering of the proceeds from drug trafficking amplifies its negative consequences in the regions affected. Acknowledging the scale of the impacts of illegal drug production and trafficking should not obscure the significance of the acknowledged causes of deforestation and loss of diversity, such as the extraction of natural resources, the expansion of the agricultural frontier and livestock farming.

2. The direct and indirect environmental impacts of drug production and trafficking on deforestation are notable and in some cases have been underestimated. Although the establishment of illicit crop plantations has not been identified as a major driver of deforestation at the regional level, local research shows that its direct and indirect impacts on forest loss are locally significant.

3. The environmental impacts of the production and trafficking of illegal drugs, as well as the measures to address them, do not occur in an isolated manner, but rather, they occur within the framework of the system for controlling psychoactive substances. The starting point for addressing these environmental impacts is the existence of a massive illegal market for prohibited substances fuelled by the incentives of profitability and the existence of growing national and international demand.

4. The environmental impacts are occurring in an increasing number of transit countries. The evidence shows the negative consequences of the creation and maintenance of these clandestine routes and landing strips, with the loss of forest and impact on fauna in the biological corridors and protected areas of the Central American countries, as well as in Amazonia.

5. The evidence on environmental impacts is asymmetrical: it focuses on one psychoactive substance – cocaine – and on a limited number of countries. Most of the information refers to cocaine production and trafficking, while research and studies on the environmental impacts of cannabis, opium poppies and synthetic drugs are very limited.

6. The burden of responsibility for the environmental impacts must not be placed on vulnerable small producers and native communities, but on stakeholders with economic resources and the capacity for coercion. The environmental impacts are driven by criminal networks and stakeholders who operate "legally" in circumstances affected by corruption, the low regulatory capacity of the State and the difficult economic and social conditions that affect inhabitants.

7. Drug trafficking can serve as a gateway for the entry of other illegal economies, it can direct financial flows towards other illicit activities and create a backdrop of impunity within which different criminal networks can operate. In addition, it is associated with coercion and violence against the public officials, institutions and communities who oppose their interests and resist their influence.

8. The laundering of the profits from drug trafficking has negative consequences for forests, environmental corridors and protected areas. A portion of the profits obtained is laundered through the conventional financial system, while another part is reinvested in other illegal economic activities, the purchase and exploitation of land, extensive livestock farming and industrial agriculture, in addition to the consolidation of transit routes serving various purposes.

9. Environmental leaders and Indigenous and Afro-descendent communities continue to be at risk, with significant consequences for environmental protection. The growing influence of the criminal networks within their territories against a backdrop of limited institutional capacities, and aggravated by corruption, exposes them to violence and intimidation. In most cases, these events remain unpunished, with significant consequences for environmental governance, forest protection and development.

10. Within the framework of drug policy, control measures taken by the State have environmental impacts that, if not assessed, mitigated and managed, can aggravate and be more significant than those caused by the production and trafficking of the psychoactive substances themselves. The final disposal of precursors and waste, in highly ecologically sensitive contexts, is one of the most critical aspects faced.

Environmental impacts in figures

- **Increase in coca crops in protected areas:** According to UNODC, in 2022 in Colombia, the presence of crops was identified in 13 of the 59 nature reserves declared in the country, with a total of 10,626 ha, which is equivalent to 3.2 times higher than the figure recorded in 2010 (UNODC, 2023). In Peru, according to DEVIDA, since 2018, the upward trend has been maintained in the size of cultivated areas in Protected Natural Areas, going from 192 ha in 2018 to 439 ha in 2022, an increase of 128% (DEVIDA, 2023).

- **Effects on Indigenous communities:** In 2022, in Colombia, 208 of the 710 indigenous reservations had coca bush crops, covering an area of 23,794 hectares, which is equivalent to a year-on-year increase of 18% (UNODC, 2023). In Peru, the trend of an increasing area under coca bush production continues in the territories inhabited by native communities or Indigenous peoples. By 2022, the amount of land under coca production had gone from the 2018 figure of 7,963 hectares to 18,076 hectares, an increase of 127% (DEVIDA, 2023).

- **Deforestation:** The analysis carried out by UNODC in the regions of Catatumbo and Amazonia in Colombia between 2005 and 2014 indicates that the establishment of coca crops was linked in a direct and associated way – the latter being the most severely affected with 42% of the estimated new deforestation (UNODC, 2018). In the department of Ucayali in the Peruvian Amazon, estimates indicate that more than 50% of the new coca crops analysed between 2003 and 2022 were established in areas deforested especially for this purpose (USAID & UNODC, 2023). In Guatemala, Honduras and Nicaragua, it is estimated that between 15% and 30% of forest loss is associated with the expansion of pasture areas financed by the proceeds of drug trafficking (Sesnie and others, 2017).

- **Impact of the illegal drug production process:** In Colombia, UNODC estimated that to process the potential production of coca leaf in 2022, around 148,500 tonnes of solid substances and 762.3 million litres of liquid substances were required, which are freely discarded in the natural environment in large quantities after use (UNODC, 2023). In the case of Mexico, *Insight Crime* estimates that the clandestine production of methamphetamines in Mexico could generate between 3,102 and 3,942 tonnes of chemical waste (Insight Crime, 2024).

- **Effects on transit areas:** In Peru, the Ministry for the Environment and Regional Forest Management has identified more than 50 landing strips in the tropical rainforests of the departments in its Amazonian region (Farman, 2021). In Central America, evidence shows that between 2007 and 2018, following the peak of suppression, areas with lower population densities and greater proximity to international borders became more vulnerable to drug trafficking, and Indigenous territories were disproportionately used as regular transport routes and corridors (Magliocca, Summers, Curtin, McSweeney, & Price, 2022).

- **Convergence with other environmental crimes:** In Colombia, according to monitoring carried out by UNODC, of the 101 municipalities with alluvial gold exploitation in 2021, 70 of them also had planted coca crops (UNODC, 2022).

Recommendations: mechanisms for change to correct and mitigate environmental impacts

1. Improve information, increase monitoring and gain further knowledge regarding environmental impacts. To mitigate and correct the environmental impacts, the first step is to be able to identify them, measure them when possible, as well as to observe their geographical distribution and dynamics over time. The use of technology offers opportunities to advance this goal.

2. Progress towards green drug policies. In Latin America and the Caribbean -with large and sensitive natural areas- there is an opportunity for drug policies to integrate an environmental dimension that permits the mitigation of the negative consequences of the illegal production and marketing of psychoactive substances. It is also important to anticipate and mitigate the environmental impacts of State interventions.

3. Incorporate the environmental Damage Reduction approach into drug policy. As occurs in other areas, in the case of drug policy, the internalisation of environmental costs would involve, at the very least, analysing whether the intervention to be carried out is more or less harmful than the problem it seeks to address or mitigate and prioritising those interventions that might generate fewer negative impacts.

4. Protect environmental activists in areas of illegal drug production and trafficking. It is important for the designers of drug policies to recognise the risk to which local leaders, their families and their communities are exposed. This requires not only coordinating with security institutions, but also with local stakeholders, with interventions that are tailored to the different territorial realities, which identify sources of risk in a timely manner and that take into account the dynamics of violence.

5. Protect Indigenous territories and Afro-descendent communities and strengthen their governance. As a whole, the areas occupied by Indigenous communities represent 35% of the forest area of Latin America. These areas concentrate almost 30% of the carbon in the region's forests and 14% of the carbon in tropical forests worldwide. Drug policy in the areas affected by the production and trafficking of psychoactive substances, as well as the laundering of drug trafficking proceeds, must be aimed at protecting local communities with measures that strengthen territorial governance, ensure communication and early warning systems, generate economic opportunities and provide public utilities, thus contributing to the protection of their leadership, guided by the damage-free action approach.

6. Alternative, Comprehensive and Sustainable Development aimed at protecting the environment. Alternative Development can contribute directly or indirectly to the protection of the environment, biodiversity and the mitigation of climate change. It is a priority that the interventions in this area have environmental impact assessments that make it possible to anticipate risks, prevent impacts and guide decision-making, in addition to incorporating other dimensions and opportunities for local development.

7. Recognition and participation of local communities. The evidence shows that their organisational capacity, the ownership of their land, the role played by their leaders, as well as the regulations established collectively, make a difference in the protection and management of biodiverse areas. It is essential to re-establish the relationship of trust and cooperation with State institutions to avoid the criminalisation and stigmatisation of vulnerable populations with considerable unsatisfied basic needs. Reducing the environmental impacts of the illegal drug trade requires collaboration with communities and their leaders to identify and expand knowledge regarding the impacts, identify sustainable alternatives that respond to local conditions, advance restoration mechanisms and promote sustainable development.

8. Detect and interrupt illicit flows and preventing money laundering. Academic and journalistic investigations have revealed the link between drug trafficking, the appropriation of land and natural resources and investment in livestock farming and agribusiness. More knowledge is required regarding the magnitude of the flows and the nature of the money laundering coming from these activities. Together with other experts, the Financial Action Task Force affirms that serious obstacles exist at the legal, information exchange and capacity level that make it difficult to investigate and prosecute crimes that impact the environment. The Financial Intelligence Units of the countries directly affected play an important role in this by identifying the risks associated with money laundering and adopting measures to increase the surveillance of transactions.

9. The regulation of psychoactive substances via environmental standards that are connected to climate justice as part of the debate on alternatives to respond to the illegal drugs phenomenon. Regulation for medical or scientific purposes, as well as regulation of recreational cannabis use, as has occurred in some countries and jurisdictions, could open opportunities for the reduction of environmental impacts if certain standards are included and met, in particular within the climate justice framework.

Protecting the planet and climate change requires effective and urgent measures. Drug policy offers an opportunity to bring together agendas and intentions, taking into account the lessons learned, while aiming at a common goal: the well-being of our planet and all the beings that inhabit it.

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Photo: The result of deforestation alongside the Utuquinía River, Ucayali, Peru. V. Martínez (COPOLAD, 2024)

Introduction

Over the last decade, there has been a growing interest in the environment and climate change on the agendas of governments at both national and regional levels. What was previously considered a niche or referential issue has acquired an importance comparable to that of the economy and the well-being of their citizens and is now a priority aspect of government policies. In the area of drug policies, the close relationship between the illicit drug trade and environmental impacts has become evident, as have the negative effects that, in some cases, can also result from the measures taken to reduce supply and respond to the problem of drug trafficking. Furthermore, countries have increasingly included the environmental dimension in their development strategies, national policies and multilateral debates.

COPOLAD III Programme, whose main objective is to improve the design and application of policies related to drug demand and supply reduction in Latin America and the Caribbean countries, while ensuring that these be based on sustainable development, by incorporating the key dimensions of public health, gender equality and human rights, among others, and as part of its agenda on cross-cutting approaches, presents this study that delves into the *negative impacts on the environment linked to the production and trafficking of illicit drugs and supply reduction activities,* and focuses on the impact on forests, areas beyond the agricultural frontier and the fragile ecosystems.

This report seeks to contribute to the understanding of the context in which environmental impacts occur and the relationship between the different components of the illegal drugs market. In addition to identifying the impacts of specific activities (the cultivation, production and trafficking of psychoactive substances), it analyses their interaction and the factors that drive them. It also recognises the convergence of the illegal drugs market with other crimes and dynamics that impact the environment, the role played by money laundering, as well as the collateral damage and unwanted effects of the State's actions. The above is viewed not only from the framework of drug control, but also from the perspective of sustainable development and Human Rights.

This study offers a strategic perspective that analyses and proposes possible alternatives to avoid, reduce or compensate the environmental impacts. In addition to the assessment, it seeks to contribute to creating public policies by identifying the challenges, options and possible solutions. In this regard, the study seeks to contribute to strengthening the monitoring and assessment capabilities in environmental matters, and

to support decision makers in each area, namely the institutions in charge of public policies, and also the citizens and their organisations to the extent that it aims to stimulate public debate and a shared effort.

The first section of the study addresses drugs policy and its connection with the environmental agenda, taking into account the frameworks that generate obligations for States and considering the current international control regime and supply reduction measures, the Sustainable Development Goals and Human Rights. The second chapter proposes a conceptual and methodological framework based on the *Strategic Environmental Assessment* designed to identify the different dimensions in which the impacts occur. The third chapter analyses the environmental impacts and is the result of an extensive review of the evidence found in the countries of Latin America and the Caribbean. The fourth provides an in-depth study of the Amazon Basin as a setting of special relevance for the region, due to its size, ecological and ethnic value, among other aspects, in which illicit crops and drug trafficking have been expanding and consolidating. The fifth section contains the main conclusions of the report and the sixth and final section identifies the opportunities and levers of change for correcting and mitigating the environmental impacts, as the main added value of the analysis.

Additionally, at the end of the document a Methodological Guide is proposed, whose main objective is to provide conceptual and instrumental guidelines and tools that can be preliminary inputs for the National Drug Observatories of Latin America and the Caribbean in the design and implementation of research and analyses more specific to this topic.

Photo: Crop plots and agricultural frontier. V. Martínez (COPOLAD, 2024)

This report shows that the environmental impacts of the illegal drugs market are multiple, significant and interrelated and, in some cases, have been underestimated or weakly integrated into the design and implementation of response policies and strategies, especially when considering their convergence with other illegal economies and environmental crimes, as well as their impact on the lives of communities and human rights. This not only affects countries where illegal drugs are produced, but also an increasing number of transit countries. The good news is that there are also multiple opportunities and levers of change for enabling drug policies to mitigate environmental impacts and contribute to the restoration and conservation of those ecosystems that have been affected.

1. Drugs policy and its connection with the environmental agenda

The growing recognition of the need to protect and conserve the planet, with manifest concern about the effects of global warming, among other more local processes, has led the different international agendas and frameworks to take into account environmental challenges and the need to find answers for the different economic activities and the distribution of the population in general. With their ever-increasing influence on the environmental perspective and the incorporation of commitments in this matter, drug policies and their development areas have not been exempted from this discussion.

Although environmental issues have tended to be debated outside drug policies, the greater influence of human rights and sustainable development has given more visibility to the environmental impacts of illegal drug production and trafficking activities and supply reduction activities. In the assessment of the application of the international drug control regime, the environmental consequences of the policies have been relatively underestimated and only recently have their effects upon local ecosystems begun to be made more clearly visible (McSweeney, 2015). The significance taken on by the crises of climate change, loss of natural habitat and biodiversity, and pollution and waste disposal in general has contributed to this perception.

1.1. The progressive connection of drugs policy and the environmental agenda

Although issues related to the environment had been discussed within the United Nations since the 1960s (the first conference on this topic was held in 1972, in Stockholm), in the field of drugs policy, the first reference to environmental issues was only made in the late 1980s. The United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988 addresses this issue in a restrictive manner, namely within the context of measures to eradicate the cultivation of plants containing narcotics while calling for the protection of the environment. During this Convention, the link between drugs and "development" is established from a predominant security perspective (Alimi, 2019).

According to paragraph 14.17 of the Commentary on the Convention: "The use of toxic chemicals, especially where they are sprayed from aircraft, may prove highly effective but the environmental risks associated with that and similar practices need to be weighed" (United Nations, 1988). At the end of the 1960s, in countries like Colombia and Mexico, paraquat was sprayed, and in 1984 the measure became widespread, with coca and later poppies being sprayed (Moreno, n.d.).

The next reference within the framework of international drugs policy came a decade later, in the *Political Declaration and Plan of Action on the Eradication of Illicit Drug Crops and Alternative Development of 1998*, which established that alternative development programmes (ADP) should include environmental protection measures. Six years earlier, the United Nations Conference on the Environment and Development, also known as the Earth Summit, had been held in Rio de Janeiro. The Rio Declaration emphasised the concept of *sustainable development*, balancing environmental, social and economic concerns.

In the first phase, the ADP focused on simple models for the substitution of crops for illicit use, implemented to prevent the expansion of plantations. But this approach was expanded, integrating social and rural development components, as well as environmental conservation and protection. In 2013, the *United Nations Guiding Doctrines on Alternative Development* once more pointed out that ADP should include measures to protect the environment, thereby creating incentives for conservation, raising awareness among communities and mitigating negative impacts. General provision 17 indicated, for example, that environmental indicators must be incorporated into the ADP.

In the global scope of development, 2015 saw the adoption of the 2030 Agenda for Sustainable Development, which has *environmental sustainability* as one of its three dimensions together with social and economic development. It is therefore an element that cuts across all of the sustainable development goals (SDGs) and is reflected more directly in some than in others. This is the case of SDG 13, which addresses the fight against climate change and its effects, or SDG 15, which promotes the sustainable use of land and forests. Furthermore, the 2030 Agenda for Sustainable Development explicitly considers substance abuse as an integral part of development problems for the first time (COPOLAD, 2023).

This same year saw the signing of the *Paris Agreement*, a legally binding international climate change treaty aimed at limiting global warming, increasing resilience and reducing greenhouse gas emissions.

Photo: Centennial tree. Disturbed primary forest-agricultural frontier. Honduras. V. Martínez (2024)

Also, in 2015, and for the first time, the World Drug Report prepared by the United Nations Office on Drugs and Crime (UNODC) considered the environmental impact within its analysis of drug markets. "The illicit cultivation of the coca bush and the transformation of coca leaves into cocaine continue to cause serious environmental damage even though coca bush cultivation has decreased" (UNODC, 2015), stated this report. In addition, the report considers the impacts caused by the herbicides and fertilisers used in the production of cocaine.

One year later, the United Nations General Assembly Special Session (UNGASS), held in 2016 to address the drug problem, and its final document, marks an important milestone by providing a multidimensional read, with clear references to the Sustainable Development Goals (SDGs) and a thematic chapter addressing development (Alimi, 2019). Regarding the environmental perspective, the approach is more restrictive, with a new call being made to address the consequences of illicit crops and the manufacturing and production of narcotic drugs and psychotropic substances, all within the framework of

alternative development programmes. Furthermore, UNGASS 2016 refers to the importance of environmental protection in relation to eradication measures.

In its 2016 World Drug Report, UNODC establishes the link between drugs and "environmental sustainability" (citing SDG 15.1 "Conserve and restore terrestrial and freshwater ecosystems") and points out the negative effects of the deforestation caused by illicit crops and substance trafficking. In addition, it refers to the consequences of eliminating the chemicals used in the production of cocaine and opioids. The reports published between 2017 and 2021 do not address nor mention environmental issues, an example of the low visibility and relevance given to this agenda.

In Latin America and the Caribbean, an important milestone can be found in the *Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters*, adopted in Escazú (Costa Rica) on 4 March 2018. Although it does not contain a reference or connection with the impact of illegal drug markets, this regional treaty is relevant for enshrining the protection of activists defending human rights in environmental matters and in containing specific provisions to safeguard them. As will be seen later, among the negative consequences of drug trafficking is its impact on local leadership, which plays a key role in the conservation and protection of ecosystems and populations.

Photo: Flood plain. Guayas, Ecuador. V. Martínez (COPOLAD, 2024)

In 2022, in its Resolution 76/300, of 28 July, the United Nations General Assembly recognised for the first time the human right to a *clean, healthy and sustainable environment*. In April of the same year, the United Nations Human Rights Council had also declared access to a "clean, healthy and sustainable environment" as a universal human right.

Although the resolution is not legally binding for the 193 member states of the United Nations, it is an important step that marks a course for the connection between an alignment of drugs policy and human rights. There are also statements made by the Commissioner for Human Rights and a significant number of Special Rapporteurs calling for a rethinking of the undesirable effects of suppression-based drug policy and to move more seriously to align drug policy with the UN Charter and, in particular, with human rights.

In this regard, a further milestone is the publication of the *2019 International Guidelines on Human Rights and Drug Policy*, supported by the United Nations Development Programme, the Office of the United Nations High Commissioner for Human Rights, the World Health Organisation and UNAIDS. According to these Guidelines, "States must ensure a safe, clean, healthy and sustainable environment to respect, protect and effectuate human rights, including the rights to health and an adequate standard of living".

International Guidelines on Human Rights and Drug Policy related with the environment

In accordance with efforts to respect, protect and effectuate those human rights related to a healthy environment, States should:

i. Ensure that drug control measures do not cause deforestation, degradation of natural habitats, loss of biodiversity or other environmental damage within or outside their geographical borders.

ii. Take effective measures to prevent and correct the environmental damage caused by drug control measures with respect to illicit crops and production, including measures to limit exposure to pesticides or other chemicals used to eradicate such crops.

iii. Establish and enforce buffer zones that prohibit or regulate the application of pesticides and other chemicals used for the eradication of illicit crops around sensitive sites, including human settlements, farms and water sources.

iv. Prohibit the spraying of pesticides, herbicides and other chemicals from aircraft as a method to prevent and eradicate illicit drug crops, unless it is demonstrated that such chemicals do not pose a risk to human life or the environment.

Source: International Centre of Human Rights and Drug Policy (2019). International Guidelines on Human Rights and Drug Policy. Available at:
https://www.humanrights-drugpolicy.org/site/assets/files/1671/hrdp_guidelines_spanish_2020.pdf

In Vienna in 2022, the Commission on Narcotic Drugs – the United Nations' main drugs policy-making body - approved its resolution 65/1 entitled "Promoting alternative development as a development-oriented drug control strategy, taking into account measures to protect the environment". This resolution establishes the link between the Conference of the Parties and the United Nations Framework Convention on Climate Change, as well as the work carried out within the framework of the *Convention on Biological Diversity.* The resolution encourages Member States to ensure that the ADP "...examine and address the harmful impact of the illicit cultivation of crops used for the production of narcotic drugs on the environment...and to seize the opportunities offered by alternative development with regard to the conservation and sustainable use of the environment and protection of biodiversity".

In this context, the 2002 World Drug Report included, for the first time, a section on the environmental impacts of drug markets, which includes all of the aforementioned, from the broader perspective of the SDG, climate change and environmental sustainability. In this section UNODC identified a number of negative consequences, such as the carbon footprint of cannabis crops cultivated in greenhouses, the deforestation associated with coca crops, as well as the dumping of the waste generated during the manufacture of drugs of all types. It is important to mention that this publication is presented at the Commission on Narcotic Drugs in Vienna, followed by a growing number of parallel events held in recent years on the topic of drugs and the environment. (Kay, 2022).

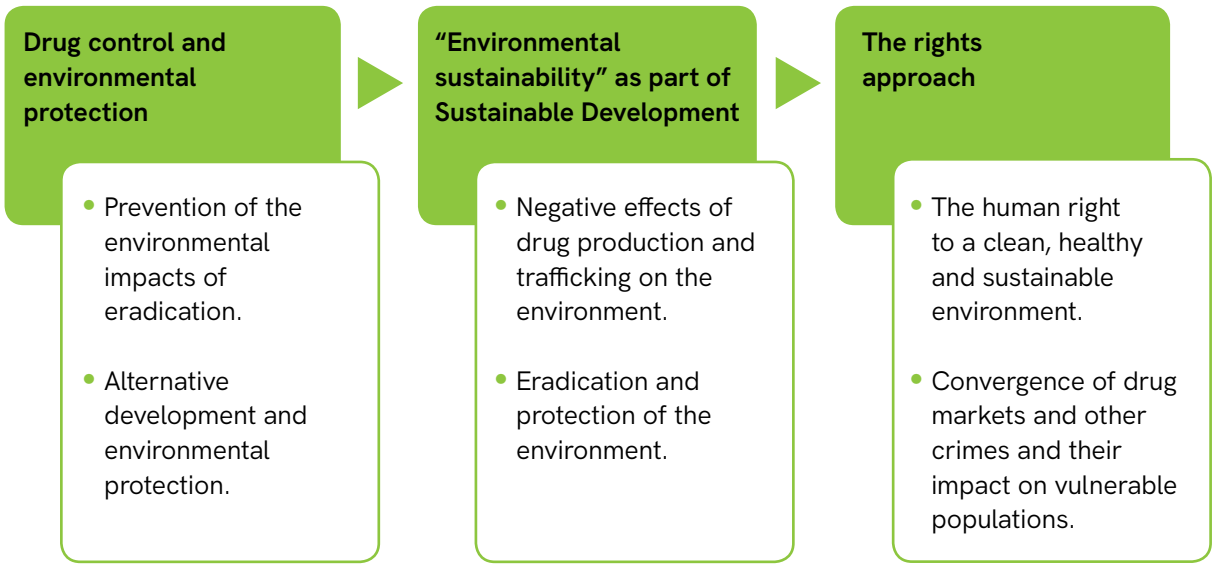
Photo: Smallholder's home with vegetable plot. Honduras. V. Martínez (COPOLAD, 2024)

Recently, the 2023 World Drug Report focused on the Amazon Basin, pointing out that drug trafficking and production are intertwined, in a cross-border dynamic, with illegal or unregulated activities harmful to the environment and society. In some areas of the Amazon Basin these activities include illegal land occupation and overgrazing, illegal logging, illegal mining, trafficking in species of wild fauna and flora, and other crimes against the environment.

In this case, the identification and analysis of environmental impacts occurs within the framework of the convergence of the illegal drug markets and other crimes. This allows us to identify impacts on social groups in vulnerable situations. UNODC notes that "Indigenous Peoples and other local communities are caught in the criminal nexus of the Amazon Basin; they are victims of displacement, mercury poisoning and other serious health consequences, as well as increased exposure to violence and victimisation." (UNODC, 2023).

As can be seen in this section, the evolution of the connection between drugs policy and the environmental agenda and its impacts can be understood via three frameworks that generate obligations for States.

Figure 1. The connection between drugs policy and the environmental agenda based on international frameworks



Source: Prepared by the author

Although the human rights approach precedes the drug control framework and the sustainable development agenda – the Universal Declaration of Human Rights was drafted in 1948 – the enshrinement of the right to a clean, healthy and sustainable environment is recent. In the case of Latin America, we must also highlight that some countries recognise *nature as being a subject to rights*. This is what is done by the constitutions of Ecuador (2008) and Mexico (2017) and Bolivian law, which recognise Mother Earth as the holder of rights (2010), as does legislation in Brazil (2017). Furthermore, in Colombia there are

multiple judicial decisions in this regard – for example, in 2018 the Supreme Court of Justice recognised the Amazon Basin as an entity subject to rights (Botina, 2020).

Whatever the case, it is important to note that the three reference frameworks – drug control, the 2030 Agenda for Sustainable Development and human rights – have been developed independently, with few interactions between them. Recent attempts have been made to generate explicit connections and align goals, as well as to create governance and monitoring mechanisms that make their scopes effective (COPOLAD, 2023).

The case of the drugs policy framework draws attention to the fact that the first allusion to environmental protection is made with respect to the potential negative consequences of eradication and the need to include this approach in the ADPs. Starting in 2015, and within the framework of the 2030 Agenda for Sustainable Development, the negative effects of illicit drug production and trafficking activities are explicitly recognised.

1.2. Sustainable Development and the environmental impacts of illegal drugs and the policies designed to address them

Historically, there has been very limited recognition of development-oriented considerations within international drug control (McSweeney, 2015). Only recently, in the 2016 UNGASS Outcome Document, did UN Member States accept that efforts to achieve global goals and address the "global drug problem" were "complementary and mutually reinforcing". This recognition offers an opportunity to connect drug policies with a global framework for progress, social security and environmental protection. Although there are few explicit links with the SDGs, the illicit drug phenomenon and the policies designed to combat it impact almost all dimensions addressed in the Agenda.

The concept of sustainable development on which the 2030 Agenda for Sustainable Development is based appeared for the first time in the Brundtland Report established within the framework of the World Commission on the Environment and Development in 1987. The *Brundtland Report* pointed out the negative environmental consequences of economic development and proposed possible solutions to the problems caused by globalisation and population growth. A decade later, at the Earth Summit in Rio de Janeiro, the concept of sustainable development was made official. This shows that the connection with environmental issues has been present since the beginning of discussions on development.

Photo: Abandoned smallholder's dwelling. Colombia. V. Martínez (COPOLAD, 2024)

"Environmental sustainability" appears as one of the three dimensions of the 17 SDGs – together with social development and economic development – and aims to protect the natural balance of the planet, while limiting the impact of human activities. Environmental sustainability is cross-cutting, although it is more directly reflected in some goals than others. For example, Goal 13 is about combating climate change and its impacts, while Goal 15 aims to promote sustainability and properly use land and forests.

