

Prohibited Plants

Environmental Justice in Drug Policy





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Abbreviations

AD	Alternative development
CND	Commission on Narcotic Drugs
DTOs	Drug Trafficking Organisations
EGM	Expert Group Meeting
FAO	Food and Agriculture Organisation of the United Nations
GAP	Good Agricultural Practices
GHG	Greenhouse gas emissions
GMP	Good Manufacturing Practices
HYVs	High Yielding Varieties
ITP	Industrial Tree Plantation
PES	Payments for Ecosystem Services
PNIS	National Programme for the Substitution of Illicit Crops (Colombia)
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
UNDP	United Nation Development Programme
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNDROP	United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas
UNGASS	United Nations General Assembly Special Session
UNODC	United Nations Office on Drugs and Crime
UWSA	United Wa State Army
WHO	World Health Organisation

Key points and Recommendations

- The impacts of so-called 'Prohibited Plants' or illicit drug crops – principally coca, opium poppy and cannabis – on the environment are an issue of concern. Depending on the particular context, they have, to varying degrees, been associated with soil erosion, land degradation, desertification, water depletion, deforestation, biodiversity loss, and an increase in greenhouse gas emissions, pollution and waste.
- Despite this, drugs are rarely seen as an environmental issue. There is no mention of drugs in any of the recent global climate or biodiversity agreements and within drug policy circles, environmental issues have, until very recently, only been debated at the margins. This disconnect stems from an institutional sequestering of drugs within the framework of crime and law enforcement.
- Greater coordination between UNODC, UNDP, UNEP, as well as a prominent role for the Task Team supporting implementation of the UN Common Position on drug policy, can help to foster UN system-wide coherence, support the implementation of the 2030 Sustainable Development Agenda, and global commitments to dramatically reduce greenhouse gas emissions.
- Greater synergies can be forged by assessing drug policy against a set of cross-cutting climate and environmental indicators, in addition to those developed around human rights, public health, sustainable development etc. There is much to be gained by bringing in relevant natural resource and human rights governance instruments such as the CFS Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests and the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas.
- The development of an environmentally sustainable drug policy must stem from an approach centred on environmental justice: the recognition that poorer and marginalised communities, often differentiated along class, gender and racial lines, face particular exposure to environmental harms. This holds especially true for populations in the global South.
- In the field of drug policy, this means that those who depend on the cultivation of illicit crops for their economic survival and social reproduction must be at the heart of decision-making processes that affect them. It also means that rather than focusing on the persecution/criminalisation of people on the basis of particular uses of plants, the underlying political and economic systems of oppression, discrimination and injustice that ultimately drive environmental harm must be examined.
- Critically interrogating drug control policies can yield important environmental benefits. All forms of forced eradication – be it through aerial fumigation or manual means - must be ended. These have been shown to be environmentally destructive as well as ultimately counter-productive given evidence of the well-known 'balloon effect' whereby cultivation simply shifts to other, often more ecologically fragile, areas. Meanwhile, the logic of interdiction can also be questioned from an environmental point of view given the number of hectares of land that are 'wasted' due to the destruction of seized product and the inevitable re-planting that follows on from this.

- Ultimately, the power of drug-trafficking organisations can best be challenged by taking away their source of profits that result from prohibition while strengthening forms of community resource access and control to help counter the influence of these non-state actors, with special protections in place for environmental and human rights defenders.
- In the realm of alternative development, there must be a clear red line drawn that replacing illicit crops with industrial monocultures or other big agro-commodity complexes should not be cast as AD programmes. Rather, AD programmes should actively seek to promote and strengthen sustainable production systems based on agroecology and regenerative practices combined with a comprehensive agrarian reform programme that supports territorial markets and more equitable access to and control over natural resources (land, water, seeds, forests etc.).
- While there are possible opportunities within AD programmes to tap into sources of climate finance, there are also risks involved in market-based conservation mechanisms and natural capital accounting that further the commodification of nature at the expense of pro-poor outcomes. Public policy should reward models of agrarian environmental justice and community driven conservation strategies based on principles of co-creation between humans and nature.
- Ongoing drug policy reforms, particular in relation to cannabis, open up the possibility to develop forward thinking strategies for addressing questions around environmental sustainability. The high carbon footprint associated with indoor cultivation of cannabis means that, as much as possible, priority should be given to outdoor cultivation, particularly from traditional producing countries in the global South.
- Environmental standard setting through e.g. organic certification (including peer-to-peer forms of certification), eco-labelling, appellation systems, and fair trade can and should all be considered to ensure environmental sustainability in regulated markets. Additionally, public agricultural research and seed banks should seek to conserve genetic diversity and local landraces.



1. Prohibited Plants, Planet and People: Connecting the Dots between Drugs and the Environment

Across the world, the state of environmental stress is unprecedented. This includes major threats to the lands, soils, waters, forests, and oceans that make up our ecosystems and biodiverse nature. Cutting across all of this are the unfolding effects of climate change and global heating. All of these developments will continue to have dramatic impacts on both people and planet. These impacts are however not evenly distributed. As scholarship and activism on ‘environmental justice’ points out, poorer and marginalised communities, often differentiated along class, gender and racial lines, face particular exposure to environmental harms. This holds particularly true for populations in the global South.

The role of illicit drugs in relation to these environmental stresses is an underexplored terrain. Yet, as this report will argue, drugs, as well as the policy responses to them, are an environmental issue. This disconnect between drug and environmental policy is the result largely of the institutional compartmentalisation of the issue of drugs into the domain of crime and law enforcement with little outreach to other spheres related to the environment or sustainable development. References to the environment within drug policy have as such remained sparse and limited in scope (see Box).

This is slowly changing. A resolution on alternative development adopted by the Commission on Narcotic Drugs (CND) – the central drug policy-making body within the UN system – in March this year gave special attention to environmental protection, encouraging “Member States to examine and address, within the efforts of alternative development, the harmful impact of the illicit cultivation of crops used for the production of narcotic drugs on the environment, which may lead to deforestation and the pollution of soil and water, and to seize the opportunities offered by alternative development with

Key References to the Environment within International Drug Policy

Box. Key references to the environment within international drug policy

Three major United Nations treaties form the backbone of what is known as the international drug control regime. There is no mention of environmental issues in the 1961 Single Convention on Narcotic Drugs, the 1971 Convention on Psychotropic Substances, nor the 1972 Protocol amending the 1961 Single Convention. The first time environmental issues are referenced is in the 1988 Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances. This is done within the context of measures to eradicate cultivation of narcotic plants. Paragraph 2 of Article 14 states that:

Each Party shall take appropriate measures to prevent illicit cultivation of and to eradicate plants containing narcotic or psychotropic substances, such as opium poppy, coca bush and cannabis plants, cultivated illicitly in its territory. The measures adopted shall respect fundamental human rights and shall take due account of traditional licit uses, where there is historic evidence of such use, as well as the protection of the environment [emphasis added].¹

In the Commentary accompanying the Convention, it is further elaborated what environmental protection within the context of eradication measures would entail. According to paragraph 4.17 of the Commentary, “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”.²

Over the years, a number of other normative governance instruments in relation to drug policy have taken up environmental issues. General Provision 11 of the 2013 United Nations Guiding Principles on Alternative Development for example notes that:

Alternative development programmes should include measures to protect the environment at the local level, according to national and international law and policies, through the provision of incentives for conservation, proper education and awareness programmes so that the local communities can improve and preserve their livelihoods and mitigate negative environmental impacts.³

This is to be done through the incorporation of environmental indicators within AD programmes (General Provision 17) as well as awareness raising efforts amongst rural communities on the impact of illicit drug crop cultivation on the environment (Action and Implementation measure 18 II).

The Outcome Document of the 2016 United Nations General Assembly Special Session (UNGASS) on the World Drug Problem also references the importance of environmental protection in relation to eradication measures (Article 4 i) and AD programmes and the Sustainable Development Goals (Article 7 g).⁴

Other UN agencies have also weighed in from time to time. In a brief produced ahead of the 2016 UNGASS for example, the United Nations Development Programme (UNDP) notes that “eradication campaigns have had devastating consequences for the environment”.⁵ More generally, it also comments on the disconnect between drug control and development policy, including in relation to sustainable development and the environment, pointing out the need to develop new metrics to account also for the broader and often unintended impacts of drug control policies on sustainable development.



regard to the conservation and sustainable use of the environment and the protection of biodiversity”.⁶ And for the first time this year, the 2022 United Nations Office on Drugs and Crime (UNODC) World Drug Report will include a special booklet on the connection between illicit drugs and the environment. This follows on from an increasing number of official side-events that have been organised in recent years at the CND in Vienna on the issue of drugs and the environment.

This report, which draws on TNI’s original research, fieldwork, interviews and a broad literature review, aims to add to this burgeoning debate in the following ways:

- **By examining the drugs-environment nexus in relation to trajectories of agrarian change and the implications for rural working people, especially in the global South.** This is in recognition of the fact that what are currently deemed to be illicit crops under the international drug control regime often have a long history of traditional cultivation and use by rural communities and indigenous peoples across the world. In addition to long-standing traditional uses, many more rely on the cultivation of illicit crops for both their economic production and social reproduction activities. At the same time, these rural people are often most at risk of
- poverty, marginalisation, discrimination, and criminalisation while being least represented in policymaking spaces and in decisions that affect them. Elevating the voices and perspectives of these growers of illicit crops (or producers of prohibited plants) and the communities in which they are embedded is therefore a key aim of this report.
- **By critically interrogating both drug policy and development responses in relation to the drugs-environment nexus.** From toxic eradication campaigns that spray the ground with chemicals, to interdiction efforts which push illicit cultivation into ever more fragile ecosystems, drug control policy has been responsible, directly or indirectly, for a number of grievous environmental harms. Additionally, crop-substitution programmes which ignore the fact that for millions of peasants, small farmers, landless, and migrant labour populations, drug crops are the alternative development to trade and investment regimes from which they are either excluded or adversely incorporated into will ultimately fail.
- **By bringing in scholarship and literature from, inter alia, the field of political ecology and critical agrarian studies and**

applying this to the issue of drugs and the environment, it is hoped that further exchange between these two hitherto quite separate spheres of enquiry can be stimulated. Drugs are an environmental issue. By making this case, it is hoped that policymakers, researchers, civil society organisations and social movements from both fields can be encouraged to engage in a process of mutual learning and knowledge exchange. Through this bridge-work, new forms of solidarity, scholar-activism, and policy change can coalesce around, for example, movements for climate justice, agroecology, or peasants' and indigenous' rights.

With this in mind, the report is structured as follows:

Chapter 2 tackles coca cultivation and cocaine production in the Andean region (Colombia, Peru and Bolivia) drawing on a number of studies that have investigated the direct or indirect links between coca and deforestation, particularly in national parks, protected areas and conservation zones. This is extended into other parts of the cocaine trade by examining the role that drug trafficking organisations in Central America (in particular Honduras and Guatemala) have played in laundering the proceeds of drug trafficking into activities such as cattle-ranching that push forward the agricultural frontier. The negative environmental impact that the 'War on Drugs' has had is also discussed here, not only in terms of toxic fumigation campaigns but also forms of manual eradication and waste that is generated through the destruction of confiscated plants and material.

Chapter 3 looks at the environmental impacts related to opium poppy cultivation through the lens of two country case studies: Myanmar and Afghanistan. In the case of Myanmar, it is noted that while the opium economy has served as a means of accumulation for a few, for the majority it has acted as a survival strategy against a backdrop whereby the traditional agricultural practices of upland populations, notably shifting cultivation and

forms of collective or customary land tenure are demonised or overridden by national policymakers. The environmental impacts of a number of opium bans and crop substitution programmes are unpacked, especially where they have led to the expansion of industrial monocultures. In the case of Afghanistan, the transformation of desert landscapes through the introduction of new 'green' technology in the form of solar-powered water wells for opium poppy cultivation is discussed. While this can be considered an innovative adaptation to a harsh and unforgiving landscape, the depletion of groundwater puts the long-term sustainability of poppy cultivation, along with the livelihoods that depend on it, at serious risk.