As UNODC points out in the 2022 World Drug Report, drug use, the illicit drug economy and responses to these phenomena are also linked to different Goals, such as Goal 1 (poverty reduction), Goal 2 (food security), Goal 3 (health) and Goal 16 (just, peaceful and inclusive societies).

It is important to highlight that the SDGs are based on the "do no harm" principle, which establishes that no policy should contradict the goals established in the 2030 Agenda for Sustainable Development (Jelsma, 2018). In other words, the actions taken to combat illegal drugs should not affect the capacity of States and communities to achieve these goals. In fact, a report published by the United Nations Development Program (UNDP) in the run-up to UNGASS 2016 highlighted the devastating consequences for the environment of eradication campaigns, pointing out the disconnection between drug control and development policies (UNDP, 2015)

In practice, the "complementary" and mutually reinforcing relationship between drug policies and sustainable development efforts contained in the UNGASS 2016 Final Document faces the challenge of integrating sectoral and compartmentalised agendas (Alimi, 2019). A relevant advance in this regard is the *Common Position* approved in 2018 by the United Nations System Chief Executives Board for Coordination to support collaboration within the United Nations system regarding implementing the international drug control policy. In the Common Position, the agencies commit to "promote sustainable livelihoods through appropriately sequenced, well-funded and long-term development-oriented drug policies in rural and urban areas affected by illicit drug activities, including cultivation, production and trafficking, taking into account the protection and sustainability of the environment".

Although there are interactions between UNODC and the United Nations Environment Programme, these do not cover issues related to drugs policy, which occupies a marginal space on the global environmental agenda. This happens in part because the environmental impact of illicit drug cultivation and manufacturing on a global scale is relatively small compared to that of the legal agricultural or pharmaceutical sectors. Although, as UNODC points out, its effects can be considerable at the local or community level (UNODC, 2022).

Furthermore, although the international drug regime has opened itself up to other approaches, it continues to have a strong punitive suppression-based bias that is often disconnected from the development agenda and the primacy of human rights. In this context, the recent announcement by the UN Committee on Economic, Social and Cultural Rights of a General Comment on drugs policy becomes relevant (Cots Fernández & Nougier, 2022).

Photo : Flor de Ucayali-Peru NC technical assistance mission (J. Guimaraes, 2024).

1.3. Illegal drugs and environmental impacts from the perspective of convergence with environmental crimes

The greater general concern for environmental issues, climate change and environmental protection has had an impact on the generation of legal frameworks and standards to punish behaviours that generate serious impacts. In this area are the so-called "environmental crimes", for which there is no formally agreed definition. The Kyoto Declaration stipulates that Member States shall endeavor to adopt effective measures to prevent and combat these crimes, such as the illicit trafficking of wildlife, timber, and hazardous waste, as well as poaching (UN, 2021). According to UNODC, environmental crimes fall into four areas: 1) Acts that cause environmental pollution or degradation; 2) Acts that involve the movement or dumping of waste; 3) Trade or possession of protected or prohibited species of fauna and flora; 4) Acts that result in the depletion of natural resources (UNODC, 2021).

Environmental crimes are often connected to other categories of crime. According to an Interpol survey, 84% of countries report a convergence of environmental crimes and other serious crimes (INTERPOL, 2015) and, on the report of Eurojust, in two out of three cases these crimes are related to other felonies (Eurojust, 2021). This occurs because the criminal networks involved in environmental crimes often also participate in other illegal economies, such as drug or human trafficking.

In the section of the 2023 World Drug Report dedicated to the environmental impacts of drug trafficking and production in the Amazon Basin, UNODC addresses "convergent crime" to point out the connection, overlap and geographic coincidence of drug-related crimes and those that impact upon the environment, including corruption, fraud, extortion, violence and other forms of victimisation. According to this report, "drug trafficking groups are diversifying into crimes that affect the environment... including the illegal occupation of land for industrial agricultural purposes, illegal logging, illegal mining, poaching, and wildlife trafficking as a way to generate income and launder illicit profits" (UNODC, 2023).

The convergence perspective expands the scope in which the environmental impacts of illicit drug production and trafficking activities are identified, making visible their multiple connections with other illegal activities or economies and crimes. Regarding environmental crimes, it has been observed that most of the damage caused occurs in the medium and long term; environmental damage is often due to the accumulation of repeated and cumulative actions and not to a single criminal act. This means that environmental crimes are not easy to detect or delimit. When the environmental impacts become evident, the criminally generated profits have already been obtained and the offenders are long gone (Mäkelä, et al., 2023). In practice, it is also difficult to find causal relationships between certain criminal behaviours and dynamics and the ensuing environmental damage and degradation. For example, in an area where different legal, illegal and informal economies converge, a systemic approach is required that allows scientific research to move forward to recognise interactions and feedback loops. As will be seen in this report,

advances in this area are incipient or weak in terms of their sustainability, although their potential results are promising.

For the purposes of this report, the *convergence* of the analysis will allow for a broader and multidimensional view that considers not only the direct and indirect impacts of drug production, processing, and trafficking but also the influence that drug trafficking has on other illegal economies, thereby expanding the range of impacts in each area.

2. What are we talking about when we discuss the impacts on the environment from the drugs perspective?

From the drugs perspective, environmental impacts can be understood as the negative or harmful effects on natural resources and ecosystems generated by activities linked to the illegal drugs market, as well as the State's responses aimed at reducing the supply of psychoactive substances. The impacts can be directly caused by drug production and trafficking activities, as well as indirect, such as those linked to drug trafficking and the money laundering linked with this illegal economy.

The drug trade phenomenon involves a complexity of processes that are either difficult to delimit or that allow stable and normalized measurements of its environmental impacts. This is both due to the particular characteristics of each activity or phase, its geographical location, its dispersion and mobility between areas, the variability of compromised natural resources, as well as the context of illegality and suppression that limits access to precise information about the potential impacts on each ecosystem.

The Environmental Impact Assessment (EIA)[2] and the Strategic Environmental Assessment (SEA) have been positioned as important tools to evaluate and manage the environmental impacts of projects and policies. The EIA is a preventive methodology and tool applied by the countries and entities involved to measure, correct or mitigate the

2. The EIA has become a preventive tool applied by different countries. In 1985, the EU approved Directive 337/85/EEC referring to the assessment of the environmental impact of certain public and private projects. Although European Directives are not mandatory and have undergone amendments, many EU countries have transposed this Directive into their national regulations as Laws, thereby making them obligatory. In the United States of America, advances in environmental regulation and control of activities in natural spaces are also highlighted, with the *Environmental Policy Law* of 1969 requiring an environmental assessment of all major federal projects and programmes that could affect the quality of the human environment. Currently, there is a robust regulatory body that is managed by the Environmental Protection Agency (better known as the EPA).

Photo: Working in the plant nursery at the cooperative. Colombia. V. Martínez (COPOLAD, 2024)

potential impacts of an activity, action or project on the physical-natural, biological or socio-economic environment in which it is implemented. It brings together specialised knowledge from different disciplines related to the environmental resources and factors identified and deemed to be compromised. However, its scope is usually ocused or one-off, requiring precise measurements of and data on each impact and location. It is also oriented towards compliance with norms or standards set as limits that guarantee the sustainability and balance of each ecosystem.

On the other hand, the *Strategic Environmental Assessment (SEA)* identifies impacts to evaluate and forecast possible significant changes that may occur as a result of the implementation of policies, plans, or programmes. The SEA seeks to identify and analyse the direct and indirect effects, in the short and long term, taking into account the complexity of environmental systems and their interaction with other aspects of development. This to consider sustainability and reasonable alternatives for prevention or compensation (Herrera & Bonilla, 2009).

From the perspective of the SEA, it is not enough to indicate some reference magnitudes and explain the environmental impacts of the different stages of the illegal drug market; it is necessary to be clear about the institutional framework and how it conditions these practices, the institutional capacities, and the policy options.

To date, the studies that have addressed the environmental impacts of the drug phenomenon have done so by identifying the changes that a certain activity – cultivation, production or transit – has on a specific ecosystem, based on a reference situation or baseline. Generally, these analyses break the market stages down into segments without stopping to assess the interaction between the different processes, variables and stakeholders.

The identification of the environmental impacts of illicit drug production and trafficking activities, as well as actions taken to reduce drug supply, are important but insufficient for the design of a comprehensive public policy and effective decision-making. When we talk about impacts on the environment, it is essential not to lose the strategic perspective, that is, to consider the underlying factors and causal chains that condition the environmental problems or effects.

As the OECD points out, compared to the Environmental Impact Assessment (EIA) implemented at the project level, the SEA is situated at a strategic policy level, which requires a deeper understanding of the political economy factors and the institutional frameworks that come together in each case. This, for example, includes recognising the differences in political power between the affected groups, their ability to negotiate and influence policy, and ultimately the economic, social and environmental impacts of policy-related decisions (OECD, 2007).

In the case of the illegal drug market, the environmental impacts must be understood within the framework of the control of psychoactive substances, under a regulatory system that assumes that the market could be controlled through the application of the law and the dissemination of police-enforced safety measures at an international level – with the goal being a "drug-free world" (Collins, 2014). The fundamental principle of international regulations is to limit the uses of controlled drugs to "medical and scientific research." All other uses must be limited or eliminated. This framework imposes strong restrictions on the drawing up of policies related to psychoactive drugs, which mark a difference with the suppression-based paradigm (Thoumi, 2009).

Considering the countries of Latin America and the Caribbean, the current system implies a transfer of the costs of the "drug problem" faced by consumer countries that involves forcing producing and transit countries to implement actions to reduce supply, with the aim being to raise the price of substances and thus reduce their availability (Mejía & Restrepo, 2014). The environmental impacts that occur within the framework of this illegal market are part of these costs.

The application of the SEA faces important restrictions when addressing the relationship between illegal drugs and the environment. The first of these is the illegal and clandestine nature of the drug market, which is generally regulated by criminal organisations that operate and sustain production in remote or isolated areas that are difficult to access and highly environmentally sensitive. The market is driven by economic processes that respond to demand, encourage production and seek to increase profitability. In other words, environmental considerations are understood, reinforced or mitigated without State involvement and are the result of the interaction of stakeholders in the illegal market.

The second restriction is that drugs policy and how the State seeks to reduce the supply of psychoactive substances are ongoing. In this case, the SEA does not seek to anticipate or prevent the implementation of a specific policy or programme, but rather will help to understand the most relevant impacts of the illegal drug market and the consequences of the State responses already implemented. Thus, this report aims to provide inputs to guide decision-making by considering a wide range of options - inside and outside the bounds of suppression - to align drugs policy with environmental protection.

Photo: Rocky riverbed, Peru. V. Martínez (COPOLAD, 2024)

The third is methodological. The SEA includes a wide range of analytical and participatory approaches and tools that seek to integrate environmental considerations into policies, plans and programmes (OCDA, 2007). The methodological approach of this report is supported by and takes elements from the SEA to guide the analysis and discussion and will focus on systematising and synthesising the status of what is known about the environmental impacts of the drug market and the State's responses while considering the underlying factors and how they interact. Ideally, the environmental assessment should also involve communities and stakeholders, and be conceived as an iterative process that encourages feedback.

It is worth mentioning that an EIA and SEA[3] can be used in a complementary manner. The former is useful when analysing specific phases of the illegal drug market (for example, the environmental impacts of coca crops in a certain geographic area) or State responses (the impacts of aerial spraying). The latter operates on a broader level by addressing strategic issues and considering multiple phases and components and their interrelationships in a more general context (for example, identifying how the demand for illegal drugs drives the planting of coca crops that cause impacts on the environment, or how crop seizures can influence the establishment of newly cultivated areas). In this report, elements of these two tools are used to integrate environmental considerations into political-strategic decision-making.

2.1. Defining the scope of the report

The first step in moving the analysis of environmental impacts from a drug perspective forward is to define the scope and purpose of the assessment clearly. This report sets out to *assess environmental impacts based on the available evidence while considering the multiple activities and processes of the illegal drug market and what States are doing to suppress it. Special attention will be paid to the impacts on forests, areas beyond the agricultural frontier, and fragile ecosystems.*

The production and trafficking of illicit drugs involves a broad set of activities and processes that vary depending on the nature of the substances (natural or synthetic), the places of origin and destination, the stakeholders involved, the technologies used, the products and precursors used, the illegal regulations established and the control mechanisms or actions implemented by the prevailing political framework to date. As it is an illegal activity, carried out clandestinely, with a generally isolated or dispersed distribution of crops and the involvement and interaction of several stakeholders, ecosystems and natural resources, information on production and trafficking and their environmental impacts is limited and must always be treated with a degree of caution.

To perform a preliminary sizing of the scope of environmental impacts, the production and trafficking of cocaine can be taken as a reference point as it is the substance about which there is the most information. A basic diagram designed to serve as a guide for the analysis consists of the following phases. Each of these is made up of a set of activities that may have consequences for the environment (Mejía & Rico, 2011; Ministry of Justice and Law and the University of Rosario, 2021):

- The cultivation and harvest phase of the coca leaf (which includes the establishment of the plantation, the use of fertilisers, herbicides and other crop maintenance products).

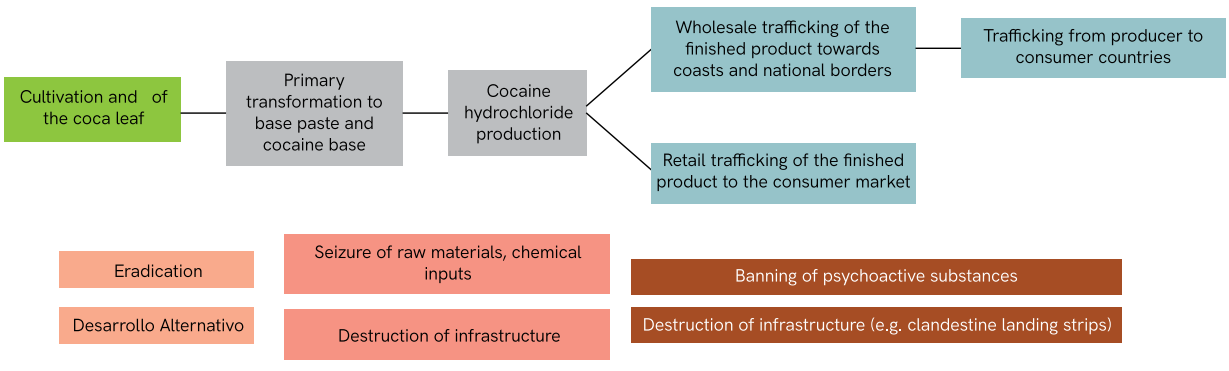
3. The Convention on Biological Diversity encourages the use of the SEA in its implementation without defining it as a specific requirement.

- The primary transformation phase to produce base paste and cocaine base (with the use of chemical precursors and elements such as cement and gasoline).
- The cocaine hydrochloride production phase (which requires physical infrastructure and chemical additives).
- Wholesale trafficking of the finished product to coasts and national borders or moving it to the retail market (via establishing different routes and means of transport).
- Trafficking from the producer to the consumer countries.

The labour or human resources used in each phase are variable and have the potential to generate temporary or permanent local environmental impacts either where they occur and when moving between producing areas. In some cases, they include flows of irregular migrants fleeing marginal urban or homeless background situations who become involved, along with other vulnerable groups. This is aggravated by a precarious habitat and stigma factors, in addition to human rights violations and an absolute lack of social protection.

Additionally, there are the actions taken by the State to reduce the supply in each of the phases: the eradication of crops; the banning of chemical substances, the destruction of laboratories and production infrastructure, as well as the implementation of comprehensive alternative development projects that seeks to advance innovative approaches to respond to the complexity and diversity of the phenomenon.

Figure 2. Cocaine production and trafficking phases and State actions to reduce supply

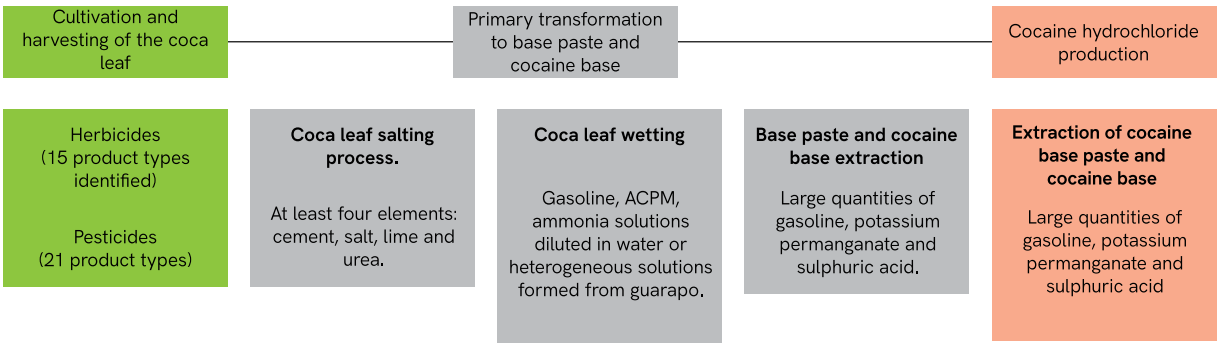


Source: (Mejía & Rico, 2011; Ministry of Justice and Law and the University of Rosario, 2021)

In turn, each of these phases includes a set of activities, practices and processes that generate impacts on the ecosystems and populations linked to them or on their areas of influence. To illustrate this point we can take as an example the large volume of substances used in the cultivation and production phase of cocaine. For example, according to UNODC estimates, 284 litres of gasoline are required to produce one kilogram of cocaine.

This and other chemical products are discarded in an uncontrolled manner and in large quantities, causing contamination of soils, aquifers and vegetation, in addition to affecting the existing fauna in the river basins and areas where production takes place. This includes the actions taken and seizures made by the authorities in remote locations, where guidelines for the safe disposal of products used in the illicit manufacture of drugs or stored for this purpose are not applied (Steffens, 2023), or the required transport, storage processes and adequate final disposal procedures specified by the current regulations are not followed.

Figure 3. Substances used in the production of cocaine



Source: (Ministry of Justice and Law and the University of Rosario, 2021; Andean Community-PRELAC/UNODC Project, 2012; Barrera-Ramírez, et al., 2019)

Furthermore, these actions do not occur within or are limited to a single territory, but rather encompass a variety of geographies, ecosystems and land division or property structures, which adds complexity to the analysis and planning of possible responses. For example, coca leaf crops can be established in areas located within the agricultural frontier, but they can also be found in forest areas and fragile ecosystems, covering several river basins and sub-basins, with interconnected hydrographic networks and biological dynamics, each with its particular degree of environmental sensitivity. In all cases there are consequences for the environment, but the impacts differ. Examining the direct environmental impacts in depth would require a focused approach involving the taking of direct measurements in delimited study areas.

It is also possible to adopt a macro view to analyse the dynamics linked to the production and trafficking of illicit drugs, as in the case of deforestation. Using aerial and satellite images, it is possible to estimate the areas of coca crops that have been established

in areas where primary forests used to exist, but generally, these are intertwined with other traditional crops and expanding livestock farming. For example, UNODC found that 50% of the new plantations located in the Ucayali region of Peru, detected between 2003 and 2022, were established in forests, thereby directly impacting the ecosystems and biodiversity existing in these areas (USAID & UNODC, 2023).

Photo: Forest plant nursery in Flor de Ucayali-Peru. V. Martínez (COPOLAD, 2024)

Taking the above into account, the analysis of the environmental impacts linked to illicit drugs involves considering different phases with multiple actions carried out in different territories and in which different stakeholders participate. This report aims to provide a broad and comprehensive perspective based on the available sources and evidence. This will allow us to identify those areas in which there is useful and sufficient information for defining relevant policies and also the knowledge gaps that must be filled.

From the SEA perspective, it is not only relevant to ask whether the particular activities linked to the illegal drug market and the State's responses to combat these have specific environmental impacts but also whether the drug policy generates the institutional framework and capacities so that its environmental impacts are socially and environmentally reasonable. This ensures that the state's response activities and drug policy not only address the immediate cause of an unwanted impact but also the structure behind it and what it generates on a recurring basis.

To illustrate this point, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) takes the example of what happens with forest fires. A reactive response would focus on how to put out the fires. On the other hand, a strategic and proactive decision would be concerned with the structural causes behind them (taking into account issues such as the abandonment of rural space or economic incentives for reforestation, practices for cleaning up remains of vegetation or conservation systems, for example). If attention is directed to the immediate cause that produces the negative environmental impact, the option would be to correct that cause – in this case putting out the fire – leaving the structure and conditions that systematically produce that impact intact and allowing them to reproduce it (Herrera & Bonilla, 2009). That is why it is vital to stop at the determining factors, namely the political-institutional framework, and examine how these have influenced the practices and policy options that have been applied.

In the case of the drugs policy, for example, it is difficult to understand the dynamics of deforestation associated with the establishment of crops for illicit use without considering the demand for psychoactive substances that stimulate their production and how these affect the conditions of the populations that participate in this activity and the effects of the State's responses to contain supply, among other factors.

Moving forward in identifying the strategic environmental dimension of drugs policy will require considering questions such as the following:

Table 1. Key questions raised by the Strategic Environmental Assessment

Scopes	Key questions
The policy framework	Has the policy framework generated any incentive to confront environmental problems in the context of the phenomenon of illicit drugs and other related crimes? What are the weaknesses of this policy and institutional framework to account for environmental problems and their interrelationships?
Policies and plans	What has been the environmental impact of policy objectives in the past? Have policy tools encouraged environmental impacts or, on the contrary, have they diminished them?

Ámbitos	Preguntas clave
Institutions	What are the relevant institutions with responsibility for managing the illicit drug problem and other related sectors? What is the capacity of the relevant institutions responsible for the environmental management of drugs policy?
Environmental policy options applied	What are the environmental policy options that have been applied to manage environmental problems? Have they been met? What are the prevention or compensation measures that have been applied to avoid environmental problems?

Source: Amended from Herrera & Bonilla 2009

Addressing environmental impacts should lead to an analysis of the environment and drug policy, including the institutional capacity to manage these effects and take advantage of environmental opportunities. This dimension will be addressed in a general way within the scope of this study, shedding light on public policy options.

2.2. Initial indicators for the analysis of environmental impacts

The SEA includes a basic analysis of environmental problems and the identification of specific impacts, based on indicators or parameters that are considered to be relevant to the impacts being evaluated. A useful tool for implementing this particular proposal are checklists. There are many indicators to determine the state of the environment; based on the relevant literature, a non-exhaustive list of indicators and variables is presented below to guide the identification of the impacts (UN environment programme, 2019).

In this particular report, the indicators are prioritised based on whether the evidence review is available. It is important to stress that this is an input for the impact analysis, which should not be limited to a list of negative impacts but rather explore the relationship between these variables, the context in which they occur, and the underlying causes.

Table 2. Environmental indicators for identifying environmental impacts

Indicator	Variables to be monitored
Air quality	Concentration of pollutants, CO2 emissions.
Water quality	Concentration of pollutants, oxygen levels, usage/capture of water sources, alteration of the hydrological cycle.
Soil and land quality	Concentration of pollutants, soil erosion, soil compaction and texture, low nutrient concentration.
Biodiversity and ecosystem health	Wealth and abundance of species, quality and diversity of habitat, plant diseases and pathogens (or phytopathological problems).
Habitat and vegetation	Loss of biodiversity, changes and fragmentation in vegetation cover; quality and extent of wetlands; forest health (slash and burn). Expansion of the agricultural frontier in nature reserves.
Waste generation	Generation of solid waste, toxic or hazardous waste and untreated wastewater.
Use of land and resources	Land use changes; impacts on agricultural practices and food security; environmental pressures on local ecosystems. More intensive production systems. Construction of access roads and tracks.
Energy consumption	Intensive energy use.

Source: Amended based on (UNODC, 2022; Policía Nacional de Colombia, 2014)

As for the *assessment factors*, within the EIA a degree of importance is established for each impact. This allows defining the most significant of these in order to study them further and prioritise correction or mitigation measures. Although this exercise involves a certain degree of subjectivity, it must be based on scientific evidence and clearly verifiable measurements and results.

In this report, the review of the literature on impacts will, as far as possible, consider the following assessment factors (Food and Agriculture Organization (FAO), 1995):

- **Impact Severity or Magnitude:** In terms of its intensity (speed and scope of the change), extension (generalised, local, one-off) and duration (long, medium, short).

- **Reversibility:** Whether the impact can be reversed or mitigated and to what extent the system has the capacity to return to a situation of balance similar or equivalent to the initial one, providing guidance on the feasible measures to apply to achieve this.

- **Cumulative nature:** If it adds to other existing impacts in the same area.

- **Synergy or Interactions:** Whether the impact interacts with others creating synergistic or exacerbating effects.

In an EIA, the combination of these factors helps to identify which impacts are minor, moderate or serious. In the case of the production and trafficking of illegal drugs, the information required to carry out this type of assessment is usually partial or limited, due to the difficult access to any formal or reliable records, to the cultivation areas and the processing centres. In the case of the cultivation areas and, in particular, of the processing centres, the presence of armed players entails risks to the safety of any external person, as well as to the local population, especially in terms of giving any information about illicit activities or related to the natural spaces where they are carried out.

2.3. The identification of impacts based on four aspects and how they interact

The identification of environmental impacts seeks to address at least four main aspects and how they interact:

a. **The direct impacts of the drug market, with emphasis on drug production and trafficking activities.** For example, the deforestation caused by the expansion of the area planted with coca shrubs or the contamination/loss of soil and water. Then, there is damage to flora and fauna due to the inappropriate use and disposal of chemical inputs used in agricultural production and processing, among other causes and factors.

b. **The impacts of the State's responses to control supply.** This includes eradication actions - either manual or using agrochemicals - and suppression, as well as projects that seek to promote comprehensive and sustainable alternative development of the areas affected by the illegal drug trade.

c. **The impacts of the convergence of the illegal drug economy with other illegal economies and crimes.** For example, illegal logging and/or mining, smuggling and other unregulated resource extraction activities, or the impact on Indigenous com-

munities and leading environmental activists by criminal organisations linked to drug trafficking, which weaken their ability to protect and conserve the ecosystems. This has a special importance for Latin America which, according to *Global Witness*, an organisation that documents the deaths of land and environmental activists, is the region that tops the list with the highest number of murdered activists (Global Witness, 2023).

d. **The local impacts linked to the laundering of the money and resources generated by the illegal drugs market.** For example, deforestation and expansion of the agricultural frontier are caused by productive activities financed with the laundered money generated by drug trafficking. According to the "2009-2016 Report on Regional Types", published by the Latin American Financial Action Group (GAFILAT), extensive livestock farming is one of the activities most used to launder money in the region (GAFILAT, 2016). As will be seen in this report, traffickers have acquired and transformed land in Central America to transport cocaine and launder part of their profits through different economic activities that have local impacts on ecosystems.

Figure 4 seeks to clarify the indicated aspects. As you can see, the relationships do not flow in a single direction. For example, State responses can impact production by eradicating plantations or interrupting transport routes, but at the same time these actions can generate displacements and stimulate replanting or the changing of routes to more isolated areas. It must be taken into account that a good part of the illicit crops are located in environmentally fragile areas. This is due to the search for remote areas so as to evade the repressive and control actions of the State and generates the so-called "balloon effect between routes and towns."

The boundaries between the four aspects indicated may not be completely clear. The illegal drug economy does not always arise as a contrary act or in the absence of the State. Different studies have shown how the coca boom in Colombia introduced farmers into the monetary economy and led them to seek recognition from their communities, stand for election and enter State politics (Torres, 2011).

Furthermore, the recent literature draws attention to the fact that illegal economies must not only be analysed according to their lack of formal institutions, but also by taking into account their co-opting and reconfiguration by criminal networks, thereby making it difficult to establish a clear line between what is illegal and the actions of the State's agents (Desmond, 2017; Schultze-Kraft, 2019). In Central America, and within the framework of Security Strategy actions, this phenomenon has also been reported in some municipalities located in border areas through which the routes or corridors regularly used by the region's drug traffickers run.