Chapter 4 deals with cannabis, with particular attention focussed on the Rif region in Morocco and on California. In Morocco, the industrialisation of cannabis production over time, including the growth of cannabis monocultures along with the introduction of hybrid seeds and 'modern' farming techniques is explored, particularly as they have increased soil erosion, forest fragmentation, and biodiversity loss across the region. In the case of California, the transition from illicit cannabis farming towards a regulated market is tracked. The Chapter notes some of the tensions between a regulatory framework that drives cannabis cultivation indoors and the greatly increased carbon footprint that results from this, as well as the burden such a framework places on smaller cannabis growers in particular. Other issues observed with the regulated cannabis market in the United States in relation to land use and soil health; water use and quality; energy use; air quality; and waste management are also highlighted.

Chapter 5 serves as a final concluding chapter, drawing together the analytical points discussed in Chapters 2 – 4 and offering up a number of reflections – or 'sustainability pathways' – for embedding environmental justice in drug policy.



2. Coca

Depending on the species of plant, coca is traditionally cultivated in the lower altitudes of the eastern slopes of the Andes in South America or the highlands, in particular in Bolivia, Colombia and Peru. Despite its illegal status under the 1961 Single Convention on Narcotic Drugs, in the Andean region, the coca leaf has a long history of traditional use, especially by indigenous communities where it is consumed by chewing or brewed as tea.⁷ This led to Bolivia to withdrawing from and re-acceding to the Single Convention with the reservation that the coca leaf is decriminalised within its territory and instead subjected to a model of 'social control'. The coca plant or coca bush is also used in the production of cocaine following a process of extraction and synthesis of the coca leaf.

This section focusses on the environmental impacts of coca cultivation as it applies to the production of cocaine. Much of this centres on the links between coca cultivation and deforestation. It has been asserted, for example, that since 2001, more than 300,000 hectares of forest have been cleared for the cultivation of coca worldwide.⁸ However, as will be argued, such estimates are extraordinarily difficult to quantify and substantiate. While some argue that coca plays a key role in destabilising ever more remote and fragile forest systems, others argue that this largely takes place indirectly and cannot be understood independently of other frontier dynamics and policy interventions. Conversely, others point out that in certain contexts, the rate of forest loss associated with coca crops is less compared to legal substitutes given variations in respective labour regimes and income generating opportunities. Furthermore, the sprawling nature of the cocaine commodity chain where sites of production in the Andean region are linked to sites of transit in Central America adds still another layer of complexity as the proceeds of drug trafficking activities are laundered into legal activities such as cattle-ranching which is responsible for the conversion of forest into pasture land.



Vats containing chemicals for coca base paste production, North of Colombia. Photographer: Diego Lagos, Drugs and Disorder project. (2021)

Another major focus of the section is the connection between drugs, violence and conflict and in particular, the role that repressive drug control measures such as forced eradication have played in furthering environmental destruction. While these have clearly been disastrous for the environment, even ostensibly more development led approaches based on voluntary eradication and crop substitution have not always adequately dealt with environmental challenges, especially in models which remain locked in to forms of top-down, agro-industrial development.

2.1 Coca Cultivation and Deforestation in the Andean Region

One of the drug-related environmental issues that has received relatively more attention in academic and policy circles over the years has been the impact of illicit coca cultivation on deforestation in the Amazonian Andes. Most scientific studies note that there is at least an overlap between areas in which illicit coca cultivation takes place and increasing rates of deforestation. However, correlation does not necessarily imply causation and the relative weight afforded to coca cultivation as

compared to other factors is highly contested. A 2006 UNODC study on the environmental effects of illicit drug cultivation and processing in the Andean region underlines some of these difficulties given the lack of robust data, the variegated methodologies and assessment tools, and the complexity of spatial dynamics at play.⁹ The study concludes that:

Coca cultivation is, of course, only one factor in deforestation in Colombia, Peru and Bolivia. The clearance of forests is driven by a complex set of factors, ranging from the decisions of local people and government, commercial enterprises, national and international governmental policies to market forces. The relative role of coca cultivation and eradication activities in deforestation varies between countries and regions. Unfortunately, UNODC is not aware of a quantitative analysis of the relative importance of the factors causing deforestation in the region. Much of the literature on the environmental effects of illicit drug cultivation and processing in the region asserts that the cultivation of illegal drugs has caused the deforestation of tens of thousands or even millions of hectares. These statements are, however, rarely supported by specific studies of the role of illegal drugs in deforestation.¹⁰

That significant deforestation is occurring in the Andean region is clear. In Colombia for example, 171,000 hectares of forests were lost in 2020, including in areas designated as forest reservation zones and national parks where, according to UNODC, 24% of national coca cultivation is concentrated.¹¹

Undoubtedly, coca has played a role in forest loss and fragmentation as land is cleared for coca cultivation, settlements expand, and both conflict and displacement intensify, partly also in response to anti-narcotic policies. Here again however, one must avoid overly simplistic, mono-causal explanations of landscape transformation. In one of the most comprehensive studies to date on deforestation and coca cultivation, Davalos et al. (2021) reject some of the underlying assumptions that have informed both development and drug policy in recent decades.¹² In particular, they challenge both what they call the ‘frontier’ and ‘immiseration’ models of tropical forest loss and the role that coca cultivation plays within this.

In the frontier model, it is hypothesized that coca cultivation functions as a type of ‘beachhead’, opening up previously unpopulated lands to environmental change and destruction. Implicit in this model and the notion of the ‘frontier’ is the contention that these are in some sense ‘lawless’ or ‘ungoverned spaces’ untouched by the presence of the state and processes of modern, capitalist development. In direct contravention to this assumption, Davalos et al. argue that far from being disconnected from development, patterns of coca cultivation are deeply rooted in earlier processes of colonisation and settlement, including notably projects of opening up the Amazon through cash-crop commodity production, land titling and formalisation, and road building during the 1960s and 70s.¹³ According to the authors, these earlier 20th century development projects created a series of ‘wedges’ that still today function as predictors of areas more likely to be known for coca cultivation. Bolstering their argument is modelling work

they have undertaken showing that the variable most associated with coca cultivation is distance to the nearest development project (roads, settlements), with increasing distance corresponding to the decreased probability of coca cultivation.

Summing up of their analysis of the interplay between coca cultivation and deforestation, they conclude that:

The review of Andean regional history and deforestation analyses as well as spatially explicit analyses of coca cultivation illuminates the origin of this crop and its effects on Amazonian deforestation. First, coca cultivation in the Amazon is embedded within the larger forest frontier along a series of wedges spatially associated with twentieth century development projects. Second, coca cultivation is not a dominant cause of direct deforestation. Third, there is little evidence that coca cultivation increases deforestation rates, independent of the dynamics already prevalent at the western Amazon frontier.¹⁴

For this reason, they argue that focussing policy attention on coca cultivation as a substantive driver of Amazonian forest loss is ‘misguided’ with conservation efforts better spent on curbing the expansion of agriculture into forest zones, in particular by avoiding or mitigating the displacement effects associated with forced eradication.

This computes with what is broadly known about the main drivers of deforestation of the Amazon, the leading cause of which is forest conversion for cattle-ranching along with the expansion of soy monocultures that serve principally as livestock feed. Cattle-ranching accounts for 80% of deforested land in Brazil for example, while it is estimated that there are over 50 million cattle living in the Amazon region.¹⁵ Other drivers include, inter alia, logging, mining, agricultural production, oil exploration, road construction, infrastructure development and settlement expansion. This puts the role of illicit coca cultivation in deforestation into perspective.

Some studies have found that coca cultivation can, depending on the interaction with other forces, even act as a stabiliser, preventing further encroachment into forested areas. In their longitudinal study of the Chapare region in Bolivia between 1963 – 2003, Bradley and Millington (2008) find that “Deforestation rates were very low from the late 1970s to the early 1990s when coca cultivation was widespread and anti- coca policies were weakly enforced. Before and after this period, deforestation rates were significantly higher”.¹⁶ They note in summary that “Low deforestation rates are typical of a coca regime..... After coca is abandoned, deforestation rates increase”.¹⁷ By way of explanation, they point to the higher income generated from coca compared to alternatives, although this is also influenced by other factors including “markets for the substitutes, trends in farmgate prices, cropping patterns before switching to coca, and their ability to grow coca under conditions of enhanced surveillance”.¹⁸

This is not to say that, leaving debates around deforestation aside, coca cultivation does not have other potentially negative

impacts. Agro-chemicals, such as herbicides and insecticides, are used for example in the cultivation of coca, while toxic chemicals such as ammonia, acetone and hydrochloric acid are involved in the processing of coca into cocaine, often in remote, clandestine jungle laboratories. As these chemicals are not disposed of responsibly, it is estimated by scientists that several million litres of these substances end up in soils and rivers each year.¹⁹ This can negatively affect aquatic flora and fauna in particular.

The War on Drugs, Forced Eradication, and Environmental Destruction

In the latter quarter of the 20th century, an increasingly hardline and militaristic approach to enforce the prohibition on illegally classified drugs took hold in what came to be referred to as the ‘War on Drugs’. Spearheaded by the U.S. and exported around the world through its foreign policy, military and aid spending, this approach centred around the three pillars of eradication, interdiction, and incarceration. In addition to the questionable



Aerial spraying, Colombia, El Espectador

effectiveness of this approach in terms of curbing the illegal drug economy, the War on Drugs has been heavily criticised for the forms of direct and collateral damage it causes, fuelling conflict, undermining human rights, and more broadly setting in motion a vicious circle of human, social and environmental destruction (see Box).

It is not just the logic of forced eradication of coca crops that must be challenged for the social and environmental harm it causes. The broader complex of interdiction and seizure can also be questioned from an environmental point of view as the destruction of seized crops also implies the ‘destruction’ of land and other necessary inputs needed for their production. By TNI’s own calculations, using the latest available figures from 2020 from UNODC/SIMCI’s Colombia coca cultivation survey on total area cultivated (143,000 ha), domestic cocaine seizures and international seizures traceable to Colombia (506 mt), purity rates (85% for export), and yield per hectare (7.9 kg/ha), between 50,000 – 54,400 hectares are “lost” to interdiction.²⁰ If one adds to this, the 130,000 hectares of land used

for coca cultivation subjected to eradication, some 180,000 hectares of land are “wasted” due to interdiction and eradication efforts. On top of this, despite the short evaluation period (164 days following on from the initial intervention), nearly half of the targeted fields show evidence of replanting, with an additional 33% of sites being within 500 metres of coca cultivation.²¹

Given the fact that supply reduction of cocaine has been a dismal failure in the last decades (global cocaine production and consumption have only increased), the long-term sustainability, ecological rationality, and effectiveness of these kinds of drug control measures would appear to be sorely lacking.