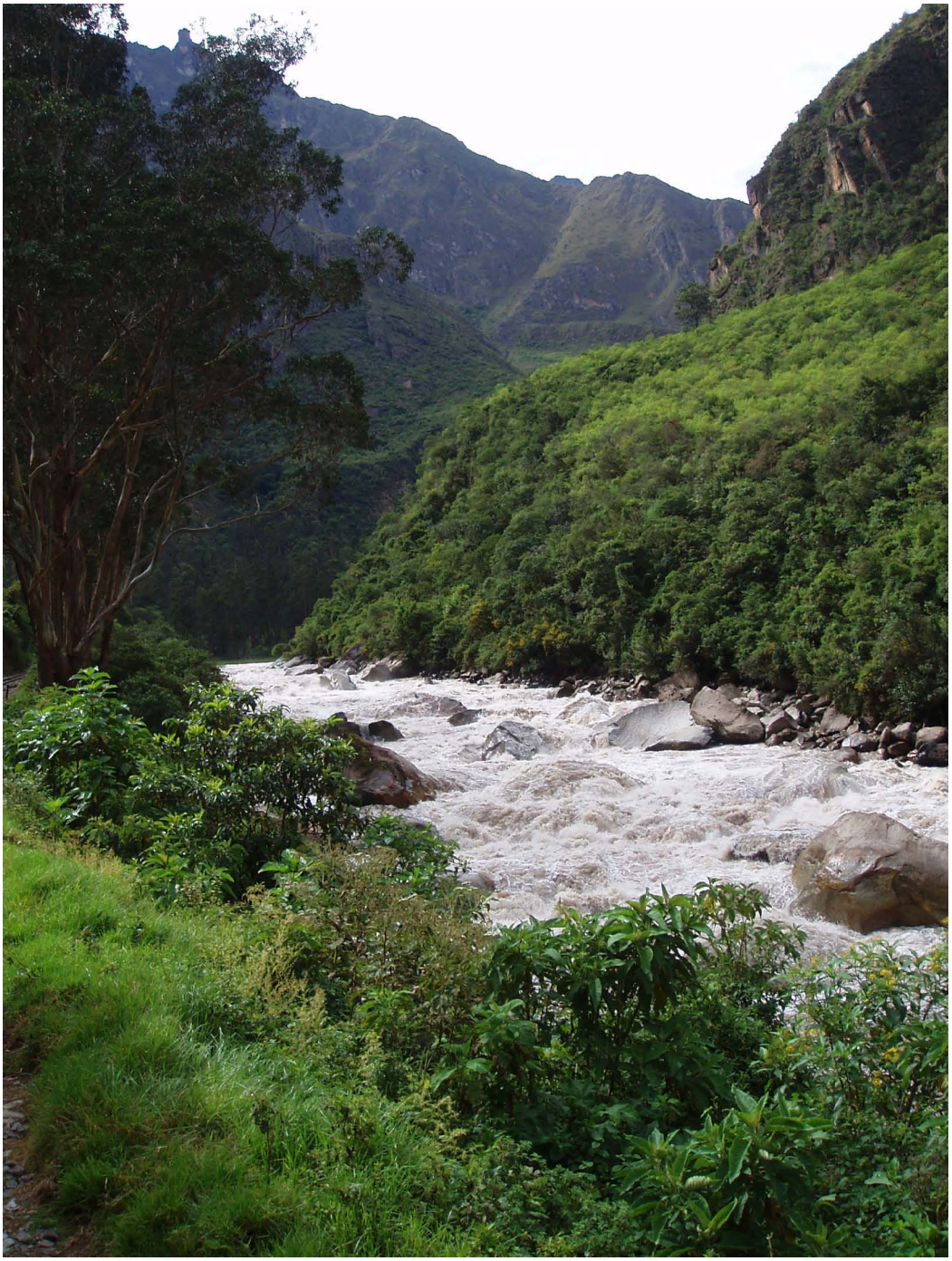


Photo: Fast-flowing river in the mountains of Colombia. V. Martínez (COPOLAD, 2024)

When considering these aspects, it is important to transcend the view of farming families as responsible for a crime that has consequences for the environment - within the framework of suppression, but as individuals who are also exposed to risks to their health and who are affected due to the deterioration of the ecosystems in which they live (Rhodes, et al., 2023) and by the control measures that are applied in certain contexts.

Figure 4. Aspects of the impacts of illegal drugs and State responses on the environment

Source: Prepared by the author

2.4. Magnitudes and reference data

In a special chapter dedicated to the clash between the illegal drug trade and the environment, UNODC concludes: "While the overall environmental impact of illicit crops and drug production is relatively small compared to the legal agricultural or pharmaceutical sector, the effects can be significant at the local, community or municipal level" (UNODC, 2022). In terms of their size, coca, marijuana and poppy plantations occupy a relatively small proportion of the agricultural land under cultivation.

In the countries of the Andean region – not including Ecuador and Venezuela – it is estimated that there are around 354,000 hectares (ha) under coca cultivation. As can be seen in the following table, this is equivalent to 0.5% or less of the land within the agricultural frontier. Globally, it is estimated that the total area dedicated to cultivation is 1.6 billion hectares, with crops for illicit use being a marginal activity. As UNODC points out, this difference in size has implications for the environmental impact of the use of chemical precursors, pesticides and other agricultural inputs for illicit crops compared to the agricultural sector in general (UNODC, 2022).

As a point of reference, in Colombia, when compared with some of the largest legal crops, the number of hectares under coca doubles those of cocoa and is four times that of those under soybeans (whose production levels in this country are very low), but it is far below the figure for coffee and palm oil. In Peru, the overall size of the coca plantations is similar to those of palm oil, but less than coffee and cocoa. In Bolivia, the hectares under coca are equivalent to 2% of those under soybeans.

Table 3. Extension of coca crops as a percentage of the agricultural frontier and in comparison with legal crops (2020-2022)

	ha of coca	% ha Agricultural frontier	% ha Coffee	% ha Cocoa	% ha Soya	% ha Palm oil
Colombia	230,000	0.5%	24.7%	121.1%	499.4%	38.3%
Peru	95,008	0.4%	22.3%	52.5%		100.0%
Bolivia	29,200	0.1%			2.0%	

Source: Hectares of coca: UNODC; FAO agricultural frontier; Coffee in Colombia Federation of Coffee Growers; Palm Oil in Peru Ministry of Agrarian Development and Irrigation (Midagri) and in Colombia Fedepalma; Soy in Colombia Fenalce, in Bolivia Integrated Productive Information System; Cocoa in Colombia Fedecacao in Peru Midagri.

From an environmental perspective, it is noteworthy that a significant percentage of these coca crops are located in protected or environmentally fragile areas. According to UNODC, in 2022 in Colombia, the presence of crops was identified in 13 of the 59 nature reserves declared in the national territory, with a total of 10,626 ha which is equivalent to 3.2 times higher than the figure recorded in 2010 (UNODC, 2023). In Peru, according to DEVIDA, since 2018 the upward trend has been maintained in the extension of the cultivated area in the Protected Natural Areas, going from 192 ha in 2018 to 439 ha in 2022, an increase of 128%. Similarly, in the transition or buffer zones, the number went from 6,535 ha in 2018 to 14,426 ha in 2022, a growth of 121% (DEVIDA,

2023). In Bolivia, in 2021, of the 22 Protected Areas, 6 coca plantations were identified, with a total of 452 ha.

In terms of their dimensions, the influence of coca crops on deforestation differs at local level. In Colombia, the evidence shows that the coincidence of these two variables is concentrated in specific areas with clear special diversities within the departments (Erasso & Vélez, 2020). In her presentation of the annual deforestation figures for the year 2022, the Minister for the Environment highlighted that, in the Colombian Amazon, the main driver of deforestation continues to be the appropriation of land, with the agricultural frontier being expanded in an uncontrolled manner, mainly for livestock farming. While, in Putumayo, Norte de Santander, Antioquia and Bolívar, forest loss is mainly caused by illicit economies such as coca cultivation and illegal gold mining (Santana, 2023).

The 2019-2020 UNODC report on the monitoring of illicit poppy plantations in Mexico estimated the total area under poppies to be 24,100 ha (within a range of 17,400 to 30,900 ha) (UNODC, 2022). In Guatemala and Colombia there is no information available. The same occurs with cannabis cultivation, for which there are no estimates of the hectares under cultivation. Figures given by the government of Paraguay to the media show the existence of around 7,000 hectares in that country. In Colombia, only in the North of Cauca, according to journalistic investigations, the authorities report the existence of around 3,000 ha.

Chemical precursors and their disposal

Regarding the volumes of chemicals necessary for the production of illegal drugs, in Colombia UNODC estimated that to process the potential production of coca leaf in 2022, around 148,500 tonnes of solid substances were required (between 133.5 mt-177.2 mt) and 762.3 million litres of liquid substances (689.2 l-915.5 l), which are freely disposed of in the natural environment in large quantities after use (UNODC, 2023), with a considerable environmental impact that is difficult to quantify. Three essential chemicals have been identified for the processing of cocaine: sulphuric acid, potassium permanganate and hydrochloric acid.

As noted above, in terms of magnitude it is important to understand that, although these volumes may be much lower than those of some legal industries, the environmental impact can be significant and concentrated in small population centres or geographic areas, intensely affecting certain hydrographic basins, ecosystems and the closest communities or human settlements (UNODC, 2022).

In general, it is difficult to obtain more precise estimates linked to illegal drug trafficking beyond the volumes seized by the authorities. According to UNODC around 21.5 million people use cocaine. Although the world cocaine market continues to be concentrated in the Americas, with the United States, Western and Central Europe as its main destination, the fastest growth in relative terms in recent years is occurring in developing countries located in Africa, Asia and Southeastern Europe. To meet this growing demand,

traffickers use not only legal trade routes but also innovative forms of illegal transport, building clandestine access roads and tracks in the jungle or forested areas, as well as landing strips in isolated or difficult-to-access locations. Added to this are the unloading of drugs in maritime and coastal areas, involving the transfer of stashes or the disposal of the evidence of international drug trafficking activity, all of which have an undoubted impact on the marine environment and the diversity of species affected.

The magnitude of the environmental impacts is greater if, in addition to considering the direct impacts linked to the production and trafficking of narcotics, the convergence with other illegal economies (for example, illegal mining) is also considered together with activities financed with laundered drug money. On the other hand, the links established with irregular migratory flows in some areas and along certain routes also need to be integrated into the impact analysis, although access to reliable information in this regard remains very limited.

This broader perspective, which approaches the drug market as a system rather than as a set of segmented activities, expands the scope of its negative consequences, challenging the claim that it is a local problem and revealing its more regional and global dimension. This is where the Strategic Environmental Assessment begins to make sense as a method for analysing the complexity of the interaction between the drug phenomenon and the environment.

3. The environmental impacts of the illegal drug market and the State's responses

According to the 2023 Global Cocaine Report, consumption of this substance has increased globally, going from an estimated 21.5 million users in 2020 to 55 million (UNODC, 2023). While the cocaine market remains fairly concentrated in the Americas and parts of Europe, there is great potential for its expansion into Africa and Asia. This increase has been correlated with the increase in production, which is concentrated in Latin American countries, with Colombia, Peru and Bolivia being the main producers.

The illegal nature of the market causes prices to be high – compared to legal products such as tea or coffee – with a notable difference in value between the country of origin and the final distribution markets, and results in production being greater than demand to compensate for the risks engendered by suppression. UNODC estimates that cocaine production reached a record high of 2,304 tonnes of pure cocaine in 2021, and the area covered by coca plantations also reached its highest level, exceeding 300,000 hectares. Additionally, in that same year a record 2,026 tonnes were seized (amount not adjusted in terms of purity) (UNODC, 2023).

In this context, the starting point for addressing the environmental impacts is the existence of an illegal market energised by the incentives of its profitability and of a growing national and international demand. In addition, obviously, there is sensitivity to the natural environments in which the production, processing, and trafficking activities are specifically carried out in each country. Each of the phases of this market generates direct and indirect impacts on the environment, which can be mitigated or amplified by the nature and approach of the actions of the State performed within the framework of the strategies designed to reduce the supply of illegal drugs. As we shall see, drug production and trafficking tend to be concentrated in areas and along corridors or routes in some countries and in certain regions within countries, making it important not to lose the local perspective of a market that has a global dimension.

This section therefore provides an overview of the available evidence on the direct and indirect impacts caused on the environment by illicit cultivation for drug production,

drug processing and transporting activities, and the response measures adopted by States in line with their own and other drug policies, especially those aimed at reducing supply. In Latin America and the Caribbean, most of the academic research, as well as the official and civil society organisation reports available on the links between illicit drugs and the environment focus on the cocaine market. However, this is still relatively recent field of study.

Next, the direct and indirect impacts of each of the illegal drugs production and trafficking stages will be identified, taking into account the aspects described in Chapter 2, that is, considering convergence with other crimes, such as money laundering. Furthermore, the impacts of the State's responses to control the supply of illegal drugs will be analysed.

3.1. Impacts of coca crops and of cocaine processing

The establishment of coca crops and their maintenance and production can have environmental impacts. These vary according to the production systems and the practices and technologies used, the places where they are located, local regulations (community-based and those imposed by illegal stakeholders), as well as the different activities implemented in the surrounding areas with which they converge or are complementary.

a) Deforestation: direct and associated with coca crops

One of the first environmental impacts of those illicit crops for which most evidence is found is deforestation. This involves the destruction of the forest canopy (in many cases primary forest of great ecological value), followed by indiscriminate burning and the consequent expansion of the agricultural frontier. In general terms, it is possible to affirm that, compared to other legal and informal activities, the establishment of illicit crop plantations is a significant factor, the magnitudes of which vary locally, but it is not among the main drivers of deforestation. For example, in Colombia, official estimates indicate that coca crops account for 8% of deforestation nationwide. According to the Ministry for the Environment, in Peru between 2001 and 2013, coca crops generated 2.3% of deforestation. In Bolivia, the pattern is that more forests are converted to pasture than coca crops (Bradley & Millington, 2008). However, the extent of deforestation may vary depending on the period and region analysed, as well as its interaction with other causes (Erasso & Vélez, 2020). Furthermore, there is the fact that it can occur in the interior, in buffer zones or the areas of influence of protected natural areas or reserves.

Different studies have shown that the environmental impacts are significant and are amplified by indirect effects. The analysis carried out by UNODC in the Colombian regions of Catatumbo and Amazonia between 2005 and 2014 indicates that the establishment of coca crops is linked to 42% of the estimated deforestation. This includes both direct and "associated" deforestation, which is measured taking into account what occurs within 1 km around the area planted with coca (UNODC, 2018). While 4% is directly related to crops, the majority of forest loss is associated with colonisation processes that stimulate

other activities or traditional practices that also cause damage, such as the formation and expansion of farms, the establishment of other large scale crops and the construction of production or service infrastructure in rural areas.

Using grid-level data and discriminating by region, Dávalos and co-authors show that proximity to new coca plots and a greater proportion of area planted with coca only increased the probability of deforestation in southern Colombia between 2002 and 2007.

In the department of Ucayali in the Peruvian Amazon, estimates indicate that more than 50% of the new coca crops analysed between 2003 and 2022 were established in areas deforested for this purpose. Among the indirect impacts of coca activity on ecosystems and biodiversity is the promotion of migratory flows that over time can give rise to stable human settlements, the opening up of new transit routes or illegal roads, the expansion of rotational agriculture and livestock farming, among other impacts (USAID & UNODC, 2023). Human trafficking for different purposes such as agricultural labour, domestic service and prostitution is another crime that usually accompanies this process. In this region of Peru, the Regional Forestry Management Office (GERF) identified, using satellite images, some 50 landing strips in the tropical forest a short distance from groups of small, deforested plots. The displacement or mobility of "settlers" or community members from other coca-growing areas of Peru to remote parts of the Amazon is also highlighted as a means of expanding illicit crops. This results in the illegal occupation of land and growing conflict with the native or Indigenous communities, who are subjected to threats, requiring their territories to be placed under surveillance and protected.

A study commissioned by UNODC, which analysed a total of 419,073 deforestation areas in the western region of the Amazon Basin (which includes Colombia, Peru and Bolivia), between 2010 and 2020, found that coca cultivation increased the frequency of clearance activities, confirming its role as the initial driver or precursor crop leading to deforestation, especially in Colombia (Dávalos & Magliocca, 2022). This study found that the likelihood of deforestation was 48% higher than in areas where there was no history of illicit crops. However, the deforested areas associated with coca crops were smaller and more dispersed than those without coca plantations.

On this last point, an analysis of deforestation during the period following the signing of the Peace Agreement with FARC in Colombia shows that massive loss of forest was consistent with economic activities that require relatively usable land, such as large agricultural projects or extensive livestock farming, while *granular deforestation* was connected to smaller-scale activities, such as coca cultivation (Prem, Saavedra, & Vargas, 2020).

This is consistent with what was found in the northwest of the Colombian Amazon between 2000 and 2009, where coca crops showed a strong dynamic of temporal and spatial expansion, being a factor of forest fragmentation through the establishment of small, transitory cultivation areas measuring less than 0.6 ha. Over time, crops for illicit use advanced into primary or intact forests, promoting greater destruction of tropical forests in the region (Armenteras, Rodríguez, & Retana, 2013).

Photo: Aerial image taken from the video report "Yavarí Under Siege". Epicentro TV-Proetica. (2024)

In Colombia, UNODC differentiates between *subsistence coca growers*, who establish small-scale plantations, the *extensive coca growers*, who establish production areas that are generally subcontracted, and the *indirect agents of deforestation*, among whom are the investors – who are generally "absent" – in coca cultivation, and who finance its establishment and expansion (UNODC, 2018). It must be pointed out that within this chain it is not the subsistence farmers and most vulnerable Indigenous communities who drive the occupation and deforestation of large areas, as their resources are generally too limited to do this.

According to the SINCHI Institute, crops for illicit use can be understood as an important spearhead of deforestation in Colombia that invigorates another series of economic areas, practices or dynamics, such as the clearing of forest areas and converting them to grazing, the purchase and concentration of land, as well as the increase in extensive livestock farming (SINCHI, 2014). For this reason, the environmental impacts of establishing coca crops should not be analysed in isolation, but rather in combination with their interaction with other territorial dynamics and, in some cases, sequencing them with other drivers or determinants of deforestation. In Colombia, for example, the complex relationship between forest loss and armed conflict and, more recently, the signing and implementation of the Peace Agreement with FARC, has been analysed.

In the areas of influence of illegal armed groups and particularly the guerrillas, some forests and forest buffer zones were "protected" by anti-personnel mines and/or the threat and application of the rules imposed by the armed organisations using these to guard their rear or as transit routes (Murillo-Sandoval, Van Dexter, Van Den Hoek,

Wrathall, & Kennedy, 2020) and for other conflict-related purposes. Furthermore, the intensity levels of the guerilla and military operations served to dissuade coca growers and other stakeholders from expanding the agricultural frontier. On the other hand, the highest levels of armed conflict are also associated with a lack of governance, which in turn increases the levels of deforestation (Negret, et al., 2019). In other environmentally fragile areas, the expansion of crops for illicit use has been stimulated by armed groups as part of their sources of financing.

The evidence shows that, after the signing of the Agreement with FARC, a faster and more pronounced effect on land use change has been generated than during the conflict (Murillo-Sandoval, Van Dexter, Van Den Hoek, Wrathall, & Kennedy, 2020). Although agricultural expansion in the Andes-Amazon Transition Belt is not new, it intensified after the disarmament of this guerilla group. However, no differential effect of coca crops is found to explain greater deforestation among municipalities with FARC presence after the ceasefire. On the contrary, the magnitude of forest loss is more linked to traditional extensive economic activities (Prem, Saavedra, & Vargas, 2020). Locals in the areas of FARC influence pointed out that, fearful of new restrictive policies, local ranchers and investors began to frantically appropriate land on a larger scale (Murillo-Sandoval, Van Dexter, Van Den Hoek, Wrathall, & Kennedy, 2020). Dávalos and co-authors forcefully conclude that currently: "The most important challenge for forest conservation in Colombia is neither coca nor conflict, but the insatiable appetite for land for pasture" (Davalos, Davalos, Holmes, Tucker, & Armenteras, 2021).

Although coca is not the most important direct cause of deforestation, its expansion into sensitive or environmentally important areas beyond the agricultural frontier is a cause for concern. According to Peru's 2022 Coca Crop Monitoring Report, the surface area under coca in Protected Natural Areas (PNAs) and Buffer Zones amounted to 14,865 hectares in that year (of which 439 are in PNAs), representing 16% of the national surface area monitored. This is equivalent to an increase of 16% compared to 2021 and more than twice the figure recorded in 2018 (Devida, 2023). In the case of Colombia, monitoring shows that 10,626 hectares were identified in the National Nature Reserves (5% of the national total), which represents an increase of 21.5% compared to 2021 and more than three times the figure recorded in 2010. 15% of the planted hectares of coca in Colombia were located in the Forest Reserve areas, an increase of 2% compared to 2021 (UNODC, 2023). In Bolivia, of 23 Protected Areas, coca crops were identified in six, amounting to 435 hectares; and there were increases in two of these, the Amboró National Park and Integrated Natural Management Area with 26%, and the Carrasco National Park with 18% (UNODC, 2023).

b) Environmental impacts of agricultural practices

The cultivation of illicit drug crops can affect the air, water and soil, as well as harm the fauna and biological environment in general – just as occurs with other agricultural crops. These impacts are linked to the working practices, requirements and additives of their respective production systems, and the pursuit of performance and quality goals. A significant proportion of the land used for coca cultivation is cleared using slash-and-

burn techniques, resulting in soil erosion and carbon dioxide emissions (Burns-Edel, 2016; UNODC, 2015). This can produce serious impacts such as erosion, sedimentation, pollution and harm to aquatic fauna depending on the magnitude of the burning and tillage tasks involved in preparing the land for cultivation.

An investigation of the carbon footprint generated by cocaine production in the department of Putumayo and the Catatumbo region in Colombia found that the most important impact is caused by changes in land use, namely the transformation of forest into farmland and the resulting release of large amounts of carbon into the atmosphere. The emissions generated by this process may amount to between 4 and 6 mt of CO2e per kilogram of cocaine produced (Barrera-Ramírez, Prado, & Solheim, 2019).

Coca crops require intensive use of fertilisers, herbicides and pesticides especially when planted in non-agricultural soils (UNODC, 2015).[4] According to recent research based on interviews with coca growers in the Putumayo region, the most common herbicides used to clear the land include Paraquat and glyphosate. Fertilisers generally comprise nitrogen, phosphorus, potassium, magnesium, humic acids and growth hormones. Pesticides include a wide variety of insecticides and fungicides. All these chemical substances used to protect and provide nutrients to the crop, as well as accelerate its growth, are potentially harmful to humans and the environment when incorrectly applied, handled, transported or stored. The testimonies of those who work with coca bush crops reveal their constant exposure to these chemicals, which are sprayed onto the plants without using any personal protective equipment (PPE) (Rodhes, et al., 2023).

The limited access routes to the crop plots, the difficulties of tilling the soil and performing other agricultural tasks, the inadequate conditions for the preparation and application of agrochemical admixtures, and the difficulties of moving the additives and accessing water sources are, in many cases, factors that accentuate or multiply the environmental impacts of production at the local level.

According to the limited evidence available in the producing countries – Colombia, Peru and Bolivia – this dynamic generates changes in the physical, chemical and microbiological properties of the soil, interrupting natural cycles and intensifying its impoverishment and degradation. It also contaminates bodies of water and indirectly poisons aquatic ecosystems (Jacobi, Lohse, & Milz, 2018; Bedoya Garland, Aramburu, & Burneo, 2017; Manzano, 2006; Policía Nacional – Anti-Narcotics Directorate, 2014).

4. The analyses carried out in Colombia identified a large number of different fertilisers (32 types) used to maintain coca leaf production levels. In 2005, it was estimated that 81,188 tonnes and 10 million litres of fertilisers were used on 85,770 hectares of coca cultivated. Regarding the use of herbicides for weed control, the use of 17 types of herbicides was identified, amounting to a quantity of 1,278,560 litres and 101,699 kilograms. There were also 28 types of pesticide, with 1,527,790 litres and 398 tonnes of these being used on the aforementioned 85,770 hectares.

According to recent qualitative research carried out in the Colombian department of Putumayo, which included conducting interviews with the stakeholders involved in production, farmers try not to directly contaminate water sources. Some, for example, dig pits in which to bury any discarded materials. However, this does not prevent their long-term polluting effect. Alternatively, many end up burning them (Rhodes, et al., 2023). Environmental impacts are, in any case, difficult to mitigate in isolated, uncontrolled areas.

The environmental impacts vary depending on the type of soil where the crops for illicit use are planted, the base conditions, the time they remain in the ground - with successive harvests without rest or the use of fertilisers that replenish their fertility - and the characteristics of the production systems used. The increase in hectares under coca in protected and environmentally sensitive areas increases its negative impacts where there has been no previous agriculture. Although the impacts that coca crops have on the soil, water and air due to the uncontrolled dumping of millions of litres of chemical substances have been reported, no rigorous measurements have been taken that allow us to gauge these at a national or regional level.

c) Impacts of the processing and production of base paste and cocaine

The cocaine production process requires the use of chemical substances to transform the coca leaf into cocaine hydrochloride. This process consists of four main phases: 1) After the farmers harvest the coca leaves, they are chopped up and left to macerate in gasoline, after which lime or cement is added to extract the alkaloid. Some farmers also add an ammonia-based fertiliser, 2) The macerated mixture is dampened with water and transferred to in plastic drums, where gasoline is added to absorb the alkaloids necessary to produce cocaine from the leaves (this is how the raw paste is obtained), 3) The paste is filtered with sulphuric acid and potassium permanganate. It is then kiln dried to evaporate off the water and leave the *base paste*, 4) This paste is then diluted in acetone and sulphuric acid and filtered. Lastly, it is either sun or kiln-dried (Mejía & Rico, 2011; Rhodes, et al., 2023; Acero, et al., 2023). The powder that is finally obtained is cocaine hydrochloride, commonly known as cocaine, which is vacuum packed and ready for transport.

This process is generally carried out in makeshift laboratories that are generally hidden to avoid detection and intervention by the authorities. These structures can be small, capable of producing between 5-100 kilograms per day, or larger, with a production capacity of more than 1,000 kilograms per month. The trend is, in most cases, to use small - to medium - sized installations designed to go unnoticed. Generally, their location is conditioned by the proximity of water sources, which increases the risk of contamination. Some estimates indicate that approximately 382 litres of gasoline, 0.85 litres of ammonia, 0.1 litre of sulphuric acid, 0.35 litres of caustic soda, 360 kg of lime or cement and 1.01 kg of potassium permanganate are required to produce 1 kg of cocaine base (Mejía & Rico, 2011).

The aforementioned precursors have multiple substitutes and the performance levels of each substance may vary. The amount of inputs has a direct relationship with the

technique and technological means used, the time of year and access conditions. This makes it difficult to obtain precise estimates of the volumes used. According to reports compiled by the Colombian Anti-Narcotics Police, an important part of the substances used in the processing of cocaine are recycled, stored and reused until they degrade or are diluted by more than 70%, after which they are dumped into water courses or simply tipped onto the ground (Policía Nacional – Anti-Narcotics Directorate, 2014). The direct impact on the flora, fauna and biological diversity of the different affected areas is evident, as is the high risk factor in food chains and reproduction cycles.

However, while there is evidence about how the cocaine transformation process can have negative environmental effects, no measurements exist of the scale of its impact, especially at the local level.

d) Impacts of the State's responses to reduce crops for illicit use and cocaine production

The State's responses aimed at reducing the supply of drugs via actions designed to reduce crops for illicit use and the production of psychoactive substances can also involve environmental risks, collateral damage and harmful results that must be anticipated and controlled. The actions taken by the stakeholders who participate in both cultivation and processing to frustrate those of State institutions - for example, the use of chemicals to counteract aerial spraying or the displacement of crops to more remote areas - generate impacts that cannot be separated from the efforts made to contain the supply of drugs.

The forced eradication of coca crops

The main tool used to reduce the number of coca crops has been forced eradication, which can be carried out on the ground – by uprooting the plants or manually spraying them with glyphosate – or from the air via fumigation or spraying. When considering the environmental impacts of these state actions, two types of damage are involved: intoxication, poisoning and other negative consequences of fumigation with glyphosate for people's health, and the displacement of plantations to other remote areas that may be far more environmentally fragile.