Crop Substitution, Alternative Development and ‘Environmental Peacebuilding’

If the War on Drugs represents the more repressive tip of the spear of prohibition, then ‘alternative development’ (AD) is meant to signal a different orientation – one that

Burning of virgin land to grow food crops and coca leaf, North of Colombia, Photographer: Diego Lagos, Drugs and Disorder project. (2021)



Vicious Circle: Impacts of Forced Eradication, Aerial Fumigation and the Chemical 'War on Drugs'²²

The use of chemical substances to control drug crop cultivation has a long history. Driven by high-minded policy goals to ensure a 'drug free world', a new chemical 'War on Drugs' was opened up during the 1970s as part of a focus on supply side interventions and the use of forced eradication to control the global drug market. The first official use of chemicals to destroy illicit crops can be traced back to 1971 when the Mexican government used the herbicide 'Paraquat' to destroy cannabis fields as well as '2,4-D' – one of the two ingredients in the infamous defoliant Agent Orange used in the Vietnam war – to eliminate the cultivation of opium poppy. Since then, a number of governments around the world have periodically used toxic herbicides to eliminate illicit drug crops including the U.S. (Hawaii), Belize, Guatemala, Jamaica, Myanmar and parts of Southern Africa.

The most notable example however of this chemical War on Drugs is that of Colombia. This has taken the form of large-scale aerial fumigations which have been rolled out in three waves targeting various illicit crops, beginning in 1978 with cannabis, extending to opium poppy in 1992, and moving to coca in 1994. Initially Paraquat was used but from 1984, glyphosate has been used. The use of the active ingredient, glyphosate, in the Monsanto produced herbicide 'RoundUp' in particular has been a major cause for concern. In 1997, Monsanto was forced to remove the terms 'biodegradable' and 'environmentally friendly' from its advertisements in light of these concerns. In spite of this, glyphosate with a concentration of 158 grams per litre – a figure that corresponds to almost 500 times the dose recommended by the manufacturer – has been used in aerial fumigation campaigns in Colombia.

The impacts in terms of public health, livelihoods and the environment have been severe. Health complaints have increased in areas where aerial fumigation has taken place while the Colombian Ombudsman has been flooded by complaints by small farmers and indigenous communities that their food and agricultural crops as well as domestic farm animals have been negatively impacted. With respect to the environment, it is difficult to estimate the direct environmental damage to fragile ecosystems like the Amazon rain forest and the Andean mountain cloud forests from the spraying of chemical herbicides, especially as wind and rain drive glyphosate saturated clouds and soil matter to areas far outside those specifically targeted. One of the major indirect effects is the displacement of coca cultivation to other even more remote and ecologically sensitive areas due to the destruction of livelihoods and the fuelling of conflict – what is also known as the 'balloon effect'. This increases the rate of deforestation and the other associated environmental harms of coca cultivation and processing.

Perhaps one of the strongest indictments against aerial spraying and forced eradication as an anti-narcotics strategy is that it also simply has not worked, even on in its own terms: levels of coca cultivation have largely remained stable or even increased over the course of various eradication campaigns. In light of these many concerns, a court ruling in 2015 suspended the aerial spraying programme and it was also taken up as a point in the peace agreement between the FARC and the government of Colombia.²³ This has not however stopped government plans for a possible resumption. In January 2022, Colombia's constitutional court ruled that aerial fumigation of coca crops could not resume for now as the government had failed to consult local community groups.²⁴

seeks to integrate human development indicators and offer a more balanced, holistic, and sustainable 'solution' to the problem of illegal drugs. Models have differed across time and place with variations in terms of sequencing (at which stage in the process towards establishing alternative licit livelihoods, drug crops are to be eradicated), targeting (whether only drug producing households or a wider population is covered), duration of projects, and the total allocation of resources. The extent to which environmental factors have been considered within AD approaches has also differed, although they have risen to greater prominence in recent years.

In the case of coca, a number of AD programmes have been pursued over the years alongside more repressive drug control measures in Colombia, Peru and Bolivia. One of the most prominent programmes in recent years has been the National Programme for the Substitution of Illicit Crops (PNIS) in Colombia which was launched in 2017 following on from the signing in 2016 of the peace agreement between the Revolutionary Armed Forces of Colombia (FARC) and the Colombian government. Within the PNIS, voluntary eradication of coca crops is tied to a transition period of two years in which peasants are to receive basic food assistance along with investments and technical assistance in productive projects and a commitment to social participation in territorial planning processes. Furthermore, although the 'land question' is dealt with in a separate chapter, the peace accord at least in theory connects the problem of illicit crops with an agenda for comprehensive agrarian reform, including land restitution for the victims of armed conflict. Given the nexus between violence and environmental degradation and the identification of marginalisation, poverty and highly unequal access to land and natural resources as structural drivers of both internal armed conflict and the cultivation of illicit crops, the peace accord thus can signal a unique opportunity to reorientate agrarian change in favour of the marginalized peasantry.

At the end of 2017, 130,000 families had signed collective agreements to voluntarily eradicate their coca crops. Figures from 2019 indicate that between 2017–2019, 40,506 hectares of coca crops were voluntarily destroyed across the country under PNIS, with a very low replanting rate of 0.4 per cent.²⁵ However, these macro-figures say little about the nature of the programme or indeed its long-term sustainability. In their study of the implementation of various PNIS pilot schemes in Miranda in the municipality of Cauca in southwestern Colombia, Vélez-Torres and Lugo-Vivas, find 'uneven compliance' with the goals of the programme.²⁶ This is attributed to the fact that, at the time of writing, just 38 per cent of families who formally signed substitution agreements have received basic economic food assistance while little progress has been made on productive alternatives that could replace the cocalero economy. As a result of this fragmented and delayed substitution process, spatially differentiated processes of both eradication and continued coca growing and replanting have emerged. The economic challenges encountered by those that signed on to the programme and gave up their coca production have meant that a number have undergone a process of proletarianization, depending on the work provided by other coca farms.

Moreover, from an environmental point of view, a number of alarming trends have emerged. These include increasing soil erosion and degradation on farms as a result of the delayed assistance to begin alternative food crop cultivation. Following the destruction of coca crops and in the absence of sustained economic commitment to allow for the successful planting of alternative crops, this has resulted in a prolonged period of exposed soils – sometimes for up to two years. These soils have washed away during the rainy season and are a factor in local landslides. More widely, there are concerns around the nature of the alternative projects promoted under PNIS and their compatibility with local culture, skills, technology and knowledge. These fears are not necessarily unfounded. As Vélez-Torres and Lugo-Vivas note:



Transformation of coca leaf into coca paste. After being crushed, the coca leaf is mixed with highly toxic chemicals. Colombia. Photographer: Diego Lagos, Drugs and Disorder project. (2021)

The period since the peace agreement has seen the resurgence of various corporate greening projects in other regions of Colombia, among them the promotion of small-scale and export-focused cultivation of monocrops such as cacao and avocado, the intensification of medium-scale forestry, and extensive biofuel and 'sustainable' carbon-neutral clusters developed with trans-Latina and multinational capital.²⁷

While some of the projects may from a technical point of view be aligned with a number of environmental goals (and are often certainly marketed as such), this does not make them the best or even preferred option. What is left out of these agri-business led models, is support for diversified, economic production systems based on agroecological

and regenerative practices that form the basis of peasant existence. Instead, peasants and other small-scale food producers become increasingly tied to Green Revolution technological packages. In the case of the PNIS projects in the community of Miranda for example, farmers expressed fears that they will no longer be allowed to freely save and exchange their own seeds.

It can be argued that this failure to grapple with power relations and exclusionary socio-economic structures that underpin environmental problems in favour and alienating forms of neoliberal development ultimately stands in the way of prospects for 'environmental peacebuilding': the multiple approaches and pathways by which the management of environmental issues



is integrated in and can support conflict prevention, mitigation, resolution and recovery.²⁸ If substitution plans and alternative development projects remain trapped within a failed Green Revolution model, then the scope for truly transformative environmental and social change is rather circumscribed (see Chapter 5).

2.2 Narco-Fuelled Land Grabbing and Environmental Crime in Drug Trafficking Regions

The global nature of the drug economy means that drug-related environmental impacts are not confined to areas of drug cultivation and manufacture but extend far and wide, including to regions known for drug trafficking. These spatial dynamics are heavily influenced by, among other things, drug policy. The rise of drug fuelled crime, violence and illicit activity in Central America, especially Honduras, Guatemala

and Nicaragua, can in large part be traced to the decision by the Mexican government in 2006–07 to adopt a militarised crack-down on its drug trade which pushed many drug trafficking organisations (DTOs) further South.

Drug trafficking carries with it a number of environmental costs. In the case of cocaine trafficking in Central America, land and forests are cleared for clandestine air strips, coastal and river landing sites for boats, and the building of access roads. To avoid detection, these transshipment sites are nearly always located in remote regions, including protected areas, indigenous territories, and lands used for peasant and smallholder agriculture. Given the need to stay ‘perpetually agile’ in light of ongoing interdiction efforts, these transshipment sites are forever changing, creating an endless cycle of forest loss and fragmentation which undermines ecological integrity and resilience. It has been estimated that cocaine trafficking

could account for between 15 – 30 percent of annual forest loss in Guatemala, Honduras and Nicaragua over the past decade, up to 60 percent of which has been in protected areas.²⁹

One way in which DTOs have used their power to assert control over territory and ‘fix’ processes of capital accumulation in place has been by laundering the proceeds of drug trafficking into licit economic activities such as cattle ranching, oil palm, teak plantations, and the acquisition of landed property. This is not unique to Central America. As commentators on transnational organised crime have noted, the blurring of illicit and licit activity takes place through processes of money laundering, corruption, bribery, intimidation and violence that link illegal trades such as the smuggling of drugs, people, timber, minerals, wildlife and antiquities to legal enterprise. In the case of cocaine trafficking in Central America, this is expressed through what McSweeney et. al (2017) call the establishment of a ‘rentier-agribusiness nexus’ involving the laundering of the proceeds of cocaine trafficking by an emboldened ‘narco-bourgeoisie’ into activities such as cattle ranching, export monocrops, and land speculation.³⁰

Central to this has been the rapid conversion of forest conservation areas and biodiverse landscapes of smallholder production into zones of ecologically simplified agribusiness from which rents and other profits can be extracted. As the authors also argue, this transformation is not dissimilar to forms of state sponsored and corporate enacted ‘land grabbing’ which involve the expansion of e.g. mega-infrastructure projects, timber extraction, and mineral and hydrocarbon mining which have for years commodified land and natural resources in ways which undermine smallholder livelihoods and indigenous ways of life. Drug trafficking organisations and the narco-bourgeoisie are however ‘uniquely positioned, motivated, and capitalized to spatially expand and accelerate’ this process of conversion, particularly of formerly common and protected lands.³¹ Halting these forms of predation and the

environmental harm associated with it therefore requires much more than simply confronting the power of DTOs. It requires protecting and strengthening forms of community resource governance and conservation that align with principles of environmental justice and human rights. The pathways for doing so are further explored in Chapter 5.

In the final analysis, the broader drug control framework as it is currently configured needs also to be critically examined. Prohibition has allowed a small number of actors to amass vast profits which increasingly form part of an interconnected web of environmental crimes such as those related to the trafficking in endangered wildlife and marine resources, alluvial goldmining, or timber extraction. The focus on eradication and interdiction meanwhile pushes both drug production and trade into increasingly fragile and remote areas, causing environmental destruction, exacerbating conflict and undermining community conservation efforts. Given this, as others have also argued, “Rethinking the war on drugs could yield important ecological benefits”.³²

3. Opium Poppy

This chapter explores the environmental dynamics associated with opium poppy cultivation in the two regions with which it is most associated: Myanmar (as part of the so-called 'Golden Triangle' along with Thailand and Laos) and Afghanistan. The two cases make for an interesting contrast. While in the case of Myanmar, more traditional forms of cultivation practised by upland populations and ethnic minority groups as part of mobile agricultural systems are examined, in Afghanistan, the environmental implications of the introduction of new 'green' technologies in the form of solar-powered deepwater wells for long-term sustainability are discussed. In both cases, opium cultivation has continued, if not dramatically increased, against the backdrop of a series of bans and, with few exceptions, failed crop-substitution and AD programmes.