The environmental impacts of aerial spraying

Large-scale aerial spraying began with cannabis in 1978, then expanded to opium poppies in 1993 before being used on coca as of 1994. At first, the herbicide Paraquat was used, which was replaced by glyphosate in 1984 (Kay, 2022). According to the Drug Observatory of the Ministry for Justice and Law of Colombia, in this country alone between 1994 and 2015 – the year in which the use of this measure was suspended – approximately 1,860,000 hectares cultivated with coca were sprayed.

Although the application of glyphosate is common in several crops such as coffee, bananas and sugar, where it is used for weed control and plantation clearance, the amount

used in eradication was up to four times more than that recommended for commercial agriculture (WWF, 2022; Lyons, 2017). Given the safety concerns, the overflights were made at a higher altitude, up to 800 metres above the site to be sprayed. This decreased the proportion of herbicide reaching the target and increasing the dispersion of the chemical compound towards surrounding ecosystems and settlements (DeJusticia, 2019). In addition to this, the aerial spraying programme was carried out using a mixture of the herbicide and adjuvant products[5] or adherents that may represent a source of additional risk and generate greater negative impacts (van Bruggen, et al., 2018).

The available evidence on the environmental impacts of the use of this substance does not refer to its use for the eradication of illicit crops but is based on research that generally indicates the effects this herbicide causes on those who handle or enter into contact with it (workers, communities) and on the natural environment as a whole. Research indicates that glyphosate and its leachates can reach groundwater, surface water and several other unintended places. It is also clear from several studies that glyphosate applied to cropping systems can potentially reach undesired areas and plant tissues through processes such as the off-target movement of herbicides, spray drift, and uptake by the roots of different plant species (Kanissery, Gairhe, Kadyampakeni, Batuman, & Alferez, 2019; Gandhi, et al., 2021).

Studies carried out on glyphosate in Brazil show that its intensive use has the potential to cause harmful effects on soil dwelling microorganisms, causing changes in soil fertility and ecological imbalance, as well impacting aquatic environments due to the changes it causes in the food chain (Marques, et al., 2021). Different qualitative research studies that have gathered the testimonies of farmers in areas where glyphosate was used show indiscriminate ecological damage directly affecting food and water (Acero, et al., 2023).

Academic research projects and judicial decisions[6] have warned that glyphosate, when used in the quantities and concentrations necessary for aerial spraying with the aim of eradicating the coca bush, can become a chemical that affects the health of people and the environment. Studies that were carried out more than a decade ago also indicated that the impact was considered relatively small compared to the risks involved in the

5. The mixture used for aerial spraying consisted of 55% water, 44% glyphosate formulation and 1% Cosmo-Flux 411F - the active components of which are polyol fatty acid esters and polyoxyethylated derivatives. Source (US Department of State, 2002) (US Department of State, 2002)

6. Order 073 of 2014 issued by the Special Monitoring Chamber in response to ruling T-025 of 2004 passed by the Constitutional Court on forced displacement and confinement recognised the impacts of the Programme for the Eradication of Illicit Crops through aerial spraying with Glyphosate (PECIG) on health, licit crops and biodiversity. The Court also recognised gaps in scientific diagnostic studies and the need to apply the precautionary principle.

cocaine production process (Salomon, Marshall, & Carrasquilla, 2009). In any event, most academic articles call for an in-depth study of the environmental impacts of this control process. Under this framework, tribunals in Colombia have invoked the *precautionary principle*, which refers "to a certain degree of probability of damage occurring in those situations in which it has not been possible to establish the magnitude of said probability with certainty".

Since 2015, the use of glyphosate to eradicate these crops was prohibited in Colombia when the National Environmental Licensing Authority (ANLA) suspended the Environmental Management Plan (EMP) for aerial spraying in compliance with a 2014 order issued by the Constitutional Court.

The displacement of crops for illicit use in response to forced eradication.

Analysts usually call the displacement of crops for illicit use as a result of forced eradication the "Balloon Effect", a term also applied when referring to trafficking or distribution processes and routes. From the environmental perspective, one of the consequences of this transfer of production areas is a greater impact on the forest mass and resources and the expansion towards new environmentally sensitive frontiers.

When this effect is analysed in clusters, a relationship between aerial fumigation in one area and coca crops appearing in neighbouring areas the following year can be established, proving that the use of this measure is associated with the expansion of illicit crops to other areas. In short, aerial eradication pushes coca cultivation into new territories, causing deforestation (Rincón-Ruiz, Pascual, & Flantua, 2013). This finding is consistent with different studies showing that the cultivated surface area expanded as eradication efforts intensified (Moreno-Sanchez, Kraybill, & Thompson, 2003; Reyes, 2014).

A recent study that integrates agricultural data with spatial econometric models tests this claim, finding that the use of spraying in a municipality reduces the new extension of coca crops by 8 percent in that same area and by 3 percent in neighbouring areas. Therefore, at the local - municipal level, aerial eradication generates negative contagion impacts. (Dávalos & Morales, 2023).

Photo: Farmers holding improved coffee varieties. Honduras. V. Martínez (COPOLAD, 2024)

It must be taken into account that this finding applies to the surrounding areas. However, the balloon effect can occur over a broader geographic range, with the appearance of crops in a distant area or even with plantations expanding beyond national borders. For example, forced eradication in Peru and Bolivia in the 1990s boosted production in Colombia, which in 2009 became the world's largest coca leaf producer (Grisaffi & Ledebur, 2016). There is also evidence of the correlation between aerial spraying and the displacement of coca crops to the Amazon Basin – particularly to nature reserves – which coincided with the intensive eradication programme in the Putumayo region. It also coincided with the displacement of cultivation areas to the Pacific region, one of the critical points of biodiversity in Colombia (Dávalos, Bejarano, & Correa, Disabusing cocaine: Pervasive myths and enduring realities of a globalised commodity, 2009).

It is therefore important to recognise the complexity of the causal mechanisms of the displacement of coca crops and forced eradication, without losing sight of the impacts aerial spraying could have had on the expansion of crops to environmentally fragile areas as a mechanism to avoid state action and its control efforts.

Furthermore, it is relevant to take into account changes in the use of tools over time, with the adoption of forced manual eradication instead of area spraying, with the objective of reducing environmental impacts. However, there is no rigorous comparison supported by indicators of the effects of these two tools. Analysing the implementation of the Macarena Comprehensive Consolidation Plan in the municipality of Vistahermosa in

Colombia between 2007and 2010 from the environmental aspect, Santos Duarte draws attention to the negative consequences on ecosystems associated with manual eradication operations that can last between 30 and 90 days, with the participation of 400 people, in environmentally vulnerable areas (Santos Duarte, 2013).

The destruction of laboratories and chemical precursors in environmentally fragile areas

Although there are manuals and guidelines for the safe disposal of the chemicals used in the manufacture of illicit drugs and their waste products without contaminating or at least reducing their impact, in the vast majority of seizures that occur in remote places, these are rarely applied. Difficult access and safety conditions lead to operations being carried out quickly. The risks involved in entering these areas prevent monitoring, taking measurements or carrying out studies on the environmental impacts generated locally. Just to get an idea of the numbers involved, according to records provided by the Colombian Anti-Narcotics Police between 2010 and 2020, these operations resulted in the disposal of more than 304 million kilograms of solid and 42 million gallons of liquid chemical precursors. During that decade, more than 16,000 laboratories were destroyed (Steffens, 2023).

Alkaloids can be eliminated in three ways: incineration, the "chemical method", which includes the use of inorganic compounds (strong acids or bases) to decompose them, and biological processes with microorganisms that can degrade the molecules. Any of these processes would require adequate facilities or equipment to ensure they are carried out safely. An environmental assessment of these three methods showed that incineration is the most harmful of them due to the high amount of CO_2 generated as a combustion by-product. However, this is the only legal and feasible form of disposal under the on-the-ground conditions in which such operations are carried out.

Therefore, the destruction of the illicit drug infrastructure and the disposal or incineration of precursors is not exempt from significant environmental impacts. It must be taken into account that these laboratories are replaced and the supplies necessary for the illegal production of drugs continue to flow along various routes and are available and, generally, easy to acquire, thus generating a feedback loop that generates continued negative effects on the environment.

The unintended environmental consequences of Alternative Development

Alternative Development (AD) is a strategy that seeks to promote a comprehensive, balanced and sustainable framework for human development based on economic activities and processes of inclusion and social protection that compensate for the elimination of illicit crops in certain territories by contributing to the eradication of poverty and other drug-related problems and counting on the participation of the communities involved (OEA/CICAD, 2019).

It is important to note that Alternative Development has moved from an approach that was strictly focused on crop substitution projects to become a broader and more holistic politi-

cal concept that addresses the root causes of illicit drug cultivation and, where properly designed and applied, is transformed into a possible driver of sustainable development (Alimi, 2017), which within the framework of the Organization of American States and other cooperation agencies is called "comprehensive and sustainable alternative development", (known by its Spanish language acronym DAIS) (OEA/CICAD, 2019). More recently, efforts have been made to extend its application to urban or "non-traditional" contexts in response to the expansion and strengthening of drug markets and drug trafficking economies.

However, in the recent publication of its Practical Guide entitled "Alternative Development and the Environment", UNODC states that "Alternative development itself has an impact on the environment that, if not well managed, could be greater than the environmental impact caused by the illicit crops it is trying to address" (UNODC, 2023). The 2013 United Nations Guiding Doctrines on Alternative Development state that Alternative Development programmes "must include measures to protect the local environment." However, it is only recently that the initiatives implemented have given greater importance to the conservation and protection of the environment.

The available evidence, which refers to the most limited version of AD, shows at least four ways which, if followed, can result in direct and indirect environmental impacts. The first of these is the promotion of extensive crops for large-scale production, as well as livestock farming as an economic alternative, in environmentally sensitive areas. The promotion of projects linked to coffee, cocoa, heart of palm, sugar cane or palm oil in areas where there were once coca bush crops in Colombia and Peru has, in some cases, occurred outside the agricultural frontier or in areas unsuitable due to their ecological fragility (Lu, Dev, & Petersen-Rockney, 2022; Cabieses, 2010). The problem is that the alternatives identified by AD programmes have been based on the perceived benefits of commercial crops, but often their environmental impacts have not been assessed (Petersen-Rockney, y otros, 2021).

The second way is the limited capacity to include growers and populations linked to crops for illicit use. The resources allocated to AD are a small percentage of the aid set aside for development and of the funds allocated to drugs policy, so one of the main obstacles to its implementation is the availability of resources and capacities. Compared to the total number of producers and families involved, the number of beneficiaries is relatively low.

Under these conditions, the farmers who benefit from these programmes tend to be those who are in the most accessible areas for the State or who have the basic conditions to develop a productive alternative – because they do not depend totally on the illicit crop or have access to land and other productive resources. This can lead to the exacerbation of existing patterns of unequal development, as well as increasing the risk that part of the population will continue to depend on illicit cultivation, thereby extending the coca frontier and with it deforestation (Grillo, Kendra, Pastor, & Manrique, 2021; Ciro, 2020; Parada-Hernández & Marín-Jaramillo, 2021). In a context of high economic and social vulnerability, people may well choose to continue participating in an activity considered illegal as a way of maintaining or complementing basic livelihoods against a backdrop of limited opportunities (Gutierrez, 2020). This is a high-risk scenario when AD is implemented in the wake of or as compensation for an intense phase of forced eradication.

The third way is the maintenance by the beneficiary population of agricultural practices that may have consequences for the environment. Initiatives linked to AD have to address broad and well-established patterns such as waste incineration, monoculture, intensive production that depends on chemical inputs, the last two of which result in a loss of diversity and of functional ecosystems (UNODC, 2023). In the transition to the legal economy, these activities can continue to be developed, with negative consequences for the environment. In addition, the beneficiaries can find themselves involved in agricultural activities that have been identified as driving deforestation, including projects that are promoted by the State itself (Dávalos, Sanchez, & Armenteras, Deforestation and Coca Cultivation Rooted in Twentieth-Century Development Projects, 2016). Both in Bolivia and Colombia, there is evidence that, under alternative development initiatives implemented more than a decade ago, farmers impacted primary forests to plant "substitute crops that required land" and that could not be cultivated as intensively as coca (Bradley & Millington, 2008).

A noteworthy fact in the case of Colombia is the preference of families linked to the Integrated National Programme for the Substitution of Illicitly Used Crops (the Spanish acronym for which is PNIS) for projects involving livestock, which implies a challenge considering that 60% of Coca crops are located outside the agricultural frontier (Garzón, Gélvez, & Bernal, ¿En qué va la sustitución de cultivos ilícitos? Desafíos, dilemas actuales y la urgencia de un consenso, 2019).

The fourth way is linked to the perverse incentives that can be generated by the announcement of the onset of an alternative development programme. Under the expectation of receiving benefits or some institutional offer from the government, families could increase the area planted with illicitly used crops. In the case of Colombia, a recent assessment of PNIS carried out by the Centre for Security and Drug Studies (CESED) of the University of Los Andes found that the announcement of the programme increased coca crops and deforestation both in the places where there are beneficiaries and in neighbouring areas, with a greater impact outside the agricultural frontier (CESED, 2024).

Considering the possible environmental consequences of AD programmes, the absence of environmental impact assessments of these initiatives is striking. In most cases, the metrics used to measure progress and expected results do not include environmental variables with the exception of those initiatives directly linked to the conservation, protection or recovery of the environment.

3.2. Environmental impacts of synthetic drug production

The illegal production of synthetic drugs also has the potential to cause environmental damage, especially in areas where clandestine laboratories are located. The disposal of chemical waste implies a significant risk to the environment, taking into account that according to UNODC, for every kilogram of methamphetamine produced, up to 10 kilograms of chemical substances are discarded.

In the case of Mexico, *Insight Crime* estimates that the clandestine production of methamphetamines could generate between 3,102 and 3,942 tonnes of chemical waste. Some of the waste dumped are metals, solvents and pre-precursors (such as methylamine, sodium cyanide and phenylacetic acid) that can contaminate water and soil. Environmental activists have reported the contamination of rivers near production areas, which has affected fauna and vegetation. Most evidence is anecdotal, making it difficult to estimate the extent of the impacts (Insight Crime, 2024).

The amount of waste produced by each laboratory depends on the method used to synthesise the drug, the number of people working there and their experience. As pointed out by *Insight Crime*, those who work in clandestine laboratories are usually not specialised chemists, so the cleaning, handling and disposal processes of substances are usually quite rudimentary (Insight Crime, 2022).

3.3. Environmental impacts of drug trafficking

Demand for cocaine, especially in the United States and Europe, has spurred increased coca bush cultivation and cocaine production. One consequence is that non-producing countries have begun to use their routes and ports to supply mainly those markets that are most profitable. Criminal organisations prefer low risk over logistical costs, geographic distance and the time it takes to move shipments from their origin (Sampó & Troncoso, 2022). Flows of psychoactive substances have a territorial dimension with environmental impacts at the local level, especially when routes pass through protected areas and biological corridors. The State's actions, focused on stopping the supply of drugs through suppression, have had the associated effect of moving routes towards inhospitable areas, with the creation of secondary roads being driven through more vulnerable or sensitive ecosystems and, in some cases, involving the poor disposal of waste linked to packaging and camouflaged transportation and/or deforestation.

a) The loss of forests in transit areas

In transit countries in Central America, different research projects show that drug trafficking organisations have influenced deforestation through illegal land transactions, money laundering, links to other illicit activities, as well as territorial control. Limited evidence shows that drug trafficking contributes significantly to forest loss in Guatemala, Honduras and Nicaragua. This has been identified through anomalous patterns of deforestation associated with the establishment of drug transit routes – especially with respect to cocaine. – in remote areas (Tellman, Magglioca, Tuner II, & Verburg, 2020; Tellman, et al., 2020). In these three countries it is estimated that between 15% and 30% of forest loss is associated with the expansion of pasture areas funded by the proceeds of drug trafficking (Sesnie, et al.), which may include the consolidation of safe trails and routes for said traffic. It is important to note that the incomplete empirical data on land ownership or tenure, as well as the inherent limitations of seizure records, prevent comprehensive attribution of all sustained forest loss related to this illegal economy (Tellman, et al., 2021).

Protected areas located in strategic drug trafficking regions are more vulnerable. These can include Indigenous territories and community land concessions, leading to the concentration of land in the hands of a relatively small number of local elites and "absentee" landowners (Tellman, et al., 2021). Estimates based on a set of spatial and temporal metrics of forest loss indicate that cocaine trafficking and money laundering could represent between 30% and 60% of the new deforestation quantified within protected areas (Sesnie, et al.).

The motives of drug traffickers to accumulate and transform land - with sensitive ecosystems - within the transit areas.

Logistical purposes. Land ownership is important for moving drug shipments surreptitiously and with minimal disruption. In addition, it prevents rival groups from taking over the routes. The more properties owned, the more agile and safe traffic operations can be in response to suppression and control actions.

To legitimise their presence. The acquisition and appropriation of land that may coincide with large areas of primary or secondary forest occurs in order to establish grazing for livestock and the planting of extensive crops. Some legislation protects the rights of "squatters" who achieve ownership status by clearing and maintaining permanent residency on state-owned land. When this transition occurs, under the "cover" of being ranchers or owners of legal crops, drug traffickers legitimise their presence in these areas and neutralise the claims of the Indigenous peoples or conservation groups.

To launder money. Rural and border economies are particularly susceptible to money laundering due to the pre-existing prevalence of a barter and cash-based exchange system, in addition to other illicit activities. Economic transactions are rarely traceable and there is no need for proof of capital income. Furthermore, most assets, such as livestock, are not formally registered.

Criminal organisations can buy livestock without needing to show proof of providence within Central America. However, when they sell livestock outside the Central American Common Market, generally to Mexico, they receive a legal receipt in exchange, thus "laundering" the money.

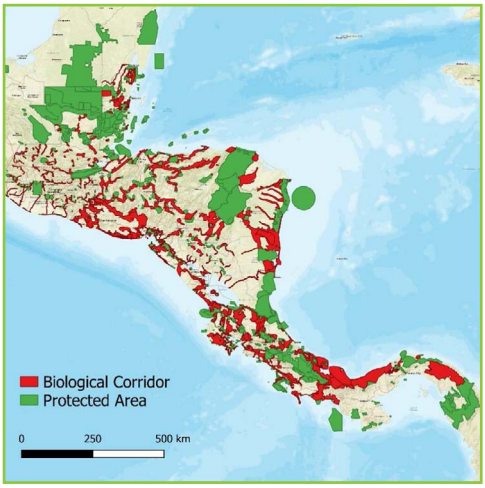
Drug traffickers are certainly not the only stakeholders accumulating land and transforming its use via illegal means. However, the possibility of using direct physical coercion, having access to resources, and the enjoyment of surroundings that enable them to operate with impunity give them comparative advantages. Drug traffickers also play a leading role in social and environmental change in rural areas, especially via the rapid conversion of the biodiverse landscapes fashioned by their previous smallholder occupants.

Source: (McSweeney, Richani, Pearson, Devine, & Wrathall, 2017)

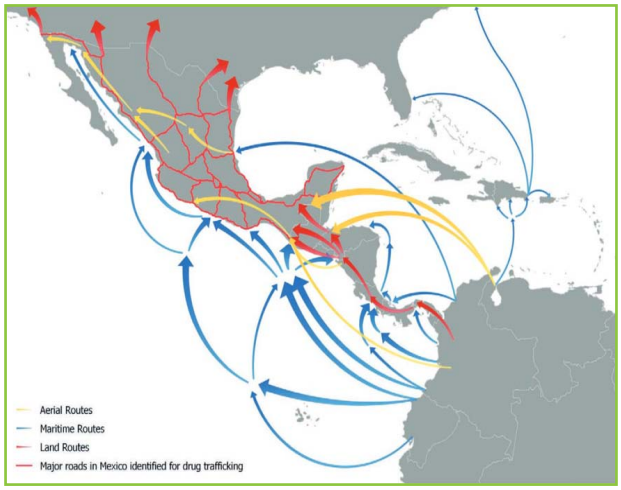
In the Moskitia region of eastern Honduras, drug transit routes have deeply distorted social relations with respect to land husbandry, labour, food production and, ultimately, land ownership. The lands transferred from small Indigenous owners to intermediaries were converted from forest or subsistence agriculture areas to pastures for livestock, with resources for doing so coming from money laundering (McSweeney, Wrathall, Nielsen, & Pearson, 2018). The modus operandi is to send settlers to take over large areas of land, give them the necessary tools to expel the Indigenous peoples and then, once the land is securely occupied, if is sold to drug traffickers or landowners (Avelar & Martínez, 2023).

In the Mayan Biosphere Reserve in Guatemala, some estimates indicate that livestock farming is responsible for most of the deforestation between 59% and 87% of the areas analysed show this pattern. This activity is linked to drug trafficking organisations that use the protected area to launder money, transport drugs and control the territory (Devine, Currit, Reygadas, Liller, & Allen, 2020). In the Laguna del Tigre National Park, vast areas of savannah set aside for conservation have been illegally appropriated and are now home to landing strips used for cocaine trafficking (Devine, Wrathall, Currit, Tellman, & Reygadas, 2018). On the Peninsula de Osa in Costa Rica, an investigation based on qualitative methods warns about the risk to the conservation of the local environment posed by the transit of illicit drugs and the influence of multinational criminal organisations (Wrathall, et al., 2020).

Figure 5. Biological corridors and protected areas and cocaine trafficking routes in Central America



Source: Wrathall, D.J. et al. En Global Environmental Change, 63 (2020) 102098: Áreas Protegidas y Corredor Biológico Mesoamericano de Centroamérica, Fig. 4. (The impacts of cocaine-trafficking on conservation governance in Central America, June 2020).



Source: UNODC, Global report on Cocaine 2023 – Local dynamics, global challenges. United Nations publications, 2023.

The protected areas and forested sections of the region's biological corridors offer advantages for drug trafficking, with hundreds of kilometres of remote beaches that are often unpopulated and difficult to access for the local communities and authorities. This, combined with a set of difficult economic and social conditions, make their small populations an easy target to become "hired hands" for the production tasks involved in drug trafficking (Avelar & Martínez, 2023). Alternatively, the remote nature of these areas for people trafficking or smuggling for various purposes to support the illegal drug marketing structures. As *InSight Crime* points out, these areas generally share four key characteristics: They are located on and around isolated, easy-to-cross and often unmonitored international borders; they are crucial points along drug trafficking corridors leading to the United States; they are affected by local corruption; and they are immersed in land ownership and human rights conflicts affecting the local Indigenous communities (Dittmar & Asmann, 2022).

Although the drug traffickers seek to operate in these isolated areas, their activities end up integrating and connecting remote areas with the region's main local and national transportation networks. An example of this is the roads built in western Honduras, which have become de facto regional transit routes (McSweeney, Richani, Pearson, Devine, & Wrathall, 2017). Drug trafficking also fuels the rise of linked illegal extractive activities (logging and mining, among others) within protected areas and natural spaces, with their inherent impacts on environmental conservation (Wrathall, et al., 2020). It also introduces the trafficking of vulnerable people for the purposes of sexual exploitation or to work in different phases of the trafficking activity.

b) Drug trafficking routes in South America and their environmental vulnerability

Cocaine produced in the Andean countries is transported along different routes through the countries of South America. Shipments enter through the Northern Amazonian states of Brazil (along the borders with Colombia, Venezuela and Peru) and Roraima, where there are extensive jungle areas that are difficult to patrol and multiple rivers that function as low-cost routes to the coastal cities. A route that has gained prominence is the one that runs from Peru and Brazil towards the estuary of the Rio de la Plata that separates Argentina from Uruguay, frequently passing through Paraguay (UNODC, 2023). In the large deltaic region at the mouth of the Orinoco River - with its rich biodiversity and ecological value - and in the coastal towns of north-eastern Venezuela, drug trafficking networks also find strategic operational bases for the transfer of shipments to other destinations in the Caribbean Sea - via the United States - and connections with the Atlantic Ocean and its regular transhipment routes to Sub-Saharan Africa via Europe.

The development of clandestine routes requires the clearance of forests for the construction of ship docking facilities and of landing strips, as well as rough tracks, all of which affect ecosystems that are already highly fragile (Rivadeneyra, Scaccia, & Salvati, 2023). In Peru, the Ministry for the Environment and Regional Forest Management (GERFF) has identified more than 50 landing strips in the rainforest of the departments of its Amazonian region a short distance from clusters of small, deforested plots (Farman, 2021). An investigation that used Artificial Intelligence to identify clandestine clues

in the Amazon from satellite images reported 1,269 landing strips linked to different illegal economies – especially mining (Meers & Kuang Keng, 2022). Evidence shows that deforestation is much greater near roads and rivers than in other parts of the Amazon Basin, making it easier for them to interconnect means of transport. One study found that 95% of all deforestation occurred within 5.5 kilometres of roads or 1 km of rivers (Barber, Cochrane, Souza Jr, & Laurance, 2014), which may be indicative of the area of operations that each activity demands.

Regarding river routes, a study carried out along the Amazon River and its tributaries to assess the presence of pharmaceutical products and illicit drugs in the waters detected cocaine in 73% of the samples. The greater frequency in the detection of this substance could be related to clandestine production and processing laboratories, as well as the dumping of shipments in the river (Fabregat-Safont, et al., 2021). Although it is difficult to determine the cause of this discovery, one impact to explore is that produced by the abandonment of stashes to avoid the actions of the authorities, and the consequent aquifer contamination. The loss of biodiversity in the rivers of the Amazon Basin is a frequent claim or complaint by the native or Indigenous communities of the region, as well as by the organisations that represent or support them, with fish farming being one of the responses that they try to promote.

c) Suppression and the displacement of drug trafficking routes to environmentally fragile areas

According to UNODC, the efforts made to contain the supply of illegal drugs through suppression can cause changes in destinations, geographical routes and the means used for trafficking (as already described, this is the so-called "balloon effect"). For example, the pressure exerted on the cocaine route running from Andean countries to the northern hemisphere indirectly contributed to increasing the efforts of drug traffickers to market their product in central and western Europe (UNODC, 2023). From this perspective, it is important to understand the nature of trafficking networks as complex adaptive systems, with disparate logistical capabilities and financial resources and a very high potential for response to anti-narcotics measures and suppression efforts (Tellman, Magglioca, Tuner II, & Verburg, 2020).

In Central America, evidence shows that between 2007 and 2018, following the peak of suppression, areas with lower population densities and greater proximity to international borders became more vulnerable to drug trafficking, and Indigenous territories were disproportionately used as regular transport routes and corridors were consolidated, affecting the natural resources and livelihoods of local communities. Suppression increased the likelihood that shipments would pass through regions with abundant remote areas and sensitive ecosystems all along their coasts (Magliocca, Summers, Curtin, McSweeney, & Price, 2022). The abnormal patterns of deforestation increased when cocaine transit significantly shifted away from the Caribbean coast to Central America due to increased suppression in Mexico and the Caribbean (Tellman, Magglioca, Tuner II, & Verburg, 2020). The establishment of new routes has been associated with the acquisition of land and the transformation of its uses, which in turn entails impacts on forest loss (Tellman, et al., 2020).

3.4. Environmental repercussions of drug use on water pollution

The pollution of river basins, which occurs due to the dumping of cocaine or the chemical compounds used in its production, can have impacts on aquatic ecosystems and the biodiversity of the species that inhabit them (Burns-Edel, 2016). The ecological repercussions of illicit drugs through water pollution are still an incipient field of study, but one that will surely reveal significant impacts that must be corrected or mitigated in some way.

In Latin America and the Caribbean, the studies carried out are limited and concentrated in Brazil. A river purity study carried out in Manaus revealed that cocaine was found in higher concentrations than any other pharmaceutical compound detected (Thomas, et al., 2014). In the State of Sao Paulo, an investigation showed that the levels of cocaine and benzoylecgonine (the carboxylic acid of cocaine that is formed in the liver by the metabolism of this substance) in water samples were between 10 and 100 times higher than those found in other countries such as Italy and Spain, which can be explained by the low efficiency and coverage of the region's health systems (Campestrini & Jardim, 2017). Furthermore, in an analysis of seven urban drainage channels whose diffuse loads continuously flow towards the beaches of Santos Bay, São Paulo, significant traces of cocaine were found (Roveri, Lopes Guimarães, Toma, & Teodorico Correia, 2021).