3.1 Myanmar

In upland communities of Myanmar – especially those populated by ethnic minority groups such as the Shan, Kachin, Lahu, Akha, Wa, Pa-O, Palaung and Kayan in Shan and Kachin states – opium poppy cultivation has a long history of cultivation and use. Used as a traditional medicine, a ritualistic practice in traditional ceremonies, and as a supplemental cash crop, opium is deeply embedded within the culture and agrarian political economy of Myanmar's upland regions and borderlands.

Traditional forms of cultivation are based on the practice of what is known variously as 'shifting cultivation', 'swidden agriculture' or, often more pejoratively, as 'slash and burn' (see Box). This involves the clearing of fields of brush and other dry matter which, after a period of drying, is then set on fire with the resultant potash providing an important nutrient source for the soil. Traditionally, land preparation for opium poppy starts in late August and beginning of September, then poppy seeds mixed with

Flowering poppy, Myanmar, TNI



Shifting the Narrative on Shifting Cultivation³³

Shifting cultivation has at times been harshly critiqued in development and climate policy circles where it is identified as a driver of deforestation and climate change as well as being an inefficient agricultural system that keeps people trapped in poverty. However, these perceptions require nuancing. Often, they are informed by implicit biases that lead to unfair comparisons between what are believed to be ‘modern’ forms of sedentary agriculture versus ‘backward looking’ mobile agricultural systems practised by communities in a sustainable way for centuries. While it is true that shifting cultivation involves the cutting down of trees and burning of debris that release carbon into the atmosphere, this overlooks the multitude of practices employed to maintain soil fertility, prevent erosion and land degradation, and tree loss. To the extent that these are compromised, this is often due to insufficient time allowed for land to remain fallow in order to regenerate. Moreover, it is far from clear that the total carbon budget of shifting cultivation contributes to climate change in a meaningful way, especially when compared to forms of intensive agro-industry and when returns to labour are factored in. Despite this, populations that practise shifting cultivation are often subjected to hostile policy frameworks. In Myanmar for example, where millions of rural working people have practised shifting cultivation as their major livelihood activity for generations, customary tenure systems which underpin shifting cultivation are not recognised, leading to fallow land being viewed as ‘empty’ and therefore ‘available’. These policy frameworks not only actively dispossess local populations, they also open the door to often much more harmful processes of ‘development’ and resource-extraction.

sand and mustard seeds are broadcasted in mid and late September. Weeding and plant thinning is done after 2 to 3 weeks. Opium farming is labour intensive as weeding has to be carried out at least 2 to 3 times before the harvest. Opium plots are normally situated on the slopes of high mountains at quite some distance from the village, leading farmers to usually live on the opium fields for the entirety of the 3 – 4 month growing season. They only bring rice and salt from the village with them, hunting for meat and inter-cropping vegetables alongside opium poppy for their own consumption during their stay in the field. Farmers sell the harvested raw opium to traders who come to their villages who then send the opium to bigger traders or traffickers who have the financial and technical resources to process the opium into heroin. After this, the heroin finds its way through smuggling networks to the drug markets of South East Asia and beyond.

The environmental impacts of traditional opium cultivation include principally deforestation due to the clearing of land and the release of carbon into the atmosphere from the burning of brush and fields. Chemical fertilisers, insecticides or irrigation have not traditionally been used in opium cultivation (or in the cultivation of other food or cash crops grown alongside opium) given that the ideal climate and topologically conditions do not require these for a successful opium yield, with the limited purchasing power of average poppy growing households also imposing an additional constraint on the ability to acquire these inputs alongside the extra labour and land investments they imply. Instead, farmers have relied upon the fertilisation provided by potash and natural weed control methods such as the intercropping of maize and opium. This has changed in the course of the past decades with the deeper penetration of capitalist relations into more remote areas, the

development of an (informal) credit economy, and processes of social differentiation that have transformed opium cultivation into not only a means of subsistence but also a means of accumulation for a few.³⁴

While the main rationale in official drug control policy for the elimination of opium cultivation in Myanmar has been adherence to the 1961 Single Convention, environmental motivations have also been given – although these usually feature much lower down the list of issues drug control policy is aiming to address. Almost without exception, these centre on the perceived environmental harms associated with shifting cultivation. To the extent that shifting cultivation does impact the environment, as mentioned above, these harms are real. It is for example common to see a fog-like yellow haze hang in the air in areas where fields have been burned, sometimes for weeks on end with the density at times blocking out the sun and stinging the eyes. This, it must be noted, is not unique to opium cultivation as shifting cultivation is the primary mode of agriculture in mountainous

regions with little to no flat land. However, there is certainly an overlap between areas with high dependency on opium cultivation and forest depletion with some more prone than others to attribute this singlehandedly to opium cultivation. As this historical account of a British official writing in 1920 states plainly:

*The forests in the eastern States are being so denuded, that east of a line from Lashio to Namhkam, it is doubtful whether there exists a square mile of continuous virgin forest in any one place.... This is what comes from opium cultivation.*³⁵

While recognising the environmental impacts, one must be wary of overly simplistic narratives that pin-point opium cultivation and shifting cultivation as drivers of environmental harm without examining how these interact with other factors, including drug control, trade, investment, development and ‘state building’ policies. Two developments in Myanmar in the past fifteen years are instructive in this regard: i) the series of bans on opium cultivation introduced



Women tending poppies, Myanmar, TNI

in parts of Shan state, including the 1997 (Mong La), 2003 (Kokang) and 2005 (Wa) bans; ii) the introduction in 2006 of China's opium substitution programme. Both of these developments will be examined in further detail below.

The 2003 Kokang and 2005 Wa opium bans in Shan state³⁶

The opium bans introduced in 1997, 2003 and 2005 in, respectively, the Mong La, Kokang and Wa regions of Shan state are illustrative of the complex interrelationship between drug control policy, opium cultivation and the environment. On the one hand, they confirm linkages between illicit crop cultivation and threats to the environment. On the other hand, they upend this conventional wisdom by illustrating the ways in which illicit crops can act as a livelihood stabiliser and as such limit environmental degradation, particularly when compared to alternatives. The two bans share some similarities. They were both introduced by ethnic armed organisations granted a considerable degree of autonomy and control over special administrative regions in northern Shan state as part of the 1989 cease fire agreement with the then military government. Both subvert the logic of alternative development as they were introduced before alternative licit livelihoods were established in regions heavily dependent on opium cultivation. And both have had grave consequences for human rights, food security, public health and the environment, while failing to curb in any significant and long-lasting way, the cultivation of opium. A brief history of each of these bans with a particular focus on the consequences they have had for the environment will be outlined below.

The 2003 ban was introduced by the Myanmar National Democratic Alliance Army (MNDA) in the Kokang region. This was largely in response to pressure from neighbouring China which at the time was facing a growing number of injecting heroin users and a related HIV/AIDS epidemic. Some control efforts had already been underway in the 1990s

with limited success. In 1998, an alternative development project centred on the growing of buckwheat as a replacement crop was initiated with funding by the Japanese government. Significant obstacles were encountered related to post-harvest losses and the transshipment to Japan. By 2002, only about 7,6 square kilometers were under buckwheat cultivation. This compares to an estimated 6,500 hectares of opium cultivation in Konkyan and 7,500 hectares in Laukai according to the 2002 UNODC opium survey.

Similarly, the 2005 ban was introduced by the United Wa State Army (UWSA) in the Wa region in the hopes that this would unlock development spending and bring about international recognition. Significant outside pressure, most notably from China, for the elimination of opium cultivation was also brought to bear. Mooted already since 1990, implementation of a drug control programme was officially announced in 1995 when Wa leaders met in Yangon with government officials and UNDCP (the forerunner to the UNODC), with observers from the Japanese



Mono-culture plantation, Kachin State, Myanmar, TNI



and American embassies present. From the beginning, there were tensions between the Wa authorities, central government, and donors, in the approach taken which hampered the start in 1997 of the UNDCP's Wa alternative development project. While the UWSA prioritised large-scale infrastructure development (including roads and the construction of power plants) as well as more sophisticated agricultural modernisation projects, UNDCP favoured more community-based approaches centred on the cultivation of rice and other crops with investments in irrigation, micro-credit schemes including rice banks, and cooperatives.

A particular controversial element involved the (sometimes forced) resettlement by the Wa authorities of upland populations to more lowland and central areas in the belief that this would boost agricultural production – especially rice production – as these regions would be more amenable to higher-tech, higher capital agricultural outlays such as the use of hybrid varieties, chemical fertilisers and irrigation. It was also “based on the belief that many small hill crest villages were unsustainable and that shifting cultivation was either anachronistic or damaging to

the environment”.³⁷ These resettlements had dire humanitarian consequences: it is believed that thousands of people died from exposure to malaria. Meanwhile, the difficulties of acquiring new agricultural skills and necessary inputs, combined with the loss of income from the elimination of opium, meant that people's food security was at risk, necessitating a reduction in household expenditures on health and education. Outside assistance was required to meet basic needs.

This was not unique to the Wa region. An analysis of the Kokang region one year after the opium ban found that, as a result of the opium cultivation ban, the majority of the population only had enough income to secure enough rice supplies for half a year, with villagers having to rely upon foraging food such as yam and taro from the forest. In some cases people resorted to eating tree bark. This in a region where, prior to the ban, average annual household earnings of \$528 from opium cultivation allowed for the purchase of a year's supply of rice, with money left over to cover the costs of other living expenses such as clothing, access to health care and education services. A humanitarian needs assessment carried out by international

NGOs and UN agencies operating in Myanmar calculated that the cost of covering the food security needs of these former opium growers would amount to about \$3,00,000.

The inability to make ends meet and the failure of local and national authorities and international partners to provide an alternative to opium cultivation has had severe repercussions. It has triggered distress sales of prized assets such as livestock and even migration across the border to China where former opium farmers seek work as seasonal labourers. It has also had a devastating impact on the environment in a way that contradicts previously held assumptions on the supposed ecological irrationality of shifting cultivation. As Sai Lone, an advisor to the Myanmar Opium Farmers Forum who worked in the Wa region for many years, explains:

Although, in the past, shifting cultivation in the Wa region was practiced in a sustainable way by rotating the crops and upland fields with considerable fallow period to let the forests to regenerate. However when the opium poppy cultivation – which used to be the main income source for the villagers to off-set their food shortage – was banned, expansion of the upland rice cultivation becomes the first priority of their coping strategies. It means that more forests have to be cut down and burned for the upland rice fields and because of the population pressure the fallow period also become shorter.³⁸

In addition to former upland opium farmers intensifying and expanding their rice cultivation, they have also had to compensate for the loss of income by cutting down trees to sell as firewood or collecting non-timber forest products such as medicinal roots, (rare) orchids, bamboo shoots, rattan, and starchy tubers to sell to Chinese traders, contributing to a loss of precious biodiversity.

The opium ban has placed additional pressure on forests in other ways. With the opium ban, the Treasury of the UWSA also lost a lucrative source of revenue as a 10% in kind tax was previously levied on raw opium production.

In order to compensate for this lost revenue, the UWSA increased the granting of logging concessions to Chinese companies. Significant concerns were raised by this, not least given the history of illegal cross-border timber trade between Myanmar and China and the questionable degree to which the authorities may exercise due diligence over logging companies associated with weak monitoring of environmental impacts. These developments also fit into a broader pattern in which opium bans were introduced at the same time as large-scale agricultural plantations were expanding across Myanmar, including in Shan state, leading to the conversion of forests into industrial monocultures, especially rubber. Many of these were closely linked to the introduction in 2006 of China's opium substitution programme.