There is still very little research that establishes a direct link between drug-related contaminants and environmental damage. Among them, a controlled experiment with eels – an endangered species – stands out. It revealed that amphibian species that suffer prolonged exposure to cocaine in their aquatic ecosystems can suffer a decrease in their population size (Fontes, et al., 2022). Furthermore, research carried out with the emission of methamphetamine found, in the case of brown trout, that the residues of this substance modify the habitat preferences of the species (Horký, et al., 2021). Reviews of the available evidence warn that the concentrations necessary to manifest negative or harmful ecological consequences require further study, with appropriately designed research projects.

3.5.The convergence of the production and trafficking of illegal drugs and crimes that affect the environment and the crucial role of money laundering

Convergence refers to the overlapping of criminal networks and the fusion of their illicit activities (Earth League International and John Jay College of Criminal Justice, 2023). In the case of the illegal drug market and the criminal organisations that manage and sustain it, connections have been identified with environmental crimes such as illegal logging, the illegal wildlife trade, illegal mining and other activities that result in the depletion or degradation of natural resources (Anagnostou, Synthesizing knowledge on crime convergence and the illegal wildlife trade, 2022; INTERPOL, 2022; Abdenur, Pelegrino, & Porto, 2019). Although this is not a new phenomenon, evidence is growing as to the extent of the interconnectivity between criminal networks and the dynamics and needs of the drug trafficking business. Convergence does not occur in a generalised manner, but rather refers to specific connections that take place in certain contexts and territories

where their environmental impacts are amplified (van Uhm, South, & Wyatt, 2021). Drug trafficking acts as a catalyst for other criminal activities.

The connections between the production and trafficking of illegal drugs and environmental crimes can occur through six main channels of convergence.

Table 4. Convergence channels linking the production and trafficking of illegal drugs and environmental crimes

Convergence channel	Description	Example
Combined trafficking	The combination of smuggling illegal consumables for reasons of convenience or opportunity.	Shipments of wood that has been illegally logged combined with cocaine stashes
Multiple business lines controlled by a criminal network (Diversification)	Spread risk and increase control and profits by dominating multiple business lines and routes.	Control by a criminal network of a route for the trafficking of wood, psychoactive substances and wildlife.
Smuggling routes and shared methods of transport	The smuggling of multiple types of merchandise taking advantage of access to multi-purpose routes to increase profitability.	Trafficking in illegally mined gold and illegal drugs using the same route, but at different times.
Barter economy	Cashless transactions that are very difficult to track. One illegally extracted product is exchanged for another.	For example, illegal wildlife is exchanged for illegal drugs – and vice versa.
The production of illegal drugs and crimes against the environmental within the same territory	Areas under the influence of criminal networks in which not only drug production and trafficking takes place, but also in which other illegal economies are found.	Areas with illegal alluvial mining where coca bush crops and cocaine production infrastructure are also found.
Money laundering	The profits generated by the illegal drug trade are laundered via the marketing of illegally extracted consumables such as gold or wood that have been introduced into and circulate via the legal supply chain.	Profits from cocaine production and trafficking are laundered via investments in gold mining.

Modified from (van Uhm, South, & Wyatt, 2021) (van Uhm, South, & Wyatt, 2021)

Illegal drugs and illegal wildlife trafficking.

Latin America is the most biologically diverse region in the world: It is home to one in every six terrestrial and aquatic species on the planet, more than Asia or Africa. Many of the most trafficked species have converged with other serious and organised crimes, most commonly drug trafficking. (Anagnostou & Doberstein , Illegal wildlife trade and other organised crime: A scoping review, 2022) Among them are scarlet macaws, sharks, jaguars, totoaba and the vaquita porpoise. In Peru, a journalistic investigation based on police documents, tax complaints, court rulings and dossiers showed how criminal wildlife trafficking organisations use methods and routes similar to those used by drug trafficking (Ojo Público, 2019). In Central America, wildlife trafficking networks are becoming increasingly sophisticated and organised, using the same routes as other markets such as illegal drugs (Gluszek, y otros, 2021). In Mexico there is evidence that both the legal and illegal wildlife trade serve as mechanisms to pay for Chinese precursors for the production of illegal drugs in Mexico (Felbab-Brown, 2022). The growing flow of investments and connections with Asian markets has opened marketing channels and routes that have facilitated convergence (Guynup, 2023). It is important to remember that in some Latin American countries illegal wildlife trafficking is not classified as a serious crime (Mongabay Latam, 2020). Despite increased efforts to address illegal wildlife trafficking, information about its size and connection to other illegal economies remains unknown.

The relationship between cocaine trafficking and the illegal timber trade.

The convergence of the illegal timber trade and drug trafficking occurs through two main channels: money laundering and the camouflaging of drug shipments on ships headed for the United States and Europe. In the first case, wood smugglers simulate high profits in the purchase and sale of this product, presenting them as part of a "legal" operation to facilitate the entry of money from drug trafficking (de Abreu, Toledo, & Goulart, 2022). Secondly, in the Amazon Basin in Brazil and Peru, the authorities and journalistic investigations have indicated that criminal networks linked to drug trafficking burn and cut down tropical forests, and take advantage of river, maritime and trade routes in general to traffic drugs hidden within loads of wood. This has been demonstrated by the seizures of large shipments. In Colombia, criminal networks subcontract logging companies and smugglers to hide drugs on ships, via Brazil and Venezuela (UNODC, 2023; Insight Crime & Igarapé Institute, 2023). One noteworthy fact is that different investigations have shown that with the majority of the wood that enters the supply chain there is a high risk of it having an illegal origin (Franca, Persson, Carvalho , & Lentini, 2023).

Illegal mining and the production and trafficking of illegal drugs.

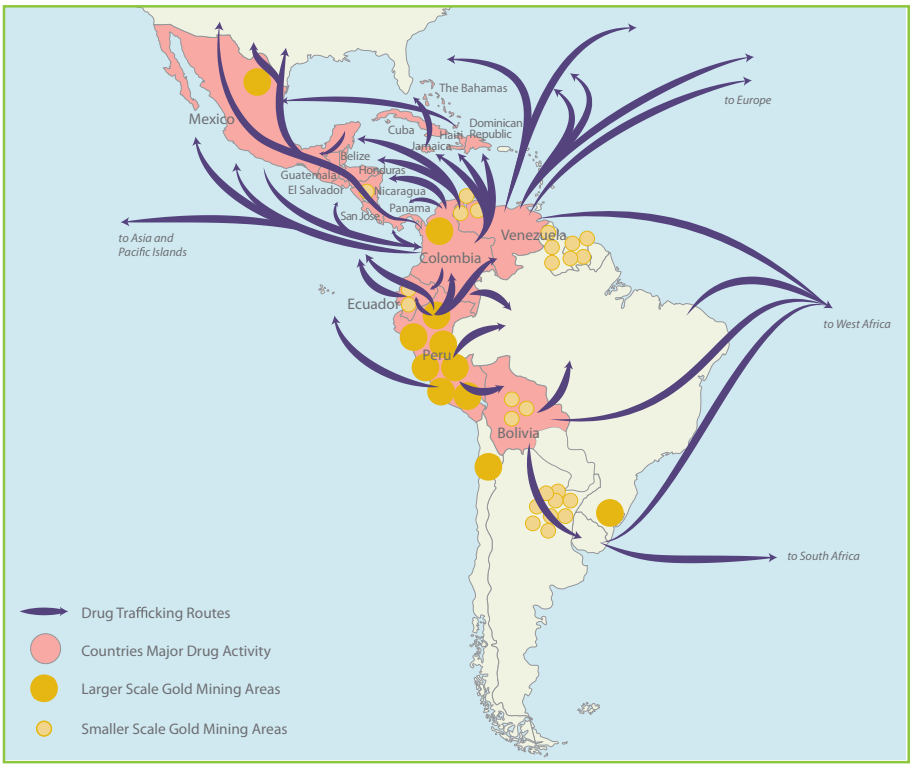
The connection between illegal mining and drug trafficking has become more deeply entwined via the use of three channels: money laundering, the use of the same smuggling routes and production within the same territory. Cocaine profits are laundered through investments in gold mining and the circulation of illegally mined gold via the

legal supply chain and the use of forged documents (International Crisis Group, 2023). While overproduction has brought down the price of cocaine at a local level, the price of gold has increased in recent years. Drug trafficking organisations and other transnational criminal groups may also use illicit funds to finance illegal gold mining activities and facilitate access to machinery and other equipment (OAS, 2021).

Groups such as *Primeiro Comando da Capital* of São Paulo are present in Itaituba, where they use illegal mining to launder drug trafficking profits. This organisation collects a percentage from certain mining operations in the Amazon Basin and at the same time finances illegal mining projects (International Crisis Group, 2023). In Madre de Dios in Peru the *Comando Vermelho* has expanded its operations, controlling drug trafficking routes and engaging in illegal gold extraction (UNODC, 2023). Bolivia is one of the main centres used to launder gold produced illegally in Peru, which is transported from Puno in Peru to Bolivia by plane. The criminal groups that exploit illegal mines use fake companies for trade and cooperate with other organised crime groups. Peruvian criminal organisations have been indicted by the United States Justice system for laundering drug trafficking money via international gold refinery transactions. In Colombia, illegal mining has been identified as one of the easiest and most profitable ways to launder money generated by networks linked to drug trafficking (Global Initiative against Transnational Organized Crime, 2016).

Satellite images of the states of Amazonas and Bolívar in southern Venezuela have identified a wide network of landing strips for trafficking gold and illegal drugs, with all the significant and inherent environmental impacts (Poliszuk, Ramírez Segovia, & Segovia, 2022). The same happens in the Brazilian Amazon where multiple landing strips have been detected, most of which are right in the middle of the jungle (Insight Crime & Igarapé Institute, 2023). In Madre de Dios in Peru, at the same time as illegal mining is growing, the area has also become a new illegal drug route, with drug trafficking organisations using the Manu National Park, one of the most important ecological reserves on the planet, as a route for transporting cocaine (Abdenur, Pelegrino, & Porto, 2019). In Peru and Colombia, officials report a convergence between the flow of illicit chemicals for illegal mining and those used for illicit drug processing in those two countries, with common sources and flows between the two illicit economies (OAS, 2021).

Figure 6. The main drug trafficking routes and main gold mining areas in Latin America and the Caribbean



Source (Global Initiative against Transnational Organised Crime, 2016) (Global Initiative against Transnational Organized Crime, 2016)

In Colombia, according to monitoring carried out by UNODC, of the 101 municipalities with alluvial gold exploitation (EVOA) in 2021, 70 of them also planted coca crops. According to UNODC, the areas in which the two phenomena occur share the circulation of inputs, substances, money, routes and marketing. The convergence of these two activities not only generates negative impacts on natural ecosystems but is also a determining factor in the economic dynamics of the territory (UNODC, 2022). The criminal infrastructure and knowledge developed by illegal armed groups to exert control and power in coca growing and cocaine production areas can be transferred to other activities when the need and opportunity arises. In turn, populations that depend on the drug economy can join extractive activities as a labour force, replacing or complementing their income (Rettberg & Ortiz-Riomalo, 2016).

The crucial role of money laundering

To identify the environmental impacts of drug production and trafficking beyond its most obvious consequences, it is crucial to take into account the dynamics linked to money laundering. As has been shown in the approach to the different stages, the way in which the profits from drug trafficking are used and reinvested can amplify their negative effects on fragile ecosystems. The areas where illicit crops are found, as well as illegal drug routes, are susceptible to money laundering through different activities that have direct repercussions on the conservation and protection of forests due to the expansion

of the agricultural frontier, livestock farming and industrial crops whose financing is difficult to trace. For this reason, it is insufficient to focus on the direct impacts of coca or marijuana plantations; a systemic view is required that takes into account the different connections and legal and illegal financial flows.

Furthermore, it is necessary to analyse how drug trafficking resources are invested in other illegal economies and in the commission of crimes that affect the environment. It does not make much sense to separate the production and trafficking of illegal drugs since, in practice, these activities are part of a network in which different stakeholders – both legal and illegal – interact. At first glance, for example, in the Brazilian Amazon it could be stated that the environmental impact of production is low, and that product is moved along already established smuggling corridors. However, a more in-depth look leads to the question of how the money generated by drug trafficking is channelled into illegal mining or timber trafficking.

But money laundering does not only happen on the periphery and in remote areas. Part of the profits from drug trafficking are put into the legal financial system and then used to develop extractive activities, buy land or establish large-scale crops with the appearance of legality. Developing large-scale deforestation operations, influencing governance and territorial planning, penetrating State institutions at the local level through corruption, requires stakeholders with the capacity for co-opting, with relationships and, in some cases, political power. These dynamics are hard to understand outside of regional and global markets and international trade in legal consumables – illegally exploited – such as wood and gold, and illegal products such as cocaine, cannabis or synthetic drugs.

3.6.The impact on environmental activists and Afro-descendant and Indigenous communities

The production and trafficking of illegal drugs have impacted the capacities of stakeholders who have been key to the protection and conservation of the environment and the defence of human rights in Latin America and The Caribbean. The threats and violence linked to drug trafficking, in their multiple manifestations, have been directed against public officials, institutions, leaders and communities that oppose the interests of criminal organisations. Conservation governance has been eroded, with the influence and control of criminal networks in protected areas and their incursion into the territories of Afro-descendent and Indigenous communities, which has affected activists defending the forest.

It is important to understand that these impacts occur in a context of insecurity, lack of protection and violence in the areas illegal drugs are produced and trafficked, which can be manifest and generally linked to disputes - with high levels of homicides - or latent, through intimidation and control by criminal networks. On average, municipalities with coca crops in Colombia have almost four times more human rights violations compared to those without coca crops, and in the Amazonas-Andes and Chocó biogeographic regions, the number of violations notably exceeds the national average (Davalos, Davalos,

Holmes, Tucker, & Armenteras, 2021). Many municipalities in the Amazon Basin have high rates of violence, due in part to disputes between rival criminal factions competing for the control, production and trafficking of drugs, as well as other illegal economies (UNODC, 2023). Changes in drug trafficking routes and networks have led to outbreaks of violence in countries like Ecuador and Costa Rica, which were traditionally considered safe and peaceful compared to some of their neighbours (International Crisis Group, 2023).

During the last decade, *Global Witness* has documented and denounced threats, violence and murders of activists defending the land, the environment and human rights. In 2022, at least 177 activists lost their lives and 88% of these murders occurred in Latin America and The Caribbean. The causes of these violent deaths are not clear and have to do not only with organised crime and illegal economies, but also with mining and corruption. More than a third (36%) of the murdered activists were Indigenous, and 7% were Afro-descendent. Those killed in 2022 also include state agents, protesters, park rangers, lawyers and journalists (Global Witness, 2023).

Photo: Erosion and landslides in intervened natural area. Ecuador. V. Martínez (2024)

The collaborative journalism project "Land of the Resistant" carried out in twelve countries in the region identified 2,469 events of victimisation between 2009 and 2020 against men and women and 252 against communities or the organisations that defend the environment and the people's land. The target of 48.8% of these episodes of violence (1,202 cases) relates to some ethnic minority, showing that the lands occupied by Indigenous and Afro-descendent people are especially vulnerable to these criminal interests. There is a high number of murders where it is suspected that drug trafficking has had an influence (Tierra de Resistentes, 2021).

Records show that throughout the region, from Mexico to the Andean countries and Brazil, public officials in charge of caring for nature reserves and protected areas have been intimidated and even murdered. In the areas of influence of drug trafficking, park rangers, being as they are the environmental authorities and having the responsibility of monitoring and reporting on threats, risks and everything that happens in these areas, are highly vulnerable when doing their jobs (Botero-García, López, Ospino, Ponce de León-Chaux, & Riveros, 2019; Wrathall, y otros, 2020; Carpio-Domínguez, 2021). Disputes between criminal groups within Protected Natural Areas affect communities and conservation staff, limiting their ability to develop monitoring, scientific research and ecotourism programmes (Carpio-Domínguez, 2021).

Furthermore, military operations carried out in defence of biodiversity—the so-called green militarisation—have, in some cases, increased the vulnerability of public officials, who are seen by criminal networks as informants and collaborators. In this context, the relationship between park rangers and communities has gone from trust to fear due to the reprisals that armed stakeholders can take against them (Garzón, Riveros, & Tobo, Fuerzas Militares y la protección del ambiente. Roles, riesgos y oportunidades, 2020).

The effects on afro-descendent and Indigenous communities

The evidence shows that community resource management contributes to reducing the negative environmental impacts of drug trafficking via strengthening local governance and special land tenure regimes and collective ownership. In the Amazon region of Bolivia, Brazil, Colombia and Peru, several studies have shown that Indigenous community management reduces both deforestation and carbon emissions (Blackman, Corral, Santos Lima, & Asner, 2017; Blackman & Veit, Titled Amazon Indigenous Communities Cut Forest Carbon Emissions, 2018). This same is found in Central American countries, with variations related to the socio-economic context (Robinson, Holland, & Naughton-Treves, 2014). In Colombia, research based on Afro-descendent community councils shows that local organisation and its rules for the use of natural resources have contributed to forest conservation (Vélez, Robalino, Cardenas, Paz, & Pacay , 2020).

In many cases, the lands where most of the Indigenous communities are located are demarcated or pending demarcation are extremely rich in biodiversity and mineral resources, which is why they attract the attention of transnational organised crime (El PAcCTO, 2021). Furthermore, these territories are located in areas that are difficult to

access, with vast surface areas and low state presence. According to SIMCI, in 2022 in Colombia 208 of the 710 Indigenous reservations had a total of 23,794 hectares planted with coca bushes, which is equivalent to a year-on-year increase of 18% (UNODC, 2023). In Peru, the growing trend in the area cultivated with productive coca leaf bushes in the territories inhabited by Indigenous or native peoples continues. In 2022 the amount of land under coca had gone from the 2018 figure of 7,963 hectares to 18,076 hectares, with a growth of 127% (DEVIDA, 2023).

However, the organisational strength, participation and commitment of the native communities is up against the weaknesses of the relevant institutions and the State in general when it comes to responding in an effective and timely manner to the threats identified and the complaints filed that affect the natural resources of their territories. Isolation, the lack of effective and stable means of communication and transport compared to the enormous capabilities of those who illegally occupy and deforest their lands to establish illicit crops are some of the most frequent limitations identified.

Photo: Woman actively participating at an Indigenous Community Meeting. Ucayali, Peru. Leonardo Andrade/J. Guimaraes (2024)

The weakening of local governance and authority as regards protecting the lands of ethnic communities and the intimidation and violence against their leaders and organisations not only affects their rights and sovereignty, but also has lasting consequences for the conservation of the forests. Throughout the region there is the presence of extractive industries and illicit activities on indigenous lands, and this is generating critical situations. Journalistic investigations have documented the murder and disappearance of

Indigenous leaders, the recruitment of boys, girls and adolescents who belong to these communities, as well as processes of confinement and forced displacement, with towns that have been abandoned. These events have caused shock and fear, weakening the capacity for resistance and response to such a threat (Mongabay, 2024; Insight Crime, 2021; La Silla Vacía, 2023).

The illegal economy of drug trafficking also generates extractive booms within protected areas, energises the incursion of settlers, generating conflicts, and creates relationships of economic dependency, in the context of difficult social conditions, in addition to producing the loss of livelihoods. traditional (FIP y adelphi, 2021).

3.7. The environmental impacts of the illegal drug market and the State's responses from a systemic perspective

In a simple way, a system can be understood as a set of elements that work together and constantly change. As explained in this chapter, environmental impacts do not result from isolated events, but are products of the interaction between different actors, processes and decisions. In this context, it is important to understand how the parts of the system are connected and related, overcoming linear thinking that seeks to identify cause and effect relationships.

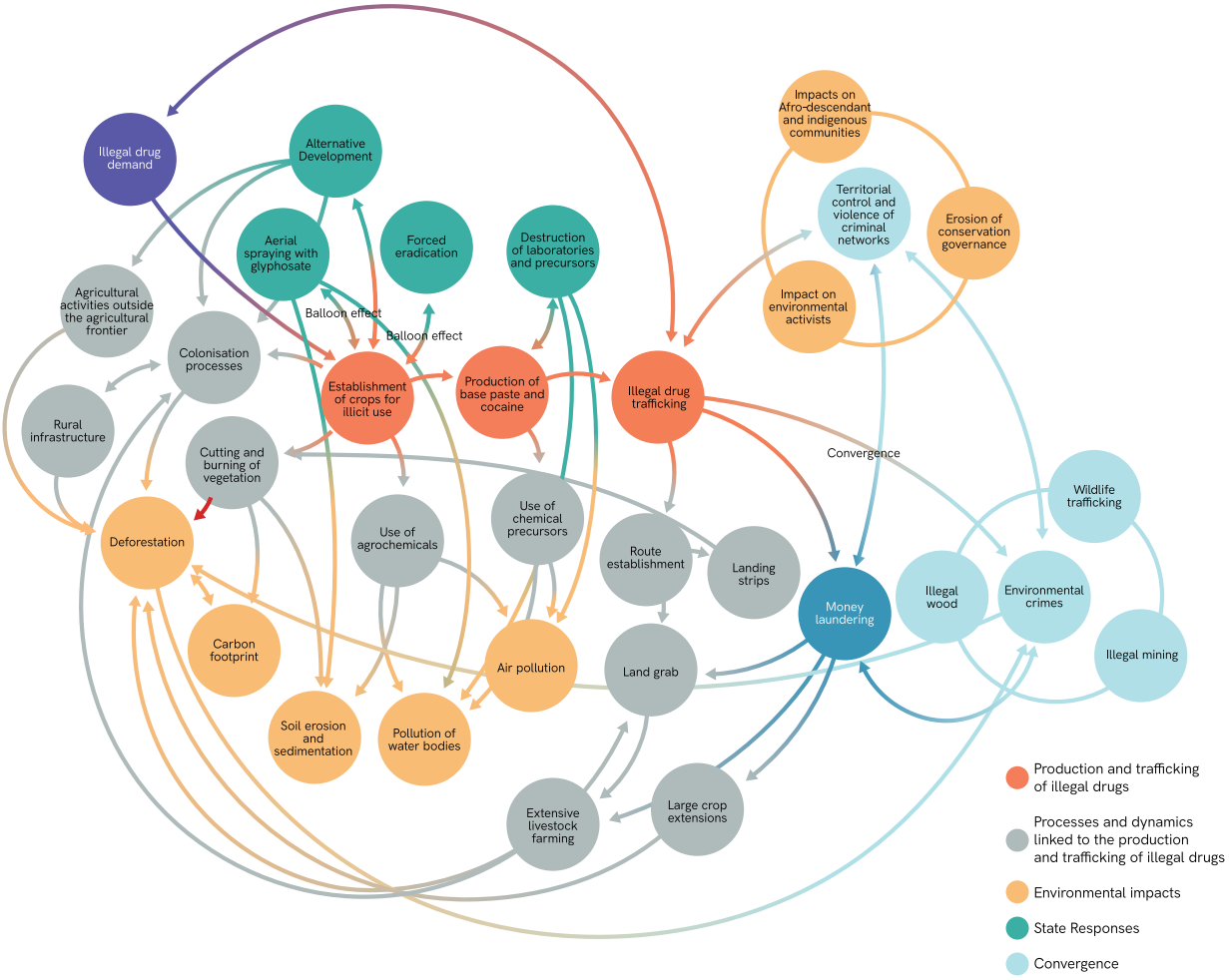
In the case of the illegal drug market, environmental impacts occur within the framework of the control of psychoactive substances, under a regulatory system that assumes that the market could be controlled through State intervention. The illegal market is driven by economic processes that respond to the demand for illegal drugs, which encourage production and that seek to increase profitability. As the evidence indicates, these processes have negative effects on the environment.

If the illegal drug market is analysed in isolation, it will be found that the global environmental impact is relatively small compared to legal economic sectors, although significant at the local level and especially serious when concentrated in highly fragile ecosystems. However, when its interactions with other illegal economies and environmental crimes, as well as with dynamics that occur within "legality", are identified, its negative consequences are amplified. In areas under the control or influence of armed stakeholders and criminal networks – including transit areas – it is difficult to isolate or distinguish the direct impacts of illegal drug production and trafficking from those of other legal and illegal activities. As the systematic review of the evidence shows, this is not a dynamic that affects only the Amazon Basin, but one that is expressed in different ways in the Latin American countries.

Figure 7 presents a first systemic map of the impacts analysed. It can be read in different ways, which requires not reading the arrows as cause and effect relationships, but as a set of interactions in which it is difficult to be certain of the direction in which they operate. The orange spheres contain the main stages of illegal drug production and trafficking. The emerald green colour identifies the State's actions to control the supply

of drugs, the light blue colour identifies environmental crimes and the dark blue sphere identifies money laundering. The grey spheres refer to the processes and dynamics linked directly or indirectly to the production and trafficking of illegal drugs. Finally, the yellow spheres are the environmental impacts themselves.

Figure 7. Environmental impacts of the illegal drug market and State responses from a systemic perspective



Source: Prepared by the author

To illustrate these interactions, what happens with deforestation can be taken as an example. As can be seen, multiple factors and activities influence the loss of the forest, not only the establishment of crops for illicit use. The convergence with environmental crimes, the collateral effects of State intervention, as well as the use of money from drug trafficking also play a role in this.

As noted above, in this system a key driver is money laundering and the use of illicit finances. Part of the money obtained is laundered directly into the formal financial system and another part of the resources are reinvested in other illegal economies, in the acquisition and appropriation of land, in extensive livestock farming and agro-industrial

crops, as well as in the consolidation of routes that serve for multiple purposes. Additionally, the local injection of these resources in contexts of difficult economic conditions and limited supply of goods and services distort social relations and governance, weakening efforts to defend the territory and conserve the environment. Criminal networks take advantage of and encourage local corruption in areas with a weak rule of law where there are widespread gaps in the implementation of environmental governance.

In a region with high levels of threats and violence, the work of environmental activists is at risk, which has profound consequences for the protection of ecosystems and biodiversity. Far from being isolated cases, there is a pattern of the incursion of criminal networks in protected environmental zones, as well as in the areas populated by Afrodescendent and Indigenous communities, some of them confined or displaced from their territories.

The State's actions to contain and reduce the supply of illegal drugs have had direct and collateral impacts on the environment. Although it has been argued that these consequences are less serious than those associated with the production and trafficking of narcotics, the limited information available does not support this statement. The evidence reveals that State interventions are not harmless, but rather have the risk of causing damage which is often difficult to estimate. The actions of the State influence the behaviour and decisions taken by criminal networks to adapt to these, generating feedback loops that produce new environmental impacts. For example, the more drug producers and traffickers are pursued, the more they seek remote landscapes or territories - often environmentally sensitive - to conduct their business, and the broader their area of influence becomes (Drug Policy Reform & Environmental Justice International Coalition, 2023).

This leads to the question of how the regulatory and institutional framework linked to control, drugs policy and its objectives, all included in the current International Drug Regime, as well as the use of State capabilities influence the behaviour of drug users, stakeholders and the protection of communities and the environment. A humane and effective drugs policy has the potential to contribute positively to the system, assuming the principle of *action to-Do-No-Harm*, and by identifying, correcting and mitigating its negative effects. The above necessarily involves strengthening the connections of the drug agenda with human rights, sustainable development and environmental protection.

4. The Amazon Basin: the environmental impacts of the illegal drug market and the path of no return

The Amazonian biome extends across nine countries, in the following approximate proportions: Brazil (62%), Peru (11%), Bolivia (8%), Colombia (6%), Venezuela (6%), Guyana (2%), Suriname (2%), Ecuador (2%) and French Guyana. Although this large basin is usually approached as a single block or unit, the region presents immense geomorphological, environmental and sociocultural diversity, with areas that are connected mainly through a broad river network that makes up the Amazon River and its different tributaries. It is, furthermore, a region that is still being explored and evaluated in all its biodiversity, resources, balances and natural dynamics, to provide key evidence that allows monitoring its development, potential and sensitivity to different types of activities.