China's Opium Substitution Programme

Injecting heroin use in China had been rising dramatically since the early 1990s leading to an exploding HIV/AIDS epidemic. The Chinese government responded by accepting previously outlawed harm reduction strategies for drug users such as methadone treatment and needle exchange while also maintaining a harsh punishment regime involving the execution of drug traffickers and compulsory treatment for recidivist drug users. Another element of the response included efforts to curb the supply of opium and heroin into China – the vast majority of which flows from northern Myanmar. In 2006, Yunnan province initiated an opium substitution programme that sought to stem the cultivation and cross-border flow of opium from Shan and Kachin states into China through large-scale agricultural and infrastructure investments meant to replace the previous economic reliance on opium cultivation.

Although presented by the Chinese government as a development programme, this has been challenged by communities on the ground. The special Opium Replacement Fund meant to catalyse investments in the

programme has consisted of the granting of subsidies, tax waivers, and import quotas for Chinese companies. Programmes have not focused on more remote and upland poppy growing areas but rather lower elevations which are easier to access and allow for plantation agriculture. The beneficiaries of these investments have tended to be overwhelmingly Chinese companies or local, politically connected individuals and groups. Wage labour work on plantations is precarious and extremely cheap, with outside labour brought in from Central Burma and the Delta region. It has pushed opium farmers unable to find work on the plantations to migrate to other forested hills to cultivate or to participate in dangerous small-scale resource extraction activities such as mining and logging. The concessions have also been accused of providing cover for illegal logging, often at the expense of villagers' traditional forestlands or newly demarcated community forests. More generally, the programme has been criticised as a form of unregulated frontier capitalism based on

the exploitation of Myanmar's resource rich ethnic borderlands with little respect for local communities' land rights and livelihoods.

In environmental terms, the substitution programme has been a disaster. The conversion of forestland into agricultural monocultures has been a major driver of deforestation. Much of this has been for the establishment of rubber plantations to meet the huge demand for natural rubber in China's automobile industry. A report by TNI noted the environmental consequences of these plantations:

There are serious environmental concerns about the massive increase of rubber plantations in northern Burma. They have caused deforestation as a direct result of establishing rubber plantations in upland forests and compared to swidden fields that maintain high levels of biodiversity. In some cases NGO sustainable livelihood projects had to be abandoned when their project sites became rubber concessions. International



Timber on the way from Myanmar into China, TNI

Industrial Tree Plantations: 'Green Deserts' or 'Green Growth'?

Recent decades have witnessed a rapid expansion of what are referred to as 'industrial tree plantations' (ITPs): large-scale estates of artificial, single-species forests, often under corporate control. These plantations serve a variety of purposes with the rise of what are called 'flex trees' allowing for new uses of tree-based commodities including not only for paper-pulp but also for the global energy, biomass and carbon-credit markets.³⁹ These uses are bolstered by a complex interplay of market and regulatory trends across a number of global sectors and industries. One of these trends has been the marketing of ITPs as carbon sinks, eligible for financial payments through schemes such as REDD+, as part of global climate mitigation strategies under the rubric of 'green growth'.

However, the implication that ITPs are 'green' has been challenged on a number of fronts. The large-scale planting of, sometimes non-native, tree species can place stresses on soil and water use. Meanwhile, ITPs introduce uniformity and forms of environmental simplification within landscapes as compared to biodiverse natural forests – forests – earning them the moniker 'green deserts'.⁴⁰ ITPs value a particular form of economic extraction over the other benefits of forest products including forest-based foods such as berries, mushrooms, herbs, medicinal plants, and game or the other eco-system functions of forests such as supplying water sources in the form of springs. This can carry with it negative consequences for forest dwellers and rural populations as they often have to compete with land converted to ITPs. In the case of the growth of rubber plantations in Myanmar for example, it has been reported that "Some villagers have no uplands any longer; they are virtually surrounded by rubber. The problem is where to keep their buffalos; they cannot find a place to feed them. If the animals go into the rubber field, they are shot".⁴¹

In response to these social and environmental concerns, the 21st of September has been declared 'International Day against Monoculture Tree Plantations' by environmental and social movements and indigenous peoples' organisations. These groups stress that the best use of trees would be to let them grow in natural forests rich in biodiversity and free from the use of fertilisers and pesticides, serving to increase water- and soil-rich ecosystems that provide important climate benefits as well as being an important foundation for both livelihoods and social reproduction. Alternative systems of forest management and tenure such as small-scale agro-forestry and community forest management based on sustainable thinning practices are foregrounded.

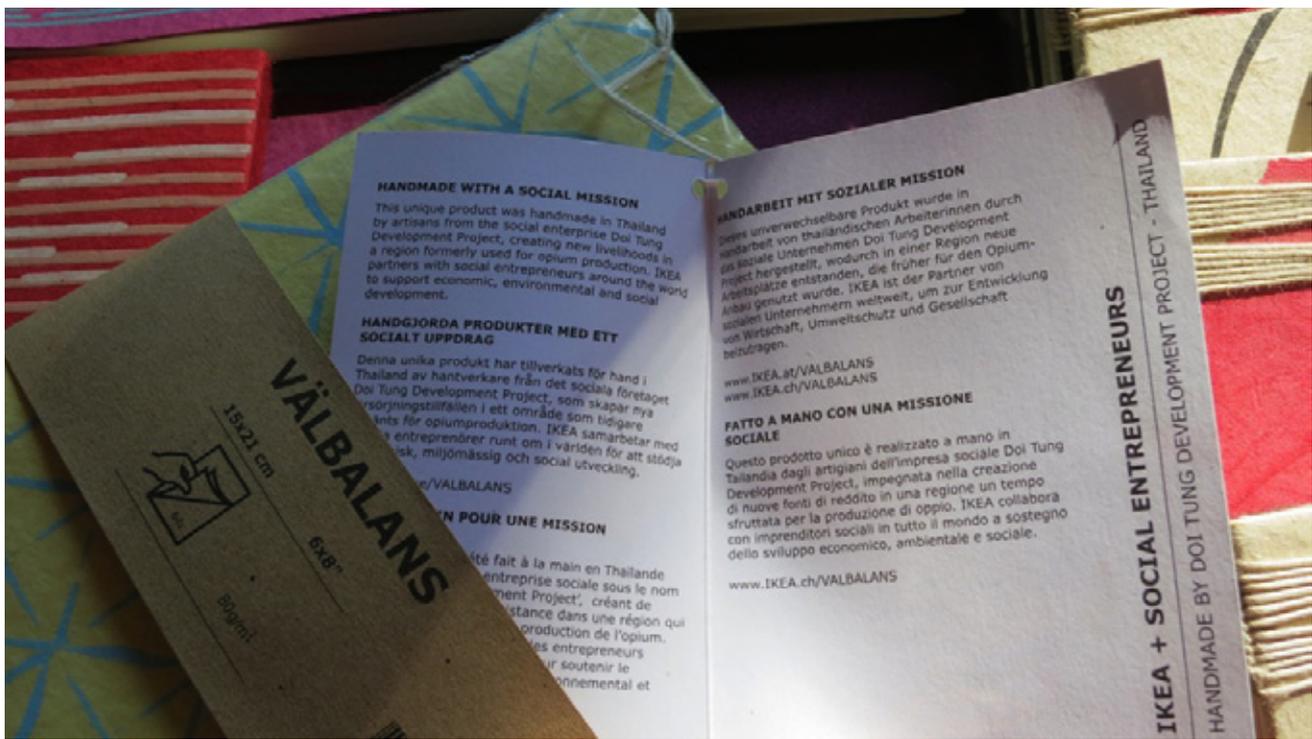
*NGOs in the Wa region say that there are already significant ecological problems because of destruction of watershed forests and misuse of limited water resources. The mono-cropping of rubber also has a negative impact on the biodiversity of the area, and local people have already noticed that certain local plants and animals are disappearing.*⁴²

These impacts are in line with what has been observed with regards to industrial tree plantations around the world which have been

criticised for both the social displacement and environmental degradation they cause (see Box).

On Upland Agriculture, Migrations and Conversions

After a period of steady decline, opium cultivation has been on the rise again in Myanmar since 2006, underscoring the ineffectiveness of the bans and crop



substitution programme. Both have relied on a set of *migrations* (from upland to lowland areas, from rural to urban, from Myanmar across the border to China or Thailand) and *conversions* of land (from low-input, small-scale uses to high-input, large-scale uses), justified in the name of ‘development’ and ‘modernisation’. Environmental arguments have been mobilised to juxtapose the supposed backwardness of shifting cultivation with the more economically ‘efficient’ and therefore supposedly ecologically rational model of industrial agriculture, often irrespective of the tenure rights, formal or informal, of existing land and forest users. Financing dispossession is however not development as the increase in land grabbing, displacement, economic marginalisation and environmental destruction that have occurred in the aftermath of the bans and opium substitution programme attest to.

How to understand the increase in opium production alongside the growing integration of Myanmar’s border-states into national and global markets? According to Patrick Meehan (2021) in his analysis of the rural opium economy and smallholder livelihoods in south-western Shan state, opium farming has allowed households to reproduce themselves, however marginally, against the backdrop of

worsening precarity and the powerlessness they felt against the “faceless compulsion of market forces surrounding licit crops”.⁴³ They expressed a greater confidence to be able to manage risks – related to adverse weather events or forced eradication – than the price volatility experienced when cultivating legal crops.

This is instructive because it speaks to how opium cultivation (as with other illicit crops) both drives and is shaped by trajectories of agrarian change. One of these positive trajectories of agrarian change can involve alternative development models for opium farmers if these take seriously a development-first approach centred on principles around participation, inclusivity, non-conditionality, proper sequencing, and the integration of human development and environmental indicators. The alternative development project ‘Doi Tung’ funded by the Mae Fah Luang Foundation on the Thai-Myanmar border for example has prioritised a people-centred approach and an unprecedented sustained commitment from the Thai Royal family over many years.⁴⁴ Alternative livelihood options centre on a diversified set of production activities based on vegetables, livestock, fruit and nut trees, coffee, smallholder rubber, mulberry paper,

and arts and crafts. Sustainable agroecological practices such as agroforestry are promoted. Investments have also been made in local schooling and health clinics.

Apart from the Doi Tong project, there are also many opportunities more broadly to experiment with new upland rice cultivation techniques to replace forms of shifting cultivation for example through the construction of terraces on sloping land and the application of organic fertilisers. These kinds of techniques will be vital to combat the increasing environmental strains opium farmers are experiencing. A 2018 UNODC survey in Shan state for example found that some 40 per cent of village headmen reported that the most severe shock faced by villagers was lower crop yield due to adverse climate conditions, more than double the figure reported just two years earlier.⁴⁵ The report concludes that “In light of the reported stresses on local resources, implemented [alternative development] policies should also consider environmental sustainability”.⁴⁶

3.2 Afghanistan

Opium poppy has been grown in Afghanistan for generations, especially in the southern provinces of Helmand and Kandahar. The plant’s high tolerance for drought (it requires only about one-fifth or one-sixth the water needed by traditional crops like wheat), makes it ideally suited for Afghanistan’s warm, dry climate. Other economic incentives for its cultivation include the fact that it does not spoil during transport, with extensive smuggling networks able to circumvent war related border closures in order to meet continued global demand. Prohibition ensures it sells for a premium. Although difficult to measure, it is widely believed that the production of opiates (opium, morphine, and heroin) constitutes Afghanistan’s largest economic activity. According to the latest UNODC opium survey, the gross output of the Afghan illicit opiate economy stood between \$1.8–\$2.7 billion in 2021, comprising 9 to 14 per cent of Afghanistan’s GDP.⁴⁷ This exceeds

the value of its officially recorded licit exports of goods and services (estimated at 9 per cent of GDP in 2020).