Source: The Nature Conservancy (TNC). www.nature.org, 2024.[7]

7.https://www.nature.org/es-us/sobre-tnc/donde-trabajamos/tnc-en-latinoamerica/cuenca-amazonica/
"The Amazon Basin provides incalculable benefits to all of humanity. It supplies humidity to all of South America, influences the region's rainfall, contributes to the stabilisation of the global climate and has the greatest biodiversity in the world. Due to its ecological, climatic and cultural importance, the Amazon Basin is an ecosystem of immense socio-environmental diversity on a worldwide level. It covers an area of 7.8 million km2 distributed across nine countries... This region has a population of about 40 million people, including 400 communities of Indigenous peoples and several groups in voluntary isolation". (web TNC, 2024)

The Amazon is currently the most threatened ecoregion in the world in terms of area logged each year, with more than 3.4 million hectares of forest lost annually according to estimates based on the MapBiomas project (MapBiomas Amazon Project, 2024). The region is increasingly exposed to unprecedented stress from rising temperatures, extreme droughts, deforestation and fires (Flores, et al., 2024).

Despite the recent decrease in deforestation in countries such as Brazil and Colombia, the situation is so serious that different studies have warned of a breaking point and the probability of irreversible loss of the ecosystems that comprise it, with serious consequences for the climatic and biological balances of the planet (Lovejoy & Nobre, 2019). The Amazon absorbs millions of tonnes of carbon dioxide present in the atmosphere. By reducing the global amount of this gas that causes the greenhouse effect that is warming the planet, many of the dynamics related to climate change are favoured. This effect could be reinforced if the current trajectory of environmental degradation in the Amazon continues.

The factors that influence deforestation are heterogeneous, complex – there is no single cause – and temporary. A systematic review of the available evidence identifies agricultural expansion as the main immediate cause of deforestation, in all countries except the Guyanas (Hänggli, et al., 2023). This includes both extensive livestock farming with its growing demand for grazing land, and mechanised, agro-industrial or large-scale crops. In contrast, coca crops are a minor cause and have tended to occur mainly in more accessible territories outside the Amazon, although in recent years, greater penetration and dispersion have been evident,, with isolated, less controlled areas being sought. Meanwhile, the illegal logging or extraction of wood along with illegal gold mining have gained strength as drivers of deforestation, with what happened in Guyana and Suriname, and also in the Peruvian Amazon, being a case in point. It is relevant to note that the analyses and studies have focused mainly on Brazil, Colombia and Peru, thus highlighting the gaps in information and evidence in countries such as Ecuador, Venezuela, parts of the Bolivian Amazon, as well as in the Guyanas (Hänggli, et al., 2023). Complaints regarding this situation continue to be filed by established native and rural communities via their organisations and environmental leaders.

From the approach proposed in this report, the environmental impacts linked to the illegal drug market in the Amazon Basin should not be analysed in isolation, but rather be considered as part of a broader system in which different connected factors interact with each other. This means that changes in one aspect can have impacts on others and also generate cumulative effects that intensify said impacts on their resources and the fragility of ecosystems.

As the evidence analysed in this section shows, increased demand for illegal drugs can stimulate greater supply and generate an increase in the income of criminal organisations. Organised crime invests these resources locally in other illegal activities and economies (such as mining or timber trade), as well as laundering money through investments that cause damage to the environment (such as the concentration, occupation or appropriation of lands and the extensive livestock farming that usually accompanies it).

This in turn generates adverse conditions for strategic and effective State intervention and puts populations at risk, which weakens the resilience and adaptability of institutions and communities. In this system, environmental impacts occur within the framework of the state vacuum and result from the complex interaction between the legal and illegal aspects of the phenomenon.

According to the report published by PAcCTO, "*Environmental Crimes in the Amazon Basin: the role of organised crime in mining*", organised crime and environmental crimes are intertwined in circumstances characterised by a lack of adequate control and incorrect application of the law. This report warns: "The criminal organisations are often strongly embedded within legal institutions and the public sphere, thereby fuelling corruption and a wide range of white collar crimes" (Abdenur, Pellegrino, Porto, & Brasil, 2019).

In a special chapter included in its 2023 Global Drug Report, UNODC addresses the intersection or convergence between drug economies and crimes that affect the environment, human rights violations and insecurity in the Amazon Basin, whose consequences are most strongly felt by rural communities and Indigenous groups (UNODC, 2023). This study, which focuses on Colombia, Brazil and Peru, warns that illegal drugs are one of the multiple illicit activities in which criminal organisations participate along with land appropriation, illegal logging, illegal mining, wild fauna and flora trafficking and other crimes that impact the environment. The trafficking of people to exploit them for labour purposes, domestic service and prostitution are other crimes reported in several areas of the Amazon Basin. The main conclusion is that "Drug production and trafficking fuel a series of other types of criminal economy in the Amazon Basin that have a negative impact on both the environment and communities" (UNODC, 2023).

Although in the Amazon region activities such as drug, arms and human trafficking are not new, the demand for illegally extracted and traded consumables, the increase in the price of gold since the beginning of 2000 and the expanding markets for psychoactive substances (including cocaine and cannabis) have stimulated cumulative and negative effects that affect and threaten primary and secondary forests and their biodiversity. As pointed out in the recent report of the *Global Initiative against Transnational Organised Crime, "*Amazon Underworld", the criminal networks have emerged, connected and grown in conditions of "little state presence, high levels of corruption, decades of failed security strategies and a lack of coordination between States" (GI-TOC; Amazon Watch; InfoAmazonia, 2023). Added to this are critical factors such as the sheer size of the territory and difficult access, the lack of means of communication, surveillance and control, the flows of consumables and people within or into protected natural areas without any type of registration, and a backdrop of unsatisfied basic needs affecting the most vulnerable and directly affected communities.

Although more coca is grown in Colombia than in any other country, research carried out in the specific drug production and trafficking areas seems to indicate that most of the coca grown in the Amazon Basin comes from Peru, which is where the greatest direct environmental impact of cultivation and processing activities may be concentrated. Recently, coca plantations have also been reported in Ecuador and Venezuela.

As this section shows, in most of the countries that make up the vast Amazon region, the cause of the impacts is threefold: 1) Drug trafficking and the establishment of transit routes through the tropical forest – in Brazil alone the Federal Police seized 32 tonnes of cocaine in 2022 in the Amazonian States, which is equivalent to an increase of 184.4% compared to 2019; 2) Convergence with other illegal economies and environmental crimes and threats and human rights violations; and 3) Money laundering through activities such as livestock farming and large-scale crops. The interaction of these aspects creates a system that combines the depredation of natural resources and destruction of the forest with a weak institutional presence (International Crisis Group, 2023).

In the Amazon Basin, the expansion and influence of transnational crime organisations that generate part of their profits from drug trafficking have gained strength, as is the case with the criminal groups Primeiro Comando da Capital (PCC) and the Comando Vermelho (CV) – with a presence in 23% of the municipalities of Brazilian Amazonia (Brazilian Public Security Forum, 2023). Although this is the most visible aspect of the criminal network, it also includes local factions with alliances and multiple and changing conflicts that have highly negative consequences for the local population and, especially, its leaders or representatives.

In general, criminal organisations use communities - which do not oppose or resist - as drug distribution and storage points, taking advantage of the low inspection and control capacity of the authorities, as well as the vulnerable situation of the inhabitants, who live in a situation of extreme poverty and marginalisation. In this context, informal and often illicit economic activities appear as a means of subsistence (Cowie, 2023; GI-TOC; Amazon Watch; InfoAmazonia, 2023), involving people who engage in activities out of fear or need who should not be considered as "criminals" (Insight Crime & Igarapé Institute, 2021). A cause for concern is the use of migrants or "settlers" and members of Indigenous or native communities, as well as the recruitment of children and adolescents who are exploited by criminal networks.

From the perspective of protection and the environment, the difficult security situation and high levels of violence constitute a repeated cause for concern (Ebus, 2023). In its report entitled "Maps of Violence in Amazonia", the *Brazilian Public Safety Forum* indicates that the average rate of lethal violence in this region exceeds the national average by 45% and 15 municipalities had a murder rate greater than 80 deaths per 100,000 inhabitants between 2020 and 2022 (Brazilian Public Security Forum, 2023). In Putumayo, the department that fuelled the growth of coca crops in Colombia in 2022, 21 massacres have been recorded since 2020, mainly as a result of the territorial conflict between dissident and rearmed factions. An analysis of violence in the Peruvian Amazon since 2010 reveals an unprecedented increase in murders of Indigenous leaders starting in April 2020, who died precisely for defending their lands and opposing the establishment of illicit crops (Amazon Network of Georeferenced Socio-Environmental Information, 2022). Precisely in Peru, the National Commission for Development and Life without Drugs - DEVIDA, the Peruvian agency responsible for drug policies, together with the Ministry for Justice and Human Rights and the support of COPOLAD III, has been developing an early warning system to respond to the growing threats to human or environmental rights leaders that

can be applied in remote regions with great potential for the expansion of coca crops and convergence with other crimes.

It is possible to conclude that what is happening in the vast Amazon Basin is the result of a complex combination of mining activities, illegal economies – including drug trafficking – and transnational and local criminal networks, all of which put the efforts to protect and conserve highly environmentally sensitive ecosystems with great diversity and biogenetic value at risk. This is against a backdrop of institutional weakness, disputed governance, and different legal and illegal stakeholders who take advantage of and deepen corruption. The interaction between all these elements creates a system and dynamics whose existence and inertia may lead the region to a point of no return, of irreversible damage to its protected natural areas, of an intensification of violence, of forced population displacement, all of which compromises the responses to the drug phenomenon, to developmental inequalities, to gaps in the meeting the basic objectives of the 2030 Agenda for Sustainable Development and the joint regional efforts to meet the challenges of climate change.

Photo: River with washed-down sediments. Cochabamba-Bolivia. V. Martínez (COPOLAD, 2024)

5. Conclusions

This section presents the main conclusions, identifying the challenges and opportunities for countries to advance an effective and sustainable agenda that aims to mitigate environmental impacts and contribute to the protection and restoration of critical ecosystems for the planet.

1. **The connection between drugs policy and the environmental agenda has been evolving from a restrictive version focused on reducing the impacts of supply control measures to a broad vision linked with the development agenda and the rights approach.** Within the framework of control measures, the first references to environmental protection were made to point out the potential negative consequences of eradication measures and the need to include this approach in the justification of the Alternative Development programmes. In the last decade, this view has expanded, connecting with the 2030 Agenda for Sustainable Development the doctrines of "environmental sustainability", and the rights-based approach.

2. **The environmental impacts of the production and trafficking of illegal drugs, as well as the measures to address them, do not occur in an isolated or segmented manner, but rather within the framework of the system for controlling psychoactive substances.** The starting point for addressing the environmental impacts is the existence of a vast illegal market for prohibited substances fuelled by the incentives of profitability and the existence of growing national and international demand. Each of the phases of this market generates direct and indirect impacts on the environment. These can be mitigated or amplified by the type and orientation of the activities implemented by the State to control the supply of illegal drugs, or by the opportunities that the drug trafficking business model proposes regarding expansion into natural areas that are either protected or whose fragile ecosystems limit control.

3. **The environmental impacts of the illegal drug market are significant, especially when considering its connections to other illegal economies and environmental crimes.** Examining the illicit drug market individually, its overall environmental impact is found to be relatively limited compared to that of legal or traditional economic sectors, although it can be locally significant and particularly severe when this activity is concentrated or expanded within fragile ecosystems. However, when analysing the impacts from a systemic perspective, that is, not as a set of isolated events, but

as the result of the interaction between different stakeholders and processes, the evidence shows that the production and transit of illicit drugs significantly impact the environment. When considering its convergence and connections with other illegal economic activities and environmental crimes, as well as with linked dynamics within the legal sphere, its negative consequences are amplified.

4. T**he impacts are not only found in the countries directly affected by the production of illegal drugs, but also in an increasing number of transit countries**. Within the geography of environmental impacts are the countries where most of the coca bush crops are concentrated, located in the Andean region and sharing the Amazon Basin, and those through which the drug trafficking routes pass. The evidence shows the negative consequences of creating and maintaining these clandestine routes and landing strips, with the loss of forest and impact on fauna in the biological corridors and protected areas of the Central American countries, as well as in the Brazilian Amazon. In Mexico and the countries of the Caribbean and the Southern Cone, no research and studies were found providing evidence of possible environmental impacts, thus making it necessary to move forward with a more in-depth identification and analysis.

5. **The environmental impacts are multiple, although in most cases there are no measurements for gauging their impact on and interactions with the ecosystems.** With the exception of deforestation, which is measured remotely using aerial or satellite images, the available evidence on the consequences of illicit crops and the processing of psychoactive substances for the soil, water and air is, in most cases, approximate or very general. For example, although information exists on the uncontrolled use and dumping of millions of litres of chemical substances each year, there are no rigorous assessments that allow us to measure their impact on specific natural resources at a local or regional level. *Field* studies of soil, water, air and the biological environment in general are scarce, partial or discontinuous, and are limited by difficult access and personal safety conditions.

6. **The evidence on environmental impacts is asymmetrical: it focuses on one psychoactive substance – cocaine – and on a limited number of countries**. Most of the information refers to cocaine production and trafficking, while research and studies on the environmental impacts of cannabis, opium poppy and synthetic drugs are very limited in Latin America and the Caribbean. Furthermore, the evidence is concentrated in a few specific countries and regions. Environmental impacts and their combination or interactions show local variations that lead to generalisations being approached with caution. However, they can serve as guidelines for making strategic decisions regarding the measures to be applied. In this context, it is important for more countries to expand research into other illegal drugs, create and strengthen environmental information systems in their Observatories and Research Centres, and promote the strategic assessment of environmental impacts.

7. **7. The direct and indirect environmental impacts of drug production and trafficking on deforestation are notable and, in some cases, have been underestimated.** Al-

though establishing illicit crop plantations is not identified as one of the main drivers of deforestation at the regional level, local research shows that its direct and indirect impacts on forest loss are locally significant. The analysis carried out by UNODC in the regions of Catatumbo and Amazonia in Colombia between 2005 and 2014 indicates that the establishment of coca crops was directly linked and associated with Amazonia being the most severely affected with 42% of the estimated new deforestation. In the department of Ucayali in the Peruvian Amazon, estimates indicate that more than 50% of the new coca crops analysed between 2003 and 2022 were established in areas deforested especially for this purpose. In Guatemala, Honduras and Nicaragua, it is estimated that between 15 and 30% of forest loss is associated with the expansion of pasture areas financed by the proceeds of drug trafficking. This evidence invites us to reflect on the real importance of the illegal drug market with respect to deforestation by considering the indirect impacts, as well as the activities associated with the protection and maintenance of "transit routes" and the laundering of money in the areas of influence of the drug trafficking networks.

8. **The burden of responsibility for environmental impacts must not be placed on vulnerable small producers and native communities, but on stakeholders with economic resources and the capacity for coercion.** The evidence shows that in the illegal drug production chain and in transit areas, it is not the smallholders or the native communities who are behind the deforestation of large areas, the large-scale transformation processes or the convergence with other illegal economies. Environmental impacts are brought about by criminal networks and stakeholders who operate illegally and act clandestinely in circumstances affected by corruption, the low regulatory capacity of the State and the difficult economic and social conditions that affect local inhabitants. Behind the most significant environmental impacts are people and organisations with the capacity for investment, corruption and coercion and able to mobilise all the resources required for the production and processing of drugs in remote areas.

9. **Drug trafficking acts as a catalyst for other criminal activities and illegal economies that produce environmental impacts.** The convergence of illegal drug production and trafficking with environmental crimes and other illegal economies creates an explosive threat to the environment. There is growing evidence of the connections of the illegal drug market with illegal logging, the illegal wildlife trade, illegal mining and other activities that cause the depletion or degradation of natural resources, as well as with the trafficking or exploitation of people for various purposes. Drug trafficking can serve as a gateway for the entry of other illegal economies, direct financial flows towards other illicit activities and create a backdrop of impunity against which different criminal networks can operate. In addition, it is associated with coercion and violence against any public officials, institutions, communities and their leaders who oppose their interests and resist their influence.

10. **The laundering of the profits from drug trafficking has negative consequences for forests, environmental corridors and protected areas.** A portion of the profits obtained is laundered through the conventional financial system, while another part

is reinvested in other illegal economic activities, the purchase and exploitation of land, extensive livestock farming and industrial agriculture, in addition to the consolidation of transit routes serving various purposes. The introduction of these funds into areas undergoing economic difficulties and with a low availability of goods and services distorts social relations and governance and weakens efforts to protect the land and conserve the environment. With this in mind, it is imperative to continue connecting anti-money laundering strategies and actions with drugs policy and the environmental protection agenda.

11. **Environmental leaders and Indigenous and Afro-descendent communities continue to be at risk, with important consequences for environmental protection.** Despite the social and media mobilisation in recent years, the advances in the regulatory and institutional framework for the effective protection of communities and their leaders, and the measures implemented by countries, the activists defending the environment and human rights in Latin America and the Caribbean continue to be at risk. The growing influence of criminal networks within their territories against a backdrop of limited institutional capacities aggravated by corruption exposes them to violence and intimidation. In most cases, these events remain unpunished, with important consequences for environmental governance, forest protection and development. Drug policy implementation in strategic environmental areas starts with guaranteeing early warning, rapid response and effective protection of these leaders and their communities.

12. **Within the framework of drugs policy, control measures taken by the State have environmental impacts that, if not assessed, mitigated and managed, can aggravate and be more significant than those caused by the production and trafficking of psychoactive substances**. According to the recent report published by the International Narcotics Control Board (INCB) indicating that activities dedicated to eradicating crops for illicit use often have undesired environmental consequences, the evidence analysed shows us the risks and impacts of the control measures. Among these risks are those associated with the use of glyphosate in aerial fumigation, procedures for the destruction of production infrastructure and the disposal or incineration of chemical precursors in fragile ecosystems, as well as the expansion of crops to protected areas as a mechanism to avoid state action. Furthermore, in its Practical Guide entitled "Alternative Development and Environment", UNODC warns about the risk of implementing agricultural projects associated with the DAIS, whose design, development and assessment do not take environmental criteria into account. The introduction or promotion of new crops or items and their "technological packages" as a compensatory response to the communities also require impact assessments of the ecosystems being acted upon. The different studies and investigations agree in pointing out that this is an area in which it is necessary to go deeper by incorporating environmental variables in the monitoring, review and balance of drug policies and actions.

13. **The environmental impacts of the production and trafficking of illegal drugs, as well as the measures taken to address them, must be analysed considering the context in which they occur.** Among the common features and structural conditions repeatedly pointed out in the evidence analysed are: the existence of vast territories that are difficult to access and suffer from low institutional presence; the limited regulatory capacity of the State especially in rural areas; corruption and high levels of impunity; the lack of opportunities and the economic vulnerability in which rural populations find themselves; the existence of porous and often unmonitored borders; the lack of legal protection for Indigenous communities; as well as an evidence accumulation model based on land ownership. In this context, incorporating the environmental agenda into drugs policy not only implies reducing and avoiding environmental impacts, but also seeking ways to promote local development by strengthening the capacities of communities and State institutions.

14. **Multiple opportunities and levers of change for drugs policy exist for mitigating environmental impacts and contributing to the restoration and conservation of the ecosystems that have been affected.** This report identifies opportunities for innovation, improvement and strengthening of capacities for the prevention and reduction of environmental impacts, and the development and implementation of actions aimed at conserving and protecting forests and fragile ecosystems. Connecting drugs policy with the environmental agenda can help identify and manage risks, increase awareness of this issue and encourage greater commitment from local communities and authorities. This would contribute to the generation of transitory opportunities for the legal economy that protect the environment, strengthen environmental governance, restore ecosystems affected by drug production and trafficking, and progress towards the inclusion of historically marginalised intercultural communities that have been disproportionately affected by the illegal drug market and the control measures taken to suppress it.

6. Recommendations: levers of change to correct and mitigate environmental impacts

Reducing environmental impacts within the framework of a global, comprehensive, and coherent strategy is a complex challenge that requires a combination of actions that mitigate the negative consequences of the illegal drug market and correct the adverse effects that State intervention may have, in addition to adjusting to the characteristics of each context in which it intervenes. Connecting drug policy to the environmental agenda not only has the potential to reduce environmental damage but can also be a catalyst for actions that contribute to the restoration and conservation of those affected ecosystems. This section identifies the main levers of change in said process, understood as those strategic points that could generate significant and sustainable transformations.

6.1. Improve information, expand monitoring and further knowledge about environmental impacts

Although the available evidence has been increasing, with more and better information on environmental impacts in different regions of Latin America – especially in Central America and the Amazon Basin – there are still significant gaps that affect the ability to monitor and assess national drug policies from the environmental perspective. Most analyses focus on cocaine production and trafficking, while other substances and aspects are rarely addressed. Progress is recognised with the integration of environmental impact indicators such as deforestation or the impacts on protected areas in the monitoring of coca bush crops. Furthermore, some national drug policies have begun to incorporate the environmental aspect into their goals and actions.

Progressively, analyses of climate change, the degradation of ecosystems and the destruction of tropical forests are being recognised as part of the negative consequences of illegal economies, including drug trafficking. The greater relevance that environmental crimes have been acquiring has made it possible to identify the connections and convergence with the production and trafficking of illegal drugs, and with money laundering through other activities that are being established or expanding throughout the territories. In addition, the effects on the most vulnerable communities and the threats and

rights violations targeting their leaders, as well as human trafficking for various purposes, have become more visible. This approach includes several actions that could contribute to having better information and knowledge about the environmental impacts of illicit economies.

Photo: Field day and technical assistance with local farmers. V. Martínez (COPOLAD, 2024)

Drug Observatories play a fundamental role in the follow-up and monitoring of drug policies from an environmental perspective. To mitigate and correct environmental impacts, the first step is to be able to identify them, measure them when possible, as well as observe their geographical distribution and dynamics over time. A set of relevant indicators can be progressively incorporated, taking into account the aspects of the illegal drug market and those State responses that have the greatest impact capacity in accordance with the scope of the different programmes and the reality of each of the countries. In this task, progress can be made jointly, from the National Drug Authorities with the institutions responsible for environmental policy, research networks that monitor land uses, as well as think tanks and specialist civil society organisations. The objective is to gather more and better evidence for the design of interventions and to help decision-making in environmental matters based on the drug policies.

The recent UNODC reports, the studies and debates promoted by the Global Programme on Drug Policy and Development - a project implemented on behalf of the German Fed-

eral Ministry for Economic Cooperation and Development -, plus the ever increasing body of academic literature and valuable journalistic investigations, provide a basis for moving forward in this direction.

Technology provides an indispensable monitoring tool. Today, satellites can provide real-time, small-scale images to identify deforestation in areas influenced by drug trafficking as it occurs. There are projects like *Global Forest Watch 2.*0, overseen by the World Resources Institute, which offers a free service providing open source data on forests. At the local level, there are also innovations such as Indigenous communities' access to smartphones and satellite connections with which they can report impacts in real time, with relevant information to warn and take early response measures (Heggie, 2020).

6.2. Moving towards Green Drug Policies

Some countries have begun to incorporate the environmental dimension into their drugs policy. In Colombia, for example, there is a specific subject matter entitled "Environmental care of territories affected by the illegal drug economy" that proposes ways to mitigate and correct environmental impacts, prevent new impacts from happening and promote the participation of communities in the processes of conservation and restoration. Peru recognises environmental impacts in its policy and promotes *Comprehensive and Sustainable Alternative Development (the Spanish language acronym for which is DAIS)*, with environmental emphasis on the comprehensive protection of the Amazonian territories affected or at risk. Brazil has been taking steps to reduce the vulnerability of Indigenous communities in the Amazon to the negative impacts resulting from the coming together of drug trafficking activities and environmental crimes.

Peru and other countries have brought forward timely studies into soil and water quality for health purposes and in response to evidence of illicit activities at the local level such as mining and indiscriminate logging, in addition to the cultivation of illicit crops in protected natural environments. The Native Communities also point out that they have sought the support of environmental organisations and cooperation agencies to monitor their natural resources, given the expansion of illicit cultivation and processing activities, as well as the inadequate final disposal of waste, with preliminary evidence of this affecting the local fauna and flora, contaminating soil and water resources and potentially altering the fragile balances of the ecosystems within their lands.

As the evidence analysed in this report shows, although the environmental impact is expressed more emphatically in some Amazonian countries, this is a challenge that also affects other regions. In Latin America and the Caribbean - with large and sensitive natural areas - there is an opportunity for drug policies to integrate an environmental dimension that enables the mitigation of the negative consequences of the illegal production and marketing of psychoactive substances. This has to do with challenges such as the production and trafficking of fentanyl in Mexico, deforestation in Central American countries, the penetration of drug trafficking activities into remote areas of the Amazon Basin and the uncontrolled use of its river network, or the impacts of the opening of new routes in the south of the continent.

It is also important to anticipate and mitigate the environmental impacts of State interventions. As this report shows, progress in reducing illicit crops and production in certain areas may mean their displacement towards environmentally fragile areas and even beyond the already established agricultural frontiers. The destruction of laboratories and seized chemical precursors can cause significant local damage, especially when the stipulated protocols are not followed or their implementation is difficult. Even initiatives linked to Alternative Development have the potential to cause damage if they do not take into account all the interactions of the new processes, biodiversity and the impact of the new crops and "technological packages" required or do not include measures to protect the local environment.

A useful instrument to advance in this direction is the Strategic Environmental Assessment (SEA), which allows for the identification of the possible environmental impacts of drug policies, plans, and programmes at an early stage of their development. Thus, decision makers can adjust and design interventions that minimise negative impacts and promote environmental sustainability.

Green drug policies have the potential to prevent contamination, help raise awareness of this issue and encourage greater commitment from local communities and technical staff to follow more sustainable practices, contribute to environmental rehabilitation to restore affected ecosystems and provide sustainable economic alternatives.

Taking into account that the environmental agenda has a multisectoral nature, involving as it does several entities and stakeholders, two fundamental issues for moving green drug policies forward are their design and institutional architecture. The first step is for the agency in charge of drugs policy to integrate the environmental approach and strengthen the capacities to address it. This includes not only Drug Observatories but also the management and technical teams.

As this report shows, the protection and conservation of the environment is a cross-cutting issue that is connected to public health, alternative development, security, measures to contain supply – including the seizure and destruction of chemical precursors – and money laundering, among others. Each of these components requires coordination with different levels of government.

Collaboration is recommended between the institutions in charge of drugs policy and the Ministries for the Environment, as well as with the institutions in charge of protected areas and strategic ecosystems, to guarantee that measures aimed at reducing the supply of illegal drugs are compatible and contribute to the objectives of protection and conservation. Additionally, it is necessary to connect Alternative Development with the environmental agenda to identify alternatives outside the agricultural frontier that contribute to the restoration and care of forests.

Regarding law enforcement measures, and within the framework of convergence, it is important that strategies and plans aimed at responding to environmental crimes consider the role that drug trafficking plays as a catalyst with respect to other criminal activities

and illegal economies. This implies the development of complex investigations aimed at affecting illicit flows and those key links in the criminal network. In practice, this approach requires interdisciplinary work, with the participation of different agencies.

Recent evidence shows that the promotion and development of policies aimed at environmental protection requires leadership at the highest level to mobilise the State's capabilities as regards reducing deforestation and recovering the forest. In this regard, the efforts of Latin American leaders who have promoted multilateral meetings that have put these issues at the centre of the table are noteworthy. The invitation is for Green Drug Policies to form a fundamental piece of this agenda.

6.3. Incorporate the Environmental Damage Reduction approach into drugs policy

Damage reduction encompasses interventions, programmes and policies that seek to reduce the health, social and economic harms of drug use for individuals, communities and societies. At the 67th session of the United Nations Commission on Narcotic Drugs (CND) in March 2024, a resolution was adopted for the first time that recognises damage reduction as an important part of an effective public health response.

From an environmental and ecological perspective, the damage reduction approach is based on a balance between caring for human beings, other living beings and the environment (Rhodes, et al., 2023). This involves identifying ways to mitigate the damage associated with the production and trafficking of illegal drugs caused to the natural resources and environments in which it occurs. As occurs in other areas, in the case of drugs policy, the internalisation of environmental costs would involve, at the very least, analysing whether the intervention to be carried out is more or less harmful than the problem it seeks to address or mitigate and prioritising which might generate fewer negative impacts.

On the other hand, with respect to damage reduction, progress could be made in work done with the communities involved in illicit crops to reduce the use of chemicals and other toxic agents and lower the harmful impacts these have on fauna, flora, land, and water. In Colombia, for example, some farming communities have defined a series of practices to reduce negative consequences on nature and protect their own health. These autonomously defined protocols seek to inform families about risks and damages and guide agricultural practices. In the same way, measures can be explored to minimise the negative impacts on the environment related to drug trafficking and consumption.

The environmental damage reduction approach can also be used to incorporate a risk assessment framework into drug control policies (tni, 2023). This would allow interventions to be monitored under environmental criteria, the identification and mitigation of possible future damage, and the taking of measures to prevent adverse impacts. The action areas include the management and disposal of chemical precursors using methods that reduce environmental impacts, environmental impact studies of the eradica-

tion processes, as well as the adoption of environmental strategies and instruments in alternative development projects.

6.4. Protecting environmental activists in areas of illegal drug production and trafficking

Protecting the environment goes hand in hand with protecting the rights of those who defend it. As this report shows (Chapter 4), the threats and violence linked to drug trafficking, in their multiple manifestations, have been directed against public officials, institutions, leaders and communities that oppose the interests of the criminal organisations that operate in each territory.

In this regard, the *Escazú Agreement* signed by 25 of the 33 countries of Latin America and the Caribbean – and ratified by 15 of them – provides the basis for the protection of environmental activists. It is the first treaty in the world to make specific provisions in this area, in addition of commitments related to access to information, public participation and access to justice. The Escazú Agreement recognises that the first line of defence in the protection of the environment are the local communities, a principle also supported by the European Green Deal.

Various countries in the region have progressively built a regulatory and institutional framework for the protection of those who defend both human rights and the environment. This includes recognition measures, cross-cutting mechanisms, the adoption of protection protocols, the implementation of early warning systems and the endorsement of urgent protection actions. In Peru, in coordination with DEVIDA and the Ministry for Justice and Human Rights, COPOLAD III is participating in the execution of a social innovation and early warning project for the protection of activists, farmers and Indigenous leaders in territories in which coca crops have been spreading and attracting other crimes, and where human rights are being violated.

Among the main challenges when it comes to making progress in the protection of environmental activists is the low presence or limited capacities of State institutions at the local level, the lack of stable communication and information systems on existing mechanisms, as well as the low degree of trust and difficult access to competent institutions. It is important for the designers of drug policies to recognise the risk to which local leaders, their families and their communities are exposed. This requires not only coordinating with security institutions, but also with local stakeholders, via interculturally sensitive interventions adjusted to the different territorial realities that promptly identify the sources of risk and take into account the dynamics of violence.

6.5. Protecting Indigenous territories and Afro-descendent communities and strengthening their governance

A meta-analysis published in 2020 on the effectiveness of global forest conservation policies and programmes found that Indigenous territories avoid more deforestation on average than protected areas or any other policy studied (Börner, Schulz, Wunder, & Pfaff, 2020). As a whole, the areas occupied by Indigenous communities represent 35% of the forest area of Latin America. These areas concentrate almost 30% of the carbon in the region's forests and 14% of the carbon in tropical forests worldwide. A recent review of 250 studies carried out by the FAO found that, in practically all countries in the region, Indigenous and tribal territories tend to have less deforestation than other forests (FAO, 2021).

Photo: Indigenous family attending an Indigenous Community Meeting. Gorka Espiau (COPOLAD, 2024)

In Colombia, collective titling for Afro-Colombian communities has reduced deforestation in the Pacific Basin by more than one percentage point. These effects represent reductions of more than 27% of what deforestation rates would have been without titling. One of the factors that explains the lower levels of forest destruction or loss is local community organisation, which defines the rules for the use of natural resources (Vélez, Robalino, Cardenas, Paz, & Pacay, 2020).

The evidence analysed shows a growing presence of organised crime in these territories whose aim is to grow crops for illicit use, produce and transport illegal drugs, launder

money and develop other illegal economies such as mining and logging. In this respect, drugs policy can contribute to the protection of these territories with the formulation and implementation of programmes that strengthen indigenous governance, which empower them and develop their capacities to manage their lands, promote their economy, secure their own livelihoods and guarantee their collective rights (WWF, 2021). This means ensuring that the communities can exercise their right to Free, Prior, and Informed Consent regarding investments and policies that affect their territories.

Indigenous peoples may be forced to cooperate with organised crime groups for fear of the consequences, becoming involved in the work of illicit crop cultivation or participating in cross-border smuggling. The lack of legal alternatives and sustainable autonomous projects to earn an income in isolated areas also provides a favourable environment for organised crime to offer them "protection" and economic opportunities (van Uhm & Grigore, 2021). Against this backdrop, in the area of alternative development and the transition to the legal economy, two promising ways to encourage Indigenous people to take care of their forests and use those same resources to improve their well-being and standard of living are *compensation for environmental services* – implemented in countries such as Costa Rica, Ecuador, Guatemala, Mexico and Peru – and *community forest management,* with the production of tropical woods, as well as non-timber consumables (FAO, 2021).

Throughout the region there are Indigenous and Afro-descendent communities that have managed to resist the attempts of criminal organisations to take over their governments, populations and territories (Trejo & Ley Gutiérrez, 2019). In a growing number of cases, this has meant that their lives and scarce means of subsistence have been threatened or infringed upon. Drug policy in those areas affected by the production and trafficking of psychoactive substances, as well as the money laundering of profits from drug trafficking in local activities, must be aimed at protecting the local communities with measures that strengthen territorial governance, ensure communication and early warning systems, generate economic opportunities and provide public utilities, thus contributing to the protection of their leadership guided by the damage-free action approach.

6.6. Alternative, Comprehensive and Sustainable Development aimed at protecting the environment

In recent years, the alternative development has moved from a restrictive approach aimed at avoiding and reducing damage to initiatives that can contribute directly or indirectly to the protection of the environment, biodiversity and the mitigation of climate change (UNODC, 2023). The implementation of programmes and projects within the framework of the DAIS must be accompanied by environmental impact assessments that enable risk anticipation, impact prevention and guidance for decision-making on the new processes being introduced and implemented as the basis of alternative development.

UNODC identifies four areas in which the alternative development can contribute to the protection of the environment (UNODC, 2023):

a) *Incorporating environmentally sustainable practices and approaches*, which contribute to balancing productivity, profitability and environmental protection and sustainability. The objective is that agricultural and land husbandry projects are implemented to care for the soil and biodiversity with minimal interference with natural processes – using organic fertilisers and pesticides, sustainable water sources, and renewable energy.

b) *Forest conservation*. In protected areas, such as nature reserves, there are restrictions on land use, with regulations that do not allow cultivation or livestock. In these areas, the AD can focus on the buffer zones, with initiatives that aim to generate opportunities and improve the quality of life of the communities while reducing pressure on protected spaces. Furthermore, in the protected areas the AD can create livelihoods related to environmental protection through ecotourism and the sustainable use of forest resources.

c) *Carbon credit schemes*, as instruments to preserve forests and initiate other activities that help maintain, capture, secure and store carbon dioxide from the atmosphere. Carbon credit projects help channel investments towards activities that generate tangible environmental benefits, while offering a way to address emissions that cannot be easily eliminated in the short term. Within the framework of the AD, it is essential that these schemes are implemented in accordance with the social and environmental safeguards agreed upon at the United Nations climate summit in Cancún in 2010, which seek to guarantee that the initiatives effectively protect both the communities and biodiversity (Bermúdez, 2022).

d) *Payments for environmental services (PES)*, providing additional income to farmers and communities in exchange for services that benefit various aspects of the environment. These payments can be a tool for transitioning to the legal economy. PES can contribute to financing the infrastructure or improvements necessary for agricultural and ecotourism projects to access markets that guarantee a stable price or purchase if they comply with environmentally friendly practices, including maintaining and recovering natural cover (Vélez, The time has come for environmental policy to talk with drug policy, 2019).

These lines are complemented by the potential that the *bioeconomy*, understood as the use of renewable biological resources and biological processes to produce goods, services and energy in a sustainable manner, has for the AD. This includes resources such as biomass, agricultural, forestry and fishing consumables and biodiversity in general. The AD can support the implementation of sustainable agricultural and forestry practices, as well as the creation of inclusive value chains for bioeconomy consumables in illegal drug production areas (WWF, 2021).

The above is important considering the European Green Deal, the European Union (EU) initiative to address climate change and promote sustainability, which requires the agri-food sector to audit and certify that they are in compliance with environmental stan-

dards, without deforestation.[8] This includes raw materials and consumables derived from beef, coffee and cocoa – among others – that are frequently part of the alternative development. One of the challenges will be that the costs associated with compliance with EU regulations are not passed on to small producers, Indigenous peoples and local communities, which could affect their livelihoods.

Photo: Mature cocoa plant in the Ucayali region-Peru. V. Martínez (COPOLAD, 2024)

8. In June 2023, the EU Parliament approved Regulation 1115/2023 on the marketing in the domestic market and the export of raw materials and consumables associated with deforestation and forest degradation.

From the AD perspective, environmental concerns are connected to the needs of people and communities involved in drug production and trafficking. At the centre of the interventions are the local populations and the need to respond not only to the symptoms (such as deforestation) but also to the underlying causes by generating opportunities and incentives for the transition to the legal economy.

6.7. Recognition and participation of local communities

Communities play a central role in the implementation of a drugs policy focused on environmental protection. The evidence shows that their organisational capacity, the ownership of their land, the role played by their leadership, as well as the regulations established collectively, make a difference in the protection and management of biodiverse areas. In areas where the presence of State institutions is weak or non-existent, the communities are on the front line, resisting and adapting to the pressures and influence of organised crime and the penetration of illegal economies. This role has put them at risk in many places and countries, making them victims of violence, intimidation and, in some cases, displacement.

It is essential to re-establish the relationship of trust and cooperation with State institutions to avoid the criminalisation and stigmatisation of populations that are in a vulnerable situation and with markedly unmet basic needs. Reducing the environmental impacts of the illegal drug market requires collaboration with communities and their leadership to identify and expand knowledge about the impacts, recognise sustainable alternatives that respond to local conditions, advance restoration mechanisms and promote sustainable development. Environmental education and awareness can play an important role in drugs policy, as well as in the development of local capacities to implement solutions and measure their progress. The involvement of local stakeholders in territorial initiatives generates a sense of responsibility and ownership of natural resources and raises awareness about their importance, management and conservation.

In the countries of Latin America and the Caribbean multiple initiatives and inspiring practices exist at the local level with respect to the protection and conservation of the environment from which valuable lessons can be drawn for the design of drugs policy. In this regard, it is not only important to reflect on those places where the environmental impacts have been greatest, but also to identify cases in which the collaboration between the communities, local and national institutions, civil society and international cooperation has managed to mitigate the negative impacts and move towards solutions that can be recognised and advertised as best practices. In this area a clear opportunity exists to promote Social Innovation Laboratories to test the environmental approach in drugs policy locally.

Photo: Watercourse adjacent to homes. Cauca-Colombia. V. Martínez (COPOLAD, 2024)

6.8. Recognising and interrupting illicit flows and preventing money laundering

The environmental impacts of illegal drug production and trafficking are amplified when these converge with other illegal economies and environmental crimes, as well as with money laundering and human trafficking. While the priority in the area of criminal finance has been drug trafficking, other crimes have received less attention with respect to resources and an assessment of the national and sectoral risks they pose (Igarapé Institute, 2023). As this report shows, an essential part of understanding the system that causes environmental impacts is money laundering and the multiple connections between criminal networks and the different legal and illegal activities it engenders. Although academic and journalistic investigations have revealed the link between drug trafficking, land appropriation and investments in livestock and agribusiness, it is still necessary to delve deeper into these relationships. In any event, although this analysis serves as guidance, more knowledge is required about the magnitude of the flows and nature of the laundering with respect to these activities.

As the Financial Action Task Force (FATF) points out, in its report entitled "Money laundering from environmental crime", the prevention of money laundering does not usually form part of the dialogue on public environmental protection policies (FATF, 2021). Ac-

cording to FATF, "Despite the significant profits generated in many of these cases, for the most part, jurisdictions approach environmental crimes from a conservation perspective rather than as a serious financial crime."

Together with other experts, the Financial Action Task Force affirms that serious obstacles exist at the legal, information exchange and capacity level that make it difficult to investigate and prosecute crimes that impact the environment. The Financial Intelligence Units of the countries directly affected play an important role in this by identifying the risks of money laundering and adopting measures to increase the surveillance of transactions. (Financial Accountability and Corporate Transparency (FACT) Coalition, 2023).

COPOLAD III provides advice for the approach to and focus on the Money Laundering component in national drug strategies. This is an opportunity to address the problem from an environmental perspective, advance diagnoses and identify specific recommendations.

As Brombacher and Santos (2023) point out, there is an urgent need to advance comprehensive approaches at both policy formulation and technical implementation level. With their different mandates and scopes, the three drug control conventions and the two conventions on organised crime and against corruption must be connected to the environmental agenda on the convergence of different crime phenomena and types (Brombacher & Santos , 2023).

6.9. The regulation of psychoactive substances with environmental standards and connected to climate justice as part of the debate on alternatives to respond to the phenomenon of illegal drugs

Regulation for medical or scientific purposes, as well as what has happened in some countries and jurisdictions where the use of cannabis for recreational purposes has been regulated, could open opportunities for the reduction of environmental impacts if certain standards are included and met, in particular within the climate justice framework. One of the key questions is whether regulation can reduce negative environmental consequences compared to the impacts produced by illegal cultivation.

The evidence on environmental impacts under regulatory frameworks is mixed and arises from the experiences observed in the United States. No research has been undertaken on this topic in Latin America and the Caribbean. In California, legalisation is associated with the displacement of plantations to urban areas with larger cultivation facilities, which can magnify negative environmental impacts. (Wartenberg, et al., 2021) In this State there is a high rate of non-compliance with regulations linked to environmental protection (Bodwitch, et al., 2019). While the regulation was found to have had no impact on forest protection in Washington state, in Oregon, the number of plantations in protected forests was significantly reduced. (Klassen & Anthony, 2019).

Different studies have shown that regulated cannabis crops, whether indoors or outdoors, have a high demand for water that can cause contamination and diversion. Indoor plantations also consume energy, mainly due to heating, ventilation, air conditioning and lighting, which generate greenhouse gas emissionsç (Zheng, Fiddes, & Yang, 2021). In the same way as occurs with legal agricultural crops, the negative consequences can increase if they lead to an intensive monoculture agriculture or whether large farms are favoured to the detriment of small ones (UNODC, 2022).

As part of the debate on alternatives, regulation can open an opportunity to establish mechanisms for environmental protection in specific contexts, as well as compliance with environmental regulations. An important issue is that the design and implementation of these standards do not translate into entry barriers for those who wish to make the transition from the illegal to the legal market (tni, 2023). In the case of cannabis regulation, this has been one of the main reasons for an extensive illegal market.

In the largest U.S. survey of cannabis growers conducted to date in California, a group of researchers found that farmers are open to strong environmental protections but face significant barriers to meeting regulatory requirements (Polson, Bodwitch, Biber, Butsic, & Grantham, 2023). In this regard, in the discussions around regulation it has been considered that it could facilitate the transition of other crops to more sustainable and equitable agricultural practices, with the inclusion of historically marginalised communities that have been disproportionately affected by the environmental impacts of the illegal drugs market.

Among the elements to be considered in the debate are: a) a more in-depth approach to environmental impacts, with an impact assessment of the models that are intended to be implemented that identifies possible risks and the options for mitigating them; b) the promotion of sustainable agricultural practices; c) the definition and incorporation of environmental standards; d) education and awareness of the stakeholders involved in the productive chain; and e) the necessary participation and inclusion of local communities.

Photo: Remains of deforestation in a river in the Amazon Basin-Peru. V. Martínez (COPOLAD, 2024)

Appendix. Methodological guide for the analysis of the environmental impacts of the illegal drug trade.

This guide complements the COPOLAD III report entitled *"The Silent Destruction: Environmental impacts of drug production and trafficking and State responses in Latin America and the Caribbean"*, the main objective of which is to establish concepts and provide tools that can serve as inputs for the work of the National Drug Observatories of Latin America and the Caribbean in the design and implementation of more systematised research, studies and analyses on the environmental impacts of the production and trafficking of illegal drugs, and of the supply control measures.

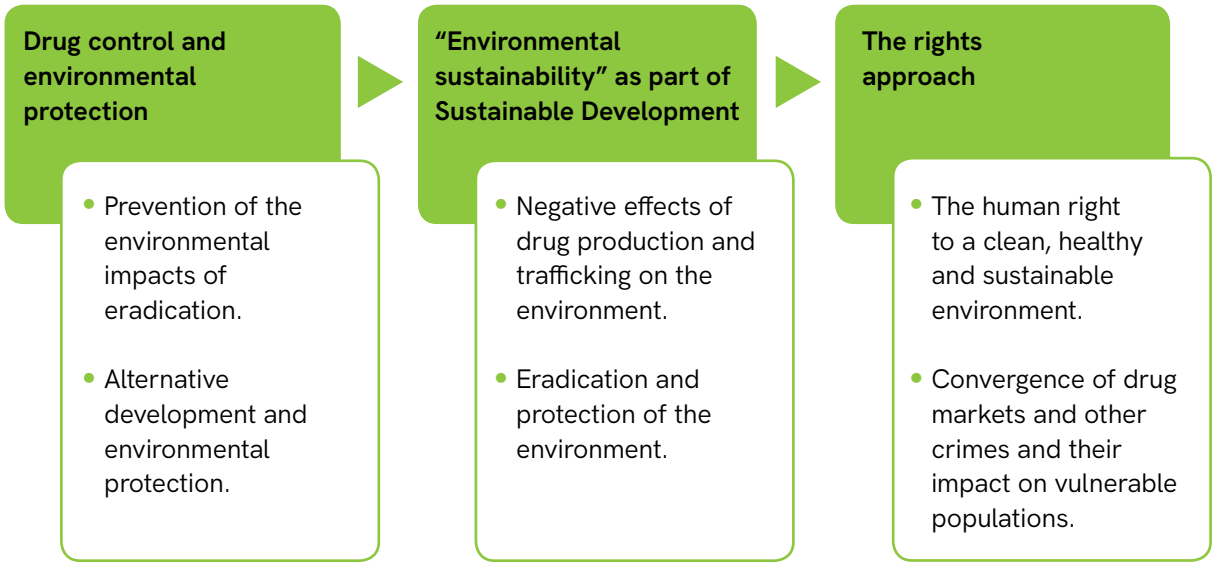
1. Conceptual and methodological approach for the analysis of environmental impacts

The connection of drugs policy with the environmental agenda and its impacts can be understood through three frameworks that generate obligations for the different States (Figure 1). First, from the international control regime and the measures for reducing supply. The United Nations Convention against the Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988, addresses the environmental impacts of the measures taken to eradicate the cultivation of plants containing narcotic drugs and calls for the protection of the environment. Additionally, the political declarations and action plans regarding Alternative Development establish that the programmes should include environmental protection measures.

Second, from the perspective of the 2030 Agenda for Sustainable Development, which has *environmental sustainability* as one of its three key aspects alongside social and economic development. It is therefore an element that cuts across all of the sustainable development goals and is reflected more directly in some than in others. This is the case of SDG 13, which addresses the fight against climate change and its effects, or SDG 15, which promotes the sustainable use of land and forests.

Third, the rights approach. In 2022, in its resolution 76/300, the United Nations General Assembly recognised for the first time the human right to a *clean, healthy and sustainable environment*. In April of the same year, the United Nations Human Rights Council had also declared access to a "clean, healthy and sustainable environment" as a universal human right. There are also statements by the Commissioner for Human Rights and a significant number of Special Rapporteurs, calling for rethinking the undesirable effects of suppression-based drugs policy and moving more seriously to align drugs policy with the UN Charter and, in particular, with human rights.

Figure 1. The connection between drugs policy and the environmental agenda based on international frameworks



Source: Prepared by the author

Within the framework of drugs policy, environmental impacts refer to the adverse or harmful effects on natural resources and ecosystems, in all their breadth and diversity, which result from activities associated with the production and trafficking of illicit drugs, as well as the actions undertaken by the State to reduce the availability of psychoactive substances. They not only include those direct impacts related to drug trafficking, but also the effects derived from the convergence with other illegal economies and environmental crimes, as well as activities linked to money laundering. Furthermore, in the context of Latin America and the Caribbean, impacts also include violence and coercion against environmental activists and native, Indigenous and Afro-descendent communities, and the subjugation or trafficking of persons for various purposes, taking advantage of their vulnerability. This guide will pay special attention to the impacts upon forests, areas beyond the agricultural frontier and fragile ecosystems.

Photo: Smallholders in their vegetable garden. Quimistan-Honduras. V. Martínez (COPOLAD, 2024)

In short, environmental impacts can be addressed from four dimensions and their interactions:

a) **The direct impacts of the drug market, with emphasis on drug production and trafficking activities.** For example, the expansion of coca crops leads to deforestation (cut, slash and burn) and loss of soil, while the inappropriate use of agricultural chemicals causes contamination of land and water sources, as well as damage to the flora and fauna by altering the balance and natural cycles, among other causes and factors, with cumulative and persistent impacts.

b) **The impacts of the State's responses to control supply.** This includes eradication actions - either manual or using agrochemicals, with impacts similar to those already described - and suppression, as well as projects that seek to promote a comprehensive and sustainable alternative development of the areas affected by the illegal drug trade, generally through the introduction of new crops or products with market and income diversification potential.

c) **The impacts of the convergence of the illegal drug economy with other illegal economies and crimes.** For example, illegal logging and/or mining, smuggling and other unregulated resource extractive activities, or threats to the life of and impacts on the Indigenous communities and leading environmental activists, including human

trafficking, by criminal organisations linked to drug trafficking, which weaken their ability to protect and conserve the ecosystems.

d) **The local impacts linked to the laundering of the money and resources generated by the illegal drugs market.** For example, deforestation and expansion of the agricultural frontier caused by productive activities financed with the laundered money generated by drug trafficking.

To move the analysis of these dimensions forward, this guide is based on two tools used to assess and manage the environmental impacts of projects and policies:

The Environmental Impact Assessment (EIA): This is a preventive tool applied by countries and entities for measuring, correcting or mitigating the potential impacts of an activity, intervention or project on the physical-natural, biological or socio-economic environment in which it is implemented. It is usually of a focused or one-off nature requiring precise measurements of and data on each impact and location. It is also oriented towards compliance with norms or standards set as limits that guarantee the sustainability and balance of each ecosystem.

The Strategic Environmental Assessment (SEA): This identifies impacts for the purpose of evaluating and forecasting possible significant changes that may occur as a result of the implementation of policies, plans or programmes. The SEA seeks to identify and analyse the direct and indirect impacts in the short and long term taking into account the complexity of environmental systems and their interaction with other aspects of development. It can be complemented with EIAs to monitor its development in relation to natural resources and specific territories.

EIAs and SEAs can be used in an integrated manner to provide a broader and more coherent view on how to intervene systematically and gradually in each context. The former is useful when analysing specific local impacts or delimited phases of the illegal drug market (for example, the environmental impacts of coca crops in a certain geographic area) or State responses (the impacts of aerial spraying). The latter uses a broader level and approach by addressing strategic issues and considering multiple phases and components and their interrelationships in a more general context (for example, identifying how the demand for illegal drugs drives the planting of coca crops that cause impacts on the environment). This methodology takes elements from each of these two tools in order to provide inputs on environmental considerations in political-strategic decision-making on the illegal drug trade.

Photo: Delimiting cultivation areas in the Río Blanco water catchment basin-Honduras. V. Martínez (COPOLAD, 2024)

2. Methodologies and variables for identifying and analysing environmental impacts

There are different approaches for identifying and measuring environmental impacts within the drugs policy framework. Most studies and research tend to focus on a specific component of drug production or trafficking (for example, the impact of illicit crops in relation to deforestation) within a given geographical area or region, or upon the impact on a specific community. Generally, these analyses break the market stages down into segments without stopping to assess the interaction between the different processes, variables and stakeholders. There is also a broader and strategic approach – as set out in this report – that seeks to identify determinants, relationships and feedback cycles, taking into account the institutional framework and the context in which the impacts occur.

The methodological design and the decision on the variables to be considered will depend on the problem proposed to be addressed and the initial objective defined in the public policy. Therefore, the first step in addressing environmental impacts is to clearly define the scope of the analysis and assessment and its purpose.

2.1. Identification of objectives

To begin, the objectives of the environmental impact assessment must be clearly defined. What is the purpose of the study or of the inclusion of environmental variables in drugs policy? What environmental aspects or natural resources are intended to be evaluated? The options identified include the following:

- Identifying the impacts of drug production and trafficking with the objective of estimating the environmental consequences of the drug market and singling out measures for its mitigation.
- Identifying the risk of environmental impacts of supply control measures with the purpose of preventing and managing them. For example, environmental impact assessments of forced manual eradication as a requirement for their approval.
- Carrying out a diagnosis of the areas affected by drug production and trafficking in order to estimate the degree of alteration and the recovery capacity of the ecosystems in order to decide on the appropriate environmental management measures.
- Characterising the environmental effects at the local level as a basis for defining conservation goals and the restoration or environmental recovery of the areas impacted by the production and trafficking of illegal drugs and the supply control measures implemented by the State (for example, the sanitation of soils impacted by the use of glyphosate).
- Developing monitoring and warning systems that enable the identification of impacts on ecosystems in real time or early with the aim of providing a rapid response to reverse the situation and change the trajectory of the impact, as well as making adjustments as necessary to guarantee the protection of the environment.
- Assessing the effectiveness of the drugs policy by identifying the environmental impacts and whether it is achieving its intended objectives in terms of environmental protection.

Photo: Drug policy and alternative, comprehensive and sustainable development (DAIS) workshop. (GIZ/DEVIDA, 2023)

The objectives may be localised and specific or may include a broader drugs policy approach. The recommendation is that the definition of objectives should take into account human, temporal, technological and economic resources, as well as the priorities established in public policy.

The objectives can be specific and supported by methodologies that include the taking of direct measurements in delimited study areas (for example, measuring soil or water quality in areas containing illegal crops) or adopting a macro view to analyse dynamics linked to the production and trafficking of illegal drugs, as is the case of deforestation. For example, using aerial and satellite images it is possible to estimate the areas of coca crops that have been established in areas where primary forests used to exist, but bearing in mind that these are generally intertwined with other traditional crops and expanding livestock farming.

2.2. The selection of aspects and environmental impact variables

The production and marketing of illegal drugs covers a wide range of activities and procedures that vary depending on the type of substances, whether natural or synthetic, as well as the places of origin and destination, the agents involved, the technologies used, the materials and precursors employed, and the illegal regulations established, as well as the control mechanisms or measures within the framework of the country's policy on psychoactive substance control. Each of the phases of drug production and

trafficking includes a set of activities, practices and processes that generate impacts on the ecosystems and populations linked to them or within their areas of influence.

Additionally, there are the actions taken by the State to reduce the supply in each of the phases: the eradication of crops, the banning of chemical substances, the destruction of laboratories and production infrastructure and equipment, and the implementation of comprehensive alternative development projects that seek to advance innovative approaches to responding to the complexity and diversity of the phenomenon.

Given this complexity, and as a methodological resource, the recommendation is to address environmental impacts from the phases or parts that make up the system, without losing sight of their interaction. This guide will take the aspects analysed in this report to identify the main components and variables for to scrutinise the environmental impact of drug production and trafficking, as well as the supply control measures implemented by the State.

a) The impacts of crops for illicit use and of the illegal drugs processing phase

According to the limited evidence, the establishment of crops for illicit use generates changes in the physical, chemical and microbiological properties of soils by interrupting natural cycles and intensifying their impoverishment and degradation. It also contaminates bodies of water and indirectly "poisons" aquatic ecosystems. On the other hand, the cocaine transformation process involves the use of fuels and other chemical precursors, which after use are discharged into watercourses or directly into the ground, with negative environmental impacts.

Table 1 identifies a set of indicators for the identification and analysis of environmental impacts. Its implementation requires the selection of study areas and systematic sampling before and after the sowing and harvesting of crops, or before and after the installation of production infrastructure and the disposal of waste. The samples are taken to the laboratory where they are analysed to determine the selected properties and make a before and after comparison of the cultures or of the transformation process.