This is despite the vast amounts of resources expended by the U.S. and, to a lesser extent, the U.K. during the war in Afghanistan to eradicate poppy cultivation – the profits of which were linked to fuelling the Taliban’s counter-insurgency: “They bribed farmers to stop cultivating poppies, hired mercenaries to invade poppy fields and drew up plans to spray defoliants from the sky. But the poppies spread anyway”.⁴⁸ Notoriously labelled by Richard Holbrooke, the US State Department’s former special representative for Afghanistan and Pakistan, as “the single most ineffective program in the history of American foreign policy”, this eradication effort has largely come to be associated with the failure of the hardline ‘war on drugs’ strategy.⁴⁹ However, well-intentioned efforts to switch to a more development-oriented ‘hearts and minds’ approach through for example investments in irrigation projects to encourage the cultivation of fruit trees and other crops also ultimately proved counter-productive as canals were used to irrigate poppies or farmers simply relocated elsewhere to continue poppy



Mountains Afghanistan, TNI, 2016

farming. Opium cultivation remained either more lucrative or offered other benefits not conferred by alternative options.

Transformation of Desert Spaces

Since the late 1990s, Afghanistan has experienced recurrent and persistent droughts which have had significant implications for both food security and livelihoods. Poppy cultivation has allowed Afghan farmers to adapt to the climate crisis but it is also exacerbating it. In what follows, a spectacular process of transformation of formerly desert spaces in southwest Afghanistan driven by the interaction between new arrivals, improved technology, and opium fuelled capital accumulation and investment will be outlined. The desert areas of Helmand and Bakwa have largely been seen by the central government and donors as ‘marginal, remote and ungoverned space’. This started to slowly change in the early-to-mid 2000s with the arrival of new farming populations, nearly all of them engaged in opium cultivation. Since then, the rate of settlement has increased dramatically to the extent that what was mostly a barren, frontier region defined by rocky and sandy outcrops at the beginning of the 21st century had become by 2016 home to up to 2.2 million people.⁵⁰ A number of

push factors spurred on this settlement process including growing land scarcity due to population and resource pressures, stepped up eradication efforts, and decades of violence and state collapse which fragmented collective and community-based responses to conditions of socio-economic and environmental insecurity.

However, although there had been some households moving to these desert areas to flee drought in the 1990s, it was not until after the opium ban introduced by the Taliban in 2000–01 which led to a spike in opium prices, that it became economically viable to invest in the kinds of land improvements and technology that would allow these spaces to be transformed. Initially this took the form of shallow wells, to be replaced later by diesel powered deepwells. Since then, the story has been one of continual adaption, innovation and change with opium capital being used to deal with the challenges posed by desert ecology, high production costs, declining yields, and growing water scarcity.⁵¹

The Role of Green Technology

One of the most noteworthy developments has been the adoption since 2013 of solar technology in the form of Chinese made solar-powered deepwater wells to replace the previous diesel-powered pumps and generators. A research team counted 67,000 solar arrays in Helmand valley in 2019 where none had existed previously just a few years ago. A BBC article framed the adoption of this green technology as “the purest example of capitalism on the planet” with the region being “at the forefront of efforts to decarbonise the economy”.⁵² The economic case is clear: while the initial outlay required for a solar compared to a diesel powered well is higher, the operating costs of solar are a fraction of that of diesel, especially when considering that the price of diesel and electricity fluctuates and also that diesel in the region is heavily adulterated, leading to frequent breakdowns of machinery. More recent improvements which allow for the



Desert landscape, Afghanistan, 2006, TNI

Water Governance in Afghanistan⁵³

As a near total arid and semi-arid country predominantly dependent on agriculture, water governance in Afghanistan has always been integral to its prosperity. This can be traced in the country's rich history of irrigation systems, which as Michael Parenti explains, must be seen not only as a technical feat but also as a deeply socio-ecological process. One of the most complex of these is the system known as *karez*, hand-dug tunnels and galleries, ranging from a few hundred metres to 20 kilometres long, that tap groundwater from the aquifers of alluvial fans and bring them to dry planes. They rely on collective forms of management for their construction and maintenance with a *mirab* or 'water guardian' responsible for day-to-day oversight of the system. Water disputes among farmers that cannot be managed by the *mirab* are referred to a *vakil*, or water judge. When working well, the *karez* system can help build both social solidarity and sustainably manage water resources. This stands in contrast to forms of large-scale 'high modernist' irrigation infrastructure such as the project undertaken by the Helmand and Arghandab Valley Authority based on the construction of high dams which led to rapid evaporation, soil salinization, and the destruction of a former wetland.

Unfortunately, the *karez* system has been severely undermined through decades of war and state collapse which have frayed social bonds, facilitated land grabs, and triggered mass out-migration. This has resulted in a loss of investment in the system and the knowledge needed to maintain it. In its place, there has been a rise in privately owned and drilled gasoline and diesel-powered (and in recent years, solar-powered) bore wells, particularly on the farms of wealthier, land-owning families. The role that opium farming has played is interesting. Undoubtedly, the opium economy has heightened processes of social differentiation with new patterns of wealth distribution fostering a more individualistic mindset and overturning familial and generational patterns of social organisation that are part of village life in rural Afghanistan. It has also provided the capital necessary to invest in deepwell technology. However, the deeper problem lies more with local perceptions that 'water is free', something that a 'benign' technology such as solar power has helped foster as it has dramatically reduced the costs of extracting groundwater.

battery storage of solar power in integrated systems have only further tipped the balance in favour of solar.

Solar power is, in principle, a clean and renewable energy source. This does not however mean there are no environmental costs associated with it. There are real concerns that, with the water table currently estimated to be falling by up to 3m a year, the use of solar-powered deepwells to tap groundwater will not be sustainable in the long run.⁵⁴ This is made worse by poor local water management practices leading to excessive evaporation of water from aquifers and the contamination of groundwater from

the increasing use of chemical fertilisers (see Box). As a result, the fear is that water in the region will simply run out.

This encapsulates the central dilemma currently facing opium farming communities in southwest Afghanistan. The adoption of this new technology - solar energy - has been a response to the difficulties of settling in a harsh and unforgiving desert terrain. Yet, at the same time, it is accelerating the very problem - water scarcity - it seeks to overcome. It remains to be seen how this interaction between the opium economy, green technology, and environmental change will play out in the future.

4. Cannabis

Cannabis is the world's most consumed illicit drug, making up half of total global drug seizures. Cannabis is shorthand for the plant *cannabis sativa* which grows in every region of the world. It has a large number of uses including for industrial, therapeutic, medical, cosmetic, cultural, ceremonial and recreational purposes. While cannabis remains classified as an illicit drug under strict international control, there has been a shift in the way in which cannabis is listed. In December 2020, the UN Committee on Narcotic Drugs voted to reclassify cannabis and cannabis resin, taking it out of the strictest Schedule IV of the Single Convention, thereby recognizing its medical value.⁵⁵ This followed the release of recommendations made by the WHO's 41st Expert Committee on Drug Dependence which noted the health benefits of a number of cannabis derived medicines to treat conditions such as epilepsy, nausea, vomiting, appetite loss, chronic pain and muscle spasms in a number of patient groups. Recent years have also been marked by an unprecedented wave of cannabis policy reform in a growing number of countries worldwide which have adopted some form of regulated market for cannabis for medical and/or adult uses.⁵⁶

These policy reforms provide an opportunity to examine the environmental implications of cannabis under shifting legal regimes. In tracking some of these shifts, it is important to be mindful of the many differences within what is called the 'global cannabis market' – each of which comes with a different set of environmental considerations (see Box for an overview).

In this section, some of these differences will be explored through a comparative analysis of the history of cannabis cultivation in Morocco and California. It is important in this analysis to be mindful of the manifold and significant distinctions between them. Morocco has historically been a colonial subject (including dual French and Spanish zones of rule) with the legacy of this imperialist

Drying cannabis plants before being sieved. Photo: Pien Metaal/TNI, July 2009



Overview of the Environmental Implications of Different Types of Cannabis Markets

The cannabis market covers a wide variety of products with distinct characteristics, regulatory frameworks, quality requirements and environmental impacts. This includes:

(1) Illegal market. Most cannabis is still cultivated illegally, largely outdoors in traditional producing countries in the global South. In Northern countries, supply has increasingly shifted to illegal indoor growing with a high carbon footprint. Illegality means there are no quality standards or controls on the use of pesticides, and the demand for high THC products can lead to the replacement of local landraces – adapted to particular climate and agro-ecological conditions – with imported strains requiring artificial lighting and the excessive use of water and chemicals. To escape from law enforcement and eradication, outdoor growing tends to move to more isolated areas, increasing deforestation.

(2) Legal recreational market. At present only existing in Uruguay, Canada and some twenty U.S. states, but legal regulation is spreading to Mexico and a couple of European countries, including Germany. The advantage is state control over production to meet quality standards, consumer protection, restrictions on hazardous agro-chemicals, etc. The main negative environmental impact is that – thus far – these are closed domestic markets, disallowing import from traditional producing countries and thus shifting cultivation largely to indoor or greenhouse grow facilities with high energy use and GHG emissions, and significant (plastic) waste production from the use of trellis netting, PVC pipes for drip irrigation, and plastic ground covers or plant pots.

(3) Self-cultivation. Many consumers around the world are growing their own plants, either illegally or within decriminalisation schemes limited to usually between 3–6 plants, and in some countries organised in social clubs growing collectively for its members. Especially in a criminalised legal environment, many hide their plants indoors to avoid detection, with the disadvantage of high energy consumption even at a small-scale. Where the climate and law allow, outdoor self-cultivation is associated with few environmental harms, also because the grower, by virtue of necessity, avoids pollution with harmful chemicals for products they consume themselves.

(4) Traditional medicinal and ceremonial use. Especially in Asia and Africa, centuries-old traditional practices have survived decades of suppression, and recently countries such as Thailand, South Africa, Morocco and several Caribbean islands have legalised again such long-standing traditions. Cannabis used for these practices usually involves local landraces, well adapted to local climatological conditions, grown outdoors with hardly any environmental impacts.

(5) Pharmaceutical-grade medicines. This is the fastest growing legal cannabis industry in the past decade, with roughly fifty countries around the world now allowing some form of medical use of cannabis-based medicines, either in herbal form, natural extracts or pharmaceutical preparations made from purified cannabinoids. The main environmental impacts are related to the high quality standards and the requirement

for standardised products to obtain medical certification, resulting mostly in high-tech indoor growing facilities to produce the raw materials with all the associated environmental disadvantages (see also section 4.3).

(6) Industrial hemp. Another fast-growing legal market, with many thousands of hectares especially in Europe (>50,000ha), U.S. (>60,000ha) and China (>65,000ha). These involve mostly large-scale industrial outdoor plantations of cannabis varieties with a low THC content (between 0.2% to 1% depending on national law). Demand for hemp fibre has increased beyond the traditional uses for textiles and ropes to include paper and cardboard (replacing wood), shoes (replacing leather), insulation materials (replacing wood and plastics), and the inside covers for cars (replacing plastics). There are considerable environmental advantages with all these hemp applications as they replace much less sustainable materials. Moreover, hemp seeds and oil have become popular as superfoods and for cosmetics, and a huge global market has grown for CBD products extracted from hemp. On top of all these benefits, hemp can also act as a carbon sequester, with one hectare of hemp absorbing up to 15 tonnes of CO₂, about double the amount captured by the equivalent surface area of forests, depending on the type of trees, years of growth, and climatic region.⁵⁷

past arguably continuing until this day. Cannabis cultivation has, until very recently, been completely illegal, even if it has been tolerated to a significant degree in particular geographical zones, with efforts centred around containment rather than full-scale eradication. As an agricultural powerhouse and one of the largest economies in the world, California stands in a very different position in the world order. Within the U.S. and worldwide, it has been at the forefront of cannabis reform through a series of citizen ballot initiatives: in 1996, California voted to allow cannabis for medical use and in 2016, cannabis was legalised for adult use.