It is generally very difficult to carry out this type of analysis in the case of the production of illegal drugs because in most cases there is no baseline that allows this comparison to be made. As it is an illegal activity, carried out clandestinely, with a generally isolated or dispersed distribution of crops and the involvement and interaction of several stakeholders, ecosystems and natural resources, information on production is extremely limited.

One alternative is that the comparison could be made between surrounding areas that have similar characteristics and have not been impacted by the establishment of crops for illicit use or transformation processes. Even in these cases, it is important to bear in mind that in these areas the activities related to the illegal drug economy are not the only ones being carried out (and that also use agrochemicals, for example), so in some cases it is very difficult determine specific environmental impacts.

Regarding the waste generation, it will be useful to take water and soil samples to identify the presence of toxic residues of chemical precursors used to produce illegal drugs. The estimation of the volumes can give an idea of the "stress" to which the ecosystems are subjected and the possible environmental impacts.

Table 1. Environmental indicators for identifying environmental impacts

Indicator	Variables to be monitored
Air quality	Concentration of pollutants, CO2 emissions.
Water quality	Concentration of pollutants, oxygen levels, usage/capture of water sources, alteration of the hydrological cycle.
Soil and land quality	Concentration of pollutants, soil erosion, soil compaction and texture, low nutrient concentration.
Waste generation	Generation of solid waste, toxic or hazardous waste and untreated wastewater.

Source: Amended based on (UNODC, 2022; National Police of Colombia, 2014)

One of the most frequently used indicators for measuring environmental impacts is deforestation, namely the deliberate and permanent elimination of the forest cover or mass of a given area. One of the most common ways to measure forest loss is using satellite images. Images of different spatial and temporal resolutions can be used to identify and quantify changes in forest cover over time. This information can be complemented with overflight images and the gathering of field data.

A time period is defined for the gathering of information and its analysis during which the aim is to identify variations and patterns linked to the establishment of crops for illicit use. It is important for this exercise to take into account territorial categories such as ecological and economic zoning, native communities lands, buffer zones and protected natural areas. The objective is to identify the loss of forest associated with the establishment of crops for illicit use. In the case of the processing phase, the georeferencing of the destroyed laboratories can be incorporated, as can the clandestine landing strips, warehouses, sheds and jetties built to support the transport-transit and consumables supply phase.

Regarding the identification of the drivers of deforestation, there are two main approaches: single-factor and multi-factor causality, the latter of which assumes that the causes of deforestation are diverse and interconnected. Most studies on deforestation embrace the second approach.

In the case of crops for illicit use, in local studies carried out by UNODC, the classification made by Geist & Lambin has been adopted, which categorises the factors into *proximate or direct causes* (the direct change in forest cover due to the establishment of crops)*, underlying causes* (the set of socio-political, economic and environmental variables that affect deforestation and forest degradation by crops) *and determining factors* (biophysical conditions that predispose the territory to the establishment of crops for illicit use) (Geist & Lambin , 2002). The gathering of information on these causes requires the identification of a broad set of quantitative variables, the generation of spatial databases, statistical and descriptive analyses, as well as qualitative information collected in the field by inter-institutional task forces, as well as regional workshops with leaders and communities who can share information in a protected and safe way.

To analyse the environmental impact, it is not only relevant to identify the loss of forest cover with crops for illicit use and with the continued impact on the forest's capacities (i.e. its degradation), but also the deforestation associated with settlement processes and ruralisation in surrounding areas. The construction or consolidation of roads or access routes are also considered to be among the infrastructure elements that impact protected areas or nature reserves. In other words, all those processes through which stable human settlements are consolidated, which can result in the fragmentation of the natural forest, in the expansion of rotational agriculture and livestock farming, in areas of planted pasture, in the formation and partitioning of farms, the opening of new roads or tracks and the spatial formation of populated centres and rural peripheries. One of the alternatives is to analyse the areas of deforestation by referring population data, transit route density or light pollution using satellite images.

Within the framework of deforestation analysis, it is also important to consider the impacts on biodiversity and ecosystem health, that is, the richness and abundance of species, as well as the quality and diversity of the habitat. Again, the challenge here is to establish baselines that enable the identification of the changes and patterns associated with the cultivation of crops for illicit use and the illegal drug production phase.

In several countries in the region, well-established monitoring and information systems measure and analyse deforestation. In these cases, the recommendation is to take advantage of these capacities by incorporating indicators and variables linked to drug policy and its response strategies.

b) Impacts of the State's responses to reduce crops for illicit use and the production of narcotics

i) The environmental impacts of aerial spraying

In most cases, the available evidence on the environmental impacts associated with the use of selective herbicides does not focus specifically on their use to eradicate illicit crops. Instead, it is based on research that generally addresses the consequences that a given agrochemical can have on the people who handle or are exposed to it (such as workers and communities) and on the environment as a whole.

Research indicates that glyphosate and its leachates can reach groundwater, surface water, and several other places where it is not intended. It is also clear from several studies that glyphosate applied to cropping systems can potentially reach undesired areas and plant tissue through processes such as the off-target dissemination of herbicides, spray drift, and uptake by the roots of different plant species (Kanissery, Gairhe, Kadyampakeni, Batuman, & Alferez, 2019; Gandhi, et al., 2021).

Measurement of the environmental impacts of glyphosate generally includes these different steps:

Water sampling and monitoring: Samples are taken from bodies of water close to areas treated with glyphosate to measure the presence and concentration of the herbicide. This may include sampling surface and groundwater and analysing parameters such as turbidity, pH, and nutrient concentration.

Photo: Recreation area on a riverbank in the Amazon Basin. V. Martínez (COPOLAD, 2024)

Soil sampling and analysis: Soil in areas treated with glyphosate is sampled to assess its impact on soil quality. This may include measuring the concentration of glyphosate and its metabolites in the soil and evaluating parameters such as soil texture, structure, and organic matter.

Impacts on biodiversity: With biodiversity studies in areas treated with glyphosate to evaluate its impact on local flora and fauna. This may include observing changes in the composition and abundance of plant and animal species, as well as assessing the health and diversity of ecosystems.

These types of measurements also require baselines and standardised sampling protocols whose preparation and implementation are more complex in remote or isolated areas with crops for illicit use. In the analysis of impacts, it is important to determine the intensity of its use – which can be significantly different from its commercial use – as well as adjuvant or adherent consumables that may represent a source of additional risk and generate greater negative impacts.

ii) The displacement of crops for illicit use in response to forced eradication

To measure the displacement of crops for illicit use, the areas in which aerial spraying or forced manual eradication occurred and the appearance or variations of plantations in the surrounding areas are generally taken as a reference—this using aerial, overflight, or satellite images. Spatial analysis models that integrate georeferenced agricultural data can be used to identify variations.

Generally, this analysis considers time series, comparing data over time to identify changes in cocaine production in different areas, before and after eradication actions. This can be complemented with qualitative studies, with interviews and focus groups, by talking with people involved in illicit crop cultivation to understand how they respond to eradication actions, and in the event of migratory movements from production areas due to the intervention of the State, interviewing the people involved.

One key issue is to determine the range of analysis of the variations, since crops for illicit use can not only be moved to adjacent territories, but also to distant areas, in which case it is more difficult to determine a correlation or find any causality. For example, eradication actions could impact the appearance and growth of plantations in areas where there are restrictions to apply this control measure for example, national parks or protected areas of the Amazon Basin.

In any event, it is important to take into account the complexity of the causal mechanisms of displacement. Measuring the so-called "Balloon Effect" can be difficult due to the multiple factors involved, so a combination of quantitative and qualitative approaches is recommended. From the perspective of environmental impacts, one key issue is to analyse whether displacement is related to deforestation and the growth of plantations in sensitive ecosystems.

iii) The destruction of laboratories and chemical precursors in environmentally fragile areas

The safe disposal of fuels and the other chemicals used in the manufacture of illicit drugs and their waste generally occurs in remote places, with difficult access and with complex security conditions, making it difficult to carry out measurements and studies on their environmental impacts. Ideally, the analysis should include the indicators contained in Table 1 in the vicinity of the areas where the destruction occurred (impacts on air, water and soil quality, as well as the effects generated by the dumping of waste). Given the difficulties in advancing this type of exercise, the analysis of the environmental risks of the elimination of substances should be considered, taking into account their toxicity, persistence and capacity for bioaccumulation in the environment. The supply points or routes of these precursors in the illicit crop expansion areas also deserve special analysis because they are key indicators that can help prevent and anticipate environmental impacts once they have been transported.

iv) The unintended environmental consequences of Alternative Development

The initial recommendation is that an Environmental Impact Assessment precede projects linked to Alternative Development (AD). This will allow us to identify the risks they represent for the areas in which they will be implemented, with the objective of providing input for decision-making and mitigating their possible negative effects on ecosystems.

As noted in this report, the available evidence, which refers to the most limited version of AD, shows at least three ways which, if followed, can result in direct and indirect environmental impacts.

The promotion of extensive crops for large-scale production, as well as livestock farming as an economic alternative, in environmentally sensitive areas. In this case, it is important to monitor land use changes in the projects' implementation areas. The evidence shows that in some cases these initiatives have been implemented outside the agricultural frontier or in areas not suitable due to their ecological fragility. In this regard, it is relevant to analyse the dynamics of deforestation by identifying whether the impact on the forest was reduced after the implementation of the project or if, on the contrary, there was an increase in the intervention areas and in the surrounding areas.

The establishment or increase of illicit crops in areas surrounding where AD is implemented. In some cases, against a backdrop of high economic and social vulnerability, people may choose to move and expand coca plantations out to surrounding areas in response to the uncertainty of the transition to a legal economy that promotes, maintains or supplements basic livelihoods against a backdrop of limited opportunities. This could lead to extending the coca frontier and with it deforestation.

Photo: Path giving access to a cocoa plantation in the Amazon Basin-Peru. V. Martínez (COPOLAD, 2024)

The continuation, by AD beneficiaries, of agricultural practices that may have consequences for the environment. Initiatives linked to AD have to address broad and well-established patterns such as waste incineration, monoculture or intensive production that depends on chemical inputs, which has resulted in loss of diversity and functional ecosystems (UNODC, 2023). In the transition to the legal economy, these activities can continue to be developed, with negative consequences for the environment. For this reason, it is important to develop a baseline of established agricultural practices by identifying those that may have significant impacts on the environment and the options to mitigate them. This makes it necessary to systematically identify the cultivation methods employed, the use of agrochemicals and soil and water management, among other aspects. This information can be obtained through surveys and interviews with farmers.

To analyse the impact of AD projects, it is recommended first to establish a baseline for the environmental assessment that includes the indicators in Table 1. This will allow subsequent assessments to be carried out on the impact these projects have on the restoration of degraded ecosystems by comparing measurements before and after the projects are implemented. The expected result is that AD will contribute to reducing soil erosion, increasing or restoring biodiversity and improving air and water quality.

c) Environmental impacts of drug trafficking

The most commonly-studied environmental impact in trafficking areas is deforestation, with the identification of abnormal patterns of forest loss associated with the establishment of routes for the transit of drugs or the supplies for processing in remote areas. The methodologies employed are similar to those used to analyse deforestation associated with crops for illicit use, but with the additional difficulty presented by the delimitation of transit areas. The identification of these areas must be performed by referring to the records of the seizures and suppression activities carried out by the state which are limited and need to be complemented by quantitative and qualitative methodologies.

To obtain estimates of how much, how often and when cocaine is moved through the region, several studies have used information from the Consolidated Counterdrug Database (CCDB) of the United States Drug Administration's Office of National Drug Control Policy. The CCDB contains consistent, although partial, information on all transit areas for cocaine smuggling from South America. To address the limitations of official drug trafficking data, some studies have constructed databases of media reports regarding drug trafficking events (Tellman, Magglioca, Tuner II, & Verburg, 2020; Tellman, et al., 2020).

A wide range of sources and methodologies have been used to analyse the environmental impacts in transit areas. In this area of research, indicators such as "the suitability of the landscape for the trafficking of drugs" have been proposed, which identify the environmental, physical and political characteristics that could favour the smuggling of psychoactive substances and consider variables such as proximity to roads, to the border, to a port, as well as population density and land ownership (Magliocca, Summers, Curtin, McSweeney, & Price, 2022). Social mapping has also been used, with maps prepared based on semi-structured interviews and workshops held with demographically diverse groups of local policy makers, conservationists, residents and other stakeholders from protected areas.

Of particular interest has been the impact of trafficking on protected areas and Indigenous communities. In this respect, spatial analyses have been carried out that overlap trafficking routes with territorial categories and the types of land use. Through this approach, for example, the conversion of subsistence agriculture areas to pastures for livestock has been found for which information from livestock censuses has also been used. The implementation of qualitative methods that have included field studies has made it possible to establish a presumption about how money is laundered and then used.

Satellite images have been used to detect and identify the insertion of roads and other transit routes into fragile ecosystems and their connection with other extractive activities. This same resource has been used to identify landing strips and loading jetties both in the jungle and in areas surrounding extensive deforestation.

d) Suppression and the displacement of drug trafficking routes to environmentally fragile areas

According to UNODC, the efforts made to contain the supply of illegal drugs through suppression can cause changes in destinations, geographical routes and the means used for trafficking (as already described, this is the so-called "balloon effect"). The methodology used to detect the displacement of routes is based on the identification of transit areas from records of state seizure and suppression operations and complemented by quantitative and qualitative methodologies (See previous section). The exercise consisted of identifying changes related to peaks of suppression activity by estimating the likelihood that shipments would pass through regions with abundant remote areas and sensitive ecosystems all along their coasts (Magliocca, Summers, Curtin, McSweeney, & Price, 2022). In addition, patterns of forest loss were identified that could have occurred after peaks in suppression activity.

For example, to analyse the causes of deforestation in Central America, including drug trafficking, B. Tellman and co-authors identified a set of variables attributed to each province or department over a period of 16 years. These variables were integrated into a model of regressions with fixed effects to estimate the role of drug trafficking in forest loss. This information was used to analyse the environmental impact of the displacement of routes in reaction to the state's suppression activities.

Table 2. Annual covariates from the Central American model attributed to each province or department of the study area, to estimate the role of drug trafficking in forest loss

Variate	Description
Agricultural production	Arable land, pasture and citrus/coffee (plantations), aggregated as a percentage by department.
Population	Population census by department.
Rural population	People in rural areas
Economic development	GDP growth.
Fires	Burned area using MODIS satellite images (MC-D64A1)*
Climate	Maximum rainfall during wildfire season
Data on drug trafficking and seizures	Cocaine seized, lost or delivered as tracked by the US military.
Media data	Press reports containing department-specific drug trafficking activity events.

Source: (Tellman, Magglioca, Tuner II, & Verburg, 2020).

As can be seen, these analyses generally include a wide range of sources and methodologies, ranging from the use of satellite images to interviews with farmers and media monitoring.

e. The convergence of the production and trafficking of illegal drugs and crimes that impact the environment

Convergence refers to overlapping of criminal networks and the fusion of their illicit activities (Earth League International and John Jay College of Criminal Justice, 2023). In the case of the illegal drug market and the criminal organisations that manage and sustain it, connections have been identified with environmental crimes such as illegal logging, the illegal wildlife trade, illegal mining and other activities that result in the depletion or degradation of natural resources (Anagnostou, Synthesizing knowledge on crime convergence and the illegal wildlife trade, 2022; INTERPOL, 2022; Abdenur, Pelegrino, & Porto, 2019).

The connections between the production and trafficking of illegal drugs and environmental crimes can occur through six main channels of convergence. The following table includes a brief description, analysis, and measurement options for each channel.

Table 3. Convergence channels linking the production and trafficking of illegal drugs and environmental crimes

Convergence channel	Description	Analysis and measurement variables
Combined trafficking	The combination of smuggling illegal consumables for reasons of convenience or opportunity.	Identification of seizures in which a combination of illegal consumables is found. For example, shipments of illegally logged wood with cocaine stashes.
Multiple business lines controlled by a criminal network (Diversification)	Risk sharing and increased control and profit by dominating multiple trade lines and routes.	Identification of trafficking routes for illegal consumables that coincide or converge in areas under the influence of or controlled by criminal networks.
Smuggling routes and shared methods of transport	The smuggling of multiple types of merchandise taking advantage of access to multi-purpose routes to increase profitability.	Identification of seizures of illegal consumables smuggled using the same route. For example, in the Amazon Basin, landing strips have been identified near illegal mining areas that are also used for illegal drug trafficking. In this case, the identification of rudimentary and clandestine runways, detected using satellite images, is an important input.

Canal de convergencia	Descripción	Variables para el análisis y la medición
Barter economy	Cashless transactions that are very difficult to track. One illegally extracted product is exchanged for another.	This convergence channel is difficult to detect and requires financial intelligence and the analysis of illicit flows.
The production of illegal drugs and crimes against the environmental within the same territory	Areas under the influence of criminal networks in which not only drug production and trafficking takes place, but also in which other illegal economies are found.	In the case of Colombia, satellite images have been used to detect areas with alluvial gold exploitation that were superimposed on areas with coca bush cultivation, finding geographical coincidences. This same exercise could be carried out with other illegal economies and environmental crimes.
Money laundering	The profits generated by the illegal drug trade are laundered via the marketing of illegally extracted consumables such as gold or wood that have been introduced into and circulate via the legal supply chain.	In this area, FATF standards provide a useful framework for helping countries and the private sector address the laundering of money generated by environmental crimes, with it being important to identify and assess the risks of money laundering in relation to drug trafficking and its relationship with environmental crimes (See FAFT, 2021).

Modified from (van Uhm, South, & Wyatt, 2021) (van Uhm, South, & Wyatt, 2021)

Based on the review of the evidence analysed in this report, some tools are also identified for analysing the convergence of the production and trafficking of illegal drugs and crimes that impact the environment:

Analysis of criminal networks. This aims to identify connections between different criminal groups and criminal activities. In this respect, analysing the way in which the individuals and organisations involved in illegal drug production and trafficking, and environmental criminals, cooperate or compete with each other. The analysis of criminal networks to identify critical points of convergence, key stakeholders within the network and their connections.

Research and case studies. Based on police and judicial investigations, specific cases are analysed that allow us to understand how different types of crimes interact. There are also journalistic investigations that focus on a specific criminal organisation or a particular territory to analyse how different illegal economies converge. In Peru, for example, a journalistic investigation based on police documents, tax complaints, court rulings, and dossiers showed how criminal organizations involved in wildlife trafficking use methods and routes similar to those used by drug traffickers. (Ojo Público, 2019)

Geographic analyses based on satellite images. Analysis based on satellite images has made it possible to identify patterns of deforestation, areas of illegal opencast mining, networks of clandestine landing strips, rudimentary roads and paths in the middle of the jungle. These data have been used as the basis for analysing the convergence of different illegal economies and criminal organisations, and their environmental impacts – especially their influence on deforestation.

Analysis of illicit finances. This analysis requires specialised knowledge and is based on the identification of suspicious transactions, abnormal financial patterns, as well as activities used to conceal, transform and legitimise income derived from illicit activities. For example, Peruvian criminal organisations have been indicted by the United States Justice system for laundering drug trafficking money via international gold refinery transactions. In Colombia, illegal mining has been identified as one of the easiest and most profitable ways to launder money generated by networks linked to drug trafficking (Global Initiative against Transnational Organized Crime, 2016).

f. Impacts on environmental activists and Afro-descendent and Indigenous communities

The production and trafficking of illegal drugs have impacted environmental activists, as well as native, Afro-descendent and Indigenous communities in different ways. In the analysis of environmental impacts, it is necessary to consider the different forms of violence against these populations and their leaders and the way in which these affect their capacities and the governance of their territories.

For this purpose, the inclusion of the following set of indicators is suggested:

Variate	Description
Violence against environmental activists in areas impacted by the production and trafficking of illegal drugs.	Information on murders, acts of violence, threats and intimidation against public officials (including park rangers), leaders, activists, social and civil organisations that work to protect and preserve the environment and natural resources in areas affected by production and illegal drug trafficking. It is important to differentiate these events by gender and belonging to an ethnic group.

Variable	Descripción
Impacts on environmental governance in areas impacted by the production and trafficking of illegal drugs.	Impacts upon the capacity of governmental and non-governmental stakeholders to manage natural resources such as the integrity of ecosystems and the communities that depend on them in areas affected by the production and trafficking of illegal drugs. Governance can be affected by: • Forced displacements and migration. • Recruitment by armed groups and criminal networks. • Corruption and institutional weakness. • The disruption of sustainable livelihoods. • Limitations on political participation. • The incursion of settlers.
The production and trafficking of illegal drugs in the territories of Indigenous or native peoples and of Afro-descendent populations.	The number of hectares of crops for illicit use, drug production infrastructure and the existence of transit routes (roads, landing strips) in indigenous reservations and on community land. It is important to identify growth trends.
The influence of armed groups and criminal networks within the territories of Indigenous or native peoples and Afro-descendent populations impacted by the production and trafficking of illegal drugs.	Presence and influence can be established through acts of violence and intimidation, as well as the establishment of rules and restrictions on mobility by armed groups and criminal networks. For the Amazon region, a tool that may be useful is the Interactive Map of Armed Groups, prepared by InfoAmazonía: https://infoamazonia.org/es/maps/amazon-underworld-mapa-interactivo-grupos-armados/

Regarding the impact upon native, Indigenous and Afro-descendent communities, it is essential that they be involved in the analysis and measurement processes while respecting their traditional knowledge and considering their concerns and priorities. Likewise, progress can be made in environmental monitoring and participation, including training in monitoring techniques and data collection while taking special care with the safety of the communities they must not be put at risk.

3. Sources of information relevant to environmental impacts

For the identification and analysis of information on environmental impacts, there are multiple sources that provide relevant inputs to address the aforementioned variables. The Drug Observatories have the opportunity to strengthen their information and analysis systems through coordination with other State institutions with powers in the envi-

ronmental agenda, research centres, non-governmental organisations, local authorities and with communities. The selection of information sources will depend on the objective stated, the methodologies selected and the variables identified to address the risk and existence of environmental impacts.

Among the sources, it is recommended to consider the following, whose names may vary depending on the country:

- **The Ministry for the Environment, Conservation Services and the Institutes of Hydrology, Meteorology and Environmental Sciences**, which can provide information on deforestation, wildfires, protected areas, buffer zones and special protection areas, biological diversity, as well as monitoring data for analysing air, water and soil quality.

Photo: The regional Surveillance Service for Protected Natural Areas office. Pucallpa-Peru. V. Martínez (COPOLAD, 2024)

- **The Ministry for Agriculture**, which can provide information on land uses, the agricultural frontier, livestock inventories, main agricultural activities, distribution and ownership of land, soil quality and erosion.

- **National Statistics Institutes**, which have information on demographics and economically active population, socio-productive variables and input-product flows of the agricultural sector.

- **The Police and Military Forces**. In addition to providing information on illicit crop eradication programmes, the destruction of drug processing infrastructure and equipment, the seizure and disposal of chemical precursors and the activities taken to suppress psychoactive substances, means of transport and clandestine landing strips, they can provide valuable information on drug trafficking routes, criminal networks, their convergence with other environmental crimes, and the impact on and violations of the rights of environmental activists and the native, indigenous and Afro-descendent communities.

- **The Justice and Ombudsman System.** Information about threats and complaints received, judicial sentences passed, and disciplinary files opened can provide valuable input for understanding the dynamics behind the environmental impacts linked to the production and trafficking of illegal drugs.

- **The Financial Intelligence Units**, in their role in preventing and detecting illicit financial activities and money laundering, can be valuable in understanding the local interaction of drug production and trafficking with other illegal and legal economies, as well as with related environmental crimes.

- **Research institutes on drugs policy and environmental issues**. One thing to keep in mind is that, with a few exceptions, these are two agendas whose paths have not crossed. As the evidence analysed in this report shows, this dynamic has been changing due to the greater importance that has been taken on by climate change and the environment. This is an opportunity to generate an exchange and an interdisciplinary conversation to raise awareness among drugs policy researchers on environmental issues and environmentalists on the importance of the impacts of the production and trafficking of illegal drugs.

- **The local, national and international Civil Society Organisations that have promoted the environmental agenda**, with research on deforestation and climate change, the loss of biodiversity and their impact on human rights activists and native communities. Many of these organisations have established monitoring and follow-up systems, engage in direct dialogue and, in some cases, work together with local populations and their leaders.

- **Investigative journalism networks**. In the region there are different journalists and networks that have been responsible for investigating and disseminating information on the environmental impacts of drug trafficking and other illegal economies, and the control measures implemented by the State. This is the case of Mongabay, La Liga contra el Silencio (The Anti-Silence League), the Latin American Centre for Journalistic Investigation (CLIP), Ojo Público (Public Eye), the Amazon Underworld Alliance, and the Global Investigative Journalism Network, among others.

- **Open information sources and new technologies for mapping deforestation and environmental crimes.** Every day, more open information sources allow access to free satellite images. For example, there are projects like *Global Forest Watch 2.*0,

overseen by the World Resources Institute, which offers a service providing open source data on forests. In the Amazon Basin region there are different spatial and crime analysis platforms, such as *MapBiomas*, a multi-partner initiative that tracks phenomena such as land use, fire scars, soil carbon stocks, industrial mining and deforestation; *Amazônia in Loco* of the Igarapé Institute, a tool with more than 80 environmental, social and economic indicators from 25 public data sources in the 772 municipalities of the Brazilian Amazon region; as well as *Radar Mining Monitoring* which provides data on deforestation caused by mining activities in Peru.

- **Leaders and local communities**. The first line of defence for environmental protection is local leaders and their communities. Their participation in the identification and analysis of environmental impacts is essential since they are the ones who have first-hand information on territorial dynamics, the impact on ecosystems and the risks to which they are exposed. That is why it is necessary to strengthen and give sustainability to communication systems, use participatory qualitative methodologies that generate spaces for understanding and dialogue, and that enable recognition of the needs and capacities of local stakeholders. It is recommended to carry out semi-structured interviews, participatory workshops and informative meetings that contribute to transparent and participatory decision-making.

Photo: Woman actively participating at an Indigenous Community Meeting. Ucayali, Peru.
Leonardo Andrade (2024)

4. Analysis of impacts and identification of environmental impact mitigation, protection and restoration measures

Once the environmental impacts have been identified, developing a systemic map is recommended to establish connections and interactions between them. The aim is to be able to view the different elements and relationships of a complex system and understand its structure, dynamics and functional characteristics. This will help to understand how changes in one component can affect others and how decisions and actions in the area of drugs policy can affect the system. By displaying interconnections, the systemic map helps identify strategic intervention points where changes can be implemented to significantly influence the impact mitigation, protection and restoration of the environment. The "Environmental Impacts" section of this report contains an example of a systemic map, which can serve as a basis for this exercise.

As part of the SEA, it is recommended to carry out an analysis focused on the regulatory and institutional framework, the way in which environmental impacts have been addressed, as well as the capacities and opportunities for addressing them, taking the following questions as guidance:

Table 4. Key questions raised by the Strategic Environmental Assessment

Scopes	Key questions
The policy framework	Has the policy framework generated any incentive to confront environmental problems in the context of the phenomenon of illicit drugs and other related crimes? What are the weaknesses of this policy and institutional framework to account for environmental problems and their interrelationships?
Policies and plans	What has been the environmental impact of policy objectives in the past? Have policy tools encouraged environmental impacts or, on the contrary, have they diminished them?
Institutions	What are the relevant institutions with responsibility for managing the illicit drug problem and other related sectors? What is the capacity of the relevant institutions responsible for the environmental management of drugs policy?
Environmental policy options applied	Which are the environmental policy options that have been applied to manage environmental problems? Have they been met? Which are the prevention or compensation measures that have been applied to avoid environmental problems?

Source: Amended from Herrera & Bonilla 2009

The analysis of environmental impacts is an important input to identify and adopt measures and actions to mitigate, prevent or compensate for the negative consequences identified. The section, "Opportunities and levers of change for reducing environmental impacts", contains a set of alternatives and recommendations that can serve as a guide.

It is recommended to continuously monitor environmental impacts as part of the drugs policy appraisal and assessment process so that the necessary adjustments can be made to comply with the objectives linked with environmental protection. Likewise, the creation and maintenance of environmental systems and databases, managed by the National Drug Observatories, is essential to serve as a basis for the design, implementation and assessment of drug policies.

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Chapter 1

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Funded by
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