Despite these differences, there are also noteworthy similarities. These centre on the growing intensification and expansion of cannabis production over time as demand soared, accelerating processes of resource exploitation, capital accumulation and social differentiation. In both regions, there has been limited or belated consideration of environmental issues which have mostly been side-lined in favour of a more entrepreneurial and agro-industrial model. This has also altered the way in which people relate to the environment, speaking to the complex

interplay between dynamics of environmental, social and political change. The chapter ends with a broader reflection on environmental issues in the transition to regulated cannabis markets – drawing from examples in the United States and the Caribbean. This sets the stage for a discussion on the prospects for environmental justice within illegal and legal drug economies in Chapter 5.

4.1 Morocco

Morocco is the world's largest producer of cannabis resin known as hashish. It has a long history of cultivation and use in the country dating back to the first introduction of the cannabis plant following successive waves of Arab conquest in North Africa between the 7th and 15th century. It has been incorporated into traditional custom, being mixed with tobacco to form a blend known as *kif* which is smoked. The term *kif* is also used colloquially to refer to the cannabis plant itself or even the whole process of growing, harvesting and marketing of cannabis. The cultivation of cannabis is concentrated predominantly in the Rif, the mountainous region of northern Morocco, largely due to the imposition of a

ban on cannabis in the French zone during the time of colonial rule which shifted cultivation to the then Spanish controlled Rif. Following independence in 1956, government policy towards cannabis has oscillated between periods of eradication, containment, and more recently, limited acceptance and tentative steps towards regulation (see Box).

The Rif is one of the poorest, most densely populated and environmentally fragile regions of the country. As a rugged landscape marked by ridges, slopes and valleys, along with inhospitable land with poor soils, economic opportunities are limited and largely confined to modest, small-scale agricultural production. Barring migration to work in Western Europe, cannabis cultivation has proven to be one of the only economic lifelines available to the population of the Rif. This does not mean it has been lucrative for all but those few with connections to underground trafficking networks. For the vast majority it

is an arduous, labour intensive, and uncertain undertaking, eked out on sloping hillsides and on small plots of land. In the Ketama region of the Rif for example, farms rarely exceed one hectare.⁵⁸

It is the sheer scale in terms of the number of households as well as the adoption of techniques borrowed from industrial agriculture that has led to the transformation of the landscape of the Rif through cannabis cultivation. This is especially the case since the 1960s when demand for cannabis in Europe, of which Morocco is the main hashish supplier, took off. This has resulted in a process described as one of ‘environmental simplification’: the loss of landscape complexity and ecological integrity, generally as a result of human activity. In the case of Morocco, this has meant a shift from a multi-crop landscape (where cannabis used to be grown in small quantities in market and residential gardens alongside traditional



Cannabis cultivation, Donar Azila, Pien Metaal, 2009

Eradication, Containment, Acceptance: Shifting Cannabis Policy in Morocco⁵⁹

While it is a known fact that Morocco is one of the largest exporters of cannabis in the world, there are currently no reliable numbers concerning the exact cultivation areas, the scale of cannabis cultivation, or the amounts of hashish produced. Estimates of the number of people depending on cannabis production for their livelihoods range from 760,000 to over 1 million – or 90,000 to 140,000 households – mostly concentrated in the northern provinces of Al-Hoceima, Chefchaouen and Ouazzane. Government policy towards the cultivation of cannabis has undergone noticeable shifts over time. While cannabis cultivation was – with some notable restrictions – licensed for the majority of the period of French and Spanish occupation, a more prohibitionist stance took hold following independence in 1956 when adherence to the international drug control conventions was emphasized. However, following a series of violent uprisings in the Rif region in response to the ban on cultivation, including a 1959 revolt which was brutally repressed by the military and in which 8,000 people were killed, cultivation in the Rif has been quietly condoned. Since then, the Moroccan government has (unofficially) practised a policy of containment: aiming to stem the expansion of cultivation to new areas but tacitly allowing those lands under cultivation to be maintained.

This has not meant that there have not been periodic attempts since the 1960s to reduce cannabis cultivation through a ‘carrot-and-stick’ approach involving both forced eradication and a series of alternative development projects. This has included slash-and-burn campaigns, herbicide spraying, and a number of rural development initiatives including investments in alternative agricultural crops, bee keeping, sheep breeding, goat farming, and eco-tourism amongst others. All of these efforts have had a negligible impact in terms of displacing the cannabis economy. Even if the absolute area under cannabis cultivation has been reduced – which is uncertain – it is questionable to what extent this has reduced cannabis production overall given the introduction of higher yielding varieties and new techniques which have intensified cultivation on existing lands.

The failure of these efforts, along with the global trend towards cannabis policy reform, has prompted a re-think. Following years of election campaign promises, the Moroccan parliament passed a bill in 2021 to regulate cannabis for pharmaceutical, medical and industrial purposes. This is to include support for the formation of licensed cannabis producer cooperatives of the Rif. It also includes references to environmental standards in relation to the use of fertilisers and pesticides and rotational planting practices. While a potentially promising first step, it remains to be seen how the implementation of this new framework for a regulated market will work out in practice. A workshop organised in January 2020 by TNI along with research and civil society partners in Morocco identified a number of future directions a regulated cannabis market could take which extend beyond the more limited confines of the current legislation. These include: 1) Support for the creation of a domestic cannabis wellness industry based on the integration of medicinal and therapeutic cannabis products in the country’s network of hammams; 2) The expansion of a cannabis-based eco-tourism industry with the sampling of cannabis products tied to a series of hiking

and mountain-biking trails and other rural experiences; 3) The creation of an Amazigh cannabis cultural festival involving music, arts, and a celebration of traditional Amazigh identity and practices; 4) The licensed export of cannabis to the European market such as to coffee shops in the Netherlands under a fair(er) trade model in which a series of quality assurances are offered (including around labour and environmental standards), and with social premiums to be re-invested back into the sustainable development of the Rif region.

crops, fruit trees, and livestock) to the linear, standardised mono-crop production of cannabis for export.⁶⁰ This has gone hand in hand with a huge loss of biodiversity, massive deforestation, rampant soil erosion and increasing water stress and scarcity. It has been claimed that soil erosion rates in the Rif are amongst the highest in the world with an estimated 2% of agricultural potential in the region being lost to erosion every year.⁶¹ This has been partly down to the extension of cultivation up slopes as well as the raising of goats to supply manure for the fertilisation of soils grown for cannabis cultivation, leading to overgrazing and subsequent soil loss and erosion.

Cannabis cultivation is undoubtedly the driving force behind the ecological transformation of the Rif. This transformation however mimics the increasing specialisation, intensification and industrialisation of agriculture, such as the large monoculture export-driven citrus and berry farms, found in other parts of the country. Both of these processes, while differing in legal status, rely on increasing resource exploitation to further the goal of capital accumulation. This has altered local populations' perceptions of and relationships with the natural resources upon which they depend. These relationships have also been shaped, oftentimes coercively, by state policies. One cannot understand the rapid decline in the region's cedar forests and other woodland areas for example without examining the failure of the state's forest conservation policy. This dates back to 1919 when Spain issued a decree taking management and control over woodlands from

local tribes and communities into the hands of the colonial administration, transforming what had been a system of community exploitation of forests and shifting cultivation towards the large-scale extraction of timber products. Further state attempts between 1960 – 1975 to preserve woodlands through an official process of demarcation backfired as cannabis farmers rushed to clear land before it could be registered.

This struggle to control forests in the Rif shows how the imposition of state doctrines of resource exploitation and management, when combined with the erasure of local practices and governance models, can have profound consequences. It underlines the point that resource use cannot be disassociated from questions of ownership, distribution and control. As Kenza Afsahi (2020) explains:

Although the laws imposed by the Spanish, and subsequently by the Moroccan state, stipulated that woodlands should be protected, they did not take into account local populations' traditional forestry practices, beliefs and intimate relationship with all living species. Nature was seen as independent of those who had inhabited and preserved it for centuries, and who would continue to use it and benefit from it.⁶²

The question of resource inequality and control is at the heart of the cannabis economy in the Rif. It continues to define who benefits, who loses out, and how relationships between populations and the environment evolve. One of the reasons that tribes in the Rif originally began to exploit forests in the

region was because they were excluded from the most fertile and accessible lands across the country that were controlled by colonial powers to develop industrial plantations. The general prohibitionist stance towards cannabis (even if to some extent tolerated or geared towards containment rather than eradication in particular areas) has led local populations to further exploit land, forests, and water resources, undermining traditional knowledge and farming techniques. This has pushed the ecology of the Rif towards the edge. As ecological threats intensify, conflict between small and large producers over, for example, water has increased while social inequalities and the exploitation of labour (especially of women and seasonal workers) have grown.

These inequalities interact with an unfolding process of agricultural innovation. This includes the spread in recent years of high-yielding varieties (HYVs) of cannabis that are replacing indigenous Moroccan landraces. Brought over by Dutch and Spanish traders and in demand for their more potent psychoactive properties, they are also however more demanding in terms of their use of agro-chemicals, water, and labour, thus potentially further compromising the environmental sustainability of the Rif. As the introduction of these HYVs is associated with this 'modern' agricultural package and set of techniques, they favour those with access to fertile soils, irrigation, and the ability to command labour. It has also attracted greater foreign involvement and consolidation within the cannabis economy in the Rif with European operators moving to vertically integrate the whole production and sales process, from the choice of seeds and land, to the choice of extraction techniques, and to the commercialization stages. Some analysts see possibilities for less water intensive HYVs to be adopted that, together with the use of more sustainable techniques such as drip irrigation and mulching, can help to alleviate environmental pressures.⁶³ Questions remain however around the suitability of these HYVs and the undermining of local genetic heritage and seed sovereignty that they imply.

It also is an open question to what extent and how the new bill that was ratified in March 2021 to regulate cannabis cultivation in the Rif for medical and scientific purposes will address environmental issues. An analysis by the North African Food Sovereignty Network noted that "the legislation kept considerations of soil preservation and the ecosystem out of scope" while raising concerns that, although the bill stipulates that production will be based on the formation of cannabis cooperatives, regulation will serve the interests of big land owners and wealthy investors.⁶⁴ In such a fragile yet strategic region of the world such as the Rif, it will be essential that regulation will manage the complex interplay between economic, social and environmental factors in a sustainable way.

4.2 California

Within the United States, California has been at the forefront of cannabis policy reform: in 1996, California became the first state in the nation to regulate cannabis for medical use, followed in 2016 with the regulation of cannabis for adult use. This makes California an interesting case study to explore how the environmental impacts associated with cannabis have evolved as legal frameworks have changed over time. This section examines the environmental implications of the earlier prohibitionist regime before turning to look at more recent developments in the cannabis industry and how environmental policymaking and compliance have been affected by corporate capture, fragmented governance structures and the ongoing ban on cannabis at the federal level.

Cannabis cultivation has historically been concentrated in the tri-county area of Humboldt, Mendocino and Trinity counties (also known as the Emerald Triangle) of Northern California. It is largely grown outdoors on small plots of public, private or Native American tribal land with an average size of one-third of an acre.⁶⁵ The concentration of cannabis in the Emerald



That's Cannabis", California, Thomas Hawk, 2016, licensed under CC BY-NC 2.0
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Triangle is in large part due to the region's sparser population and rugged terrain that allows for easier evasion from law enforcement agencies. However, this has also meant that illicit cannabis cultivation increasingly encroached into sensitive forest and watershed areas. This has, over the years, caused a number of environmental problems including: habitat loss and fragmentation from the illegal logging and clearing of land; surface water diversions threatening salmon, trout and salamander species; widespread use of rodenticides potentially impacting other mammalian and avian populations; forest cover and vegetation loss due to illegal road building, agrochemical pollution, and fossil fuel run-off into waterways as a result of the use of diesel for on-site, off-the grid generators.⁶⁶ The presence of illicit cannabis farms has also been linked to an increase in illegal wildlife poaching.

According to Tony Silvaggio from Humboldt University, prohibition has played a major role in amplifying these environmental problems.⁶⁷ It has driven cannabis cultivation underground where, despite efforts at eradication, it has expanded without any environmental oversight. Asset forfeiture

has pushed growers onto public land while surveillance, eradication and interdiction programmes such as the Campaign Against Marijuana Planting (CAMP) have encouraged a shift to industrial, indoor cultivation. Prohibition has also meant that established systems of water governance prevalent in Californian agriculture, such as the organisation of local irrigation districts as well as access to the extensive network of dam reservoirs and irrigation canals offered by large state and federal water projects such as the Central Valley Project and the State Water Project, have been unavailable to cannabis farmers.⁶⁸ This has sparked a number of water conflicts and fears around the impacts of illegal water withdrawals and diversions, especially during the state's dry summer months. All of these factors have transformed cannabis into what, arguably, was at one time a small, and ecologically relatively benign cottage industry during the 'back to the land' era to become, over the past 30 years, one of the state's primary environmental concerns.

This raises the question: "To what extent can regulation/legalisation effectively tackle environmental issues?" This will be explored in further depth below and also in Chapter 5.

However, a number of specific aspects with respect to the cannabis industry in California are worth highlighting here. First of all, it is worth noting that at the time of the passing of Proposition 64 in 2016 which regulated cannabis for adult use, it was heralded by policymakers as ‘the environmental gold standard’ of cannabis legislation, with funding provided for conservation, restoration work, and the enforcement of environmental laws.⁶⁹ Concerns that the market would be taken over by large corporate and industrial monocultures were meant to be addressed through limits on the number of licenses and canopy size. All of this initially boded well for the future direction and environmental sustainability of the cannabis market in California.

Unfortunately, the reality on the ground has been some distance removed from the original intent of the bill. Small cannabis growers have found themselves mired in a complex framework of county and state rules, regressive tax policies, and high costs of regulatory compliance to the extent that by February 2018 only 0.78 per cent of the existing 68,150 small growers in the state had been able to obtain a license.⁷⁰ Some have been simply forced out of business. Larger players meanwhile have been able to circumvent some of the original limits put in place by stacking licenses and by taking advantage of a number of other loopholes. Investors from California’s agricultural rich Central Valley have increasingly moved into the Emerald Triangle, converting former timberland into cannabis plantations. This has led to an intensification and expansion of cannabis production from an average of 20 – 30 plants per farm to a growing number of sites with hundreds or even thousands plants per farm.⁷¹ Largely due to this cumbersome governance structure, a significant black market continues to exist alongside the regulated market.

These difficulties have been recognised by policymakers and efforts are underway to encourage environmental compliance through a combination of incentive programmes,

lowered barriers to entry for small growers and enforcement to reign in the most egregious violators. Ultimately however, many observers argue that a solution is required at the federal level through the lifting of the federal ban on cannabis. This would open up the industry and small growers in particular to important federal support programmes such as that offered by the U.S. Department of Agriculture’s financial and technical assistance programme, the Small Business Administration’s loan assistance programme, and the Environmental Protection Agency’s grants, technical assistance, education, research and training programmes. It would also provide an opportunity to set nationally recognised environmental, labour, and other standards across the industry in order to drive sustainability, rather than the patchwork of competing county and state laws that exists today. This has been actively called for by a number of industry players.⁷² However, while lifting of the federal prohibition of cannabis has received support amongst a significant number of legislators and amongst the general public, the prospects for federal regulation in the near future remain uncertain.

4.3 Environmental Issues in Regulated Cannabis Markets

The rapidly evolving policy landscape around cannabis allows for a tentative evaluation of the environmental issues encountered in regulated cannabis markets. There is, at times, an assumption that due to the historical disconnect between drug and environmental policy engendered by prohibition, regulation will automatically confer environmental benefits. However, as will be discussed, this is certainly not a given. It matters very much how regulation is designed and the extent to which environmental concerns are integrated. This section will examine some of the main environmental issues encountered in regulated cannabis markets, drawing principally on studies conducted in the United States and the Caribbean. This includes a comparative evaluation of the relative greenhouse gas emissions of indoor

versus outdoor cultivation; the continuation of unsustainable land use, soil, water, air quality, and waste disposal practices; and the risks of corporate greenwashing in the cannabis industry.

Carbon Footprints in Indoor Cultivation versus Outdoor Cultivation

Depending on the climate conditions, there are a variety of options for cultivating cannabis ranging from traditional outdoor growing using natural sunlight and inputs to windowless indoor sites which require sophisticated technologies to regulate the ambient environment and stimulate plant growth. Variations within this spectrum include the use of greenhouses or other structures which include (part-time/night-time) artificial lighting and other forms of climate control.

From an environmental standpoint, the distinction between outdoor and indoor growing is significant because of the implications for energy use and greenhouse gas emissions (GHGs). To meet global climate goals, there has been a significant effort to undertake what are known as 'life cycle assessments' to determine the 'carbon footprints' of various sectors and industries in order to inform policymaking and climate action. To date, only very limited analysis has been undertaken on this front with respect to cannabis, with the vast majority of research focused on the United States. A notable early study was that conducted by Evan Mills in 2012 which found that indoor cannabis consumed 20 billion kilowatt-hours of electricity annually, with additional amounts from direct fuel use, together corresponding to 15 million metric tonnes of CO₂ released into the atmosphere each year.⁷³ This corresponded to 1% of electricity



Cannabis Indoor", Oregon, Oregon Department of Agriculture, 2016, licensed under CC BY-NC-ND 2.0
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use nationally and was equivalent to the emissions of 1.7 million average U.S. homes or three million cars. It also placed the (indoor) cannabis industry at the high end of carbon emitting sectors, generating for example four-times the aggregate U.S. pharmaceutical industry energy expenditure. Over the years, a number of other studies, mostly at state level, have added to these findings and corroborated the high energy consumption and carbon emissions associated with indoor cultivation.⁷⁴

One of the most comprehensive studies at a national level to be completed to date is that conducted by Summers et al. (2021) at Colorado State University.⁷⁵ The study is notable for its ambitious scope: it includes both upstream and downstream, direct and indirect drivers of energy use through a 'cradle-to-gate system boundary' which is performed across the United States, taking into account geographic variations in the composition of the energy mix in electrical grids and meteorological data. They find that, based on location, lifecycle GHG emissions range from 2,283 to 5,184 kg CO₂ -

equivalent per kg of dried flower - meaning that producing one ounce (28 grams) of dried weed is equivalent to burning 7 - 16 gallons (26 - 60 litres) of gasoline. In some states, this placed cannabis at the top-end of the range of emitters. In Colorado for example, carbon emissions from indoor cannabis production were greater than the state's active coal industry.

The main factors driving up the greenhouse gas emissions from indoor cannabis cultivation include:

- Heating, ventilation and air conditioning systems needed to maintain the required indoor temperature and humidity levels;
- High intensity grow lights which can be 50 - 200 times higher in intensity compared to a standard office setting and which are run for 12, 18 or 24 hours a day depending on the life cycle of the plants;
- Supplemental CO₂ supplies which are added to increase the rate of

photosynthesis to allow for quicker and more frequent harvests. This supplemental CO₂ accounts for between 11 – 25 percent of total emissions across the indoor cannabis industry in the U.S.

All of the above adds up to a compelling case for outdoor cultivation. It has been estimated that outdoor cultivation uses just 2.5% of the electricity required for the average indoor operation.⁷⁶ Greenhouse operations are situated somewhere in between, using around 45% of the energy of the average indoor facility. According to Summers (2021), “If you strip away everything that’s purely associated with indoor growing, your emissions drop by 80 per cent”.⁷⁷ While there are steps that can be taken to maximise efficiencies in indoor operations by, for example, encouraging the use of more efficient LED lighting, this still “optimises the suboptimal” as the carbon footprint of indoor cultivation remains many times higher than that of outdoor growing.⁷⁸

It is also something of a chimera to assume that energy demand can be met through switching to renewable energy sources after efficiencies have been maximised given the implications for land use this would entail. For example, it is estimated that meeting the total energy requirements of a proposed 55 acre indoor ‘cannabis industrial park’ in Palo Verde California, would require approximately 1,400 acres of photovoltaic panel area.⁷⁹ This does not mean that solar panels can and should not be built on, for example, rooftops to encourage a greater share of renewable energy production, but the best-case scenario still rests with outdoor cultivation. As Mills and Zeramby (2021) argue, “Outdoor cultivation – which has sufficed for millennia and could meet all U.S. demand with only 0.01% of current farmland – is the most technologically elegant, sustainable, ethical, and economically viable approach for minimising the rising energy and environmental burden of cannabis production”.⁸⁰ There are also important social and economic development arguments in favour of outdoor cultivation, especially for traditional producing countries in the Global South where outdoor growing is the

norm. These considerations and their policy implications will be further touched on in Chapter 5 as part of the overall discussion on sustainability pathways.

The Case for Outdoor Cultivation in Traditional Producing Countries and Regions

There is therefore a strong case to be made for cannabis cultivation for the regulated market to be based as much as possible on outdoor cultivation in light of the vastly reduced carbon footprint of outdoor versus indoor growing. Licit outdoor cultivation is still however stymied by a number of regulations. In the U.S., co-location requirements – the requirement that cultivation and retail along with the needed infrastructure take place in close proximity to one another – as well as licensing regimes that set fees according to the size of the area under cultivation, incentivise indoor growing as yields can more easily be maximised per square foot indoors, mostly in urban areas. A number of other measures, such as the offering by utility companies of energy-saving rebates and cheap industrial rates to indoor growers, tip the balance in favour of indoor cultivation. In some jurisdictions, such as the U.S. state of Illinois, outdoor cultivation is banned outright. Meanwhile, the federal prohibition of cannabis in the U.S. disallows inter-state commerce which would enable ‘geographic optimisation’: locating cannabis production in regions that are suitable for outdoor growing and possibly also with a larger share of renewable energy in their energy mix.⁸¹

The ultimate form of ‘geographic optimisation’ would be to prioritise and regulate cannabis cultivation within traditional producing countries of the global South where the vast majority of (illicit) cannabis is currently cultivated, nearly all exclusively outdoors. However, significant challenges prevail. Trade in licit cannabis products is still extremely complex, with the difficulties in obtaining import and export licenses meaning that still relatively limited

cross-border trade in legal cannabis products has taken place thus far. This has not stopped an influx of foreign investors, nearly all from countries in the global North, coming in to Africa, Latin America and the Caribbean, in anticipation of future market openings – developments that have been associated with corporate capture and historical patterns of uneven development.⁸²

This raises a number of intersecting environmental and economic justice issues. First of all, to the extent that cannabis regulation has, with some notable exceptions, advanced more rapidly in the global North, this confers significant ‘prime mover’ advantages to investors from these countries in the global cannabis market. It is not coincidental for example that many of the world’s largest cannabis companies that dominate the industry are Canadian. The influx of foreign direct investment, largely from the Northern investors to countries in the global South – lured by lower production costs, including cheap labour – does not necessarily lend itself to the development of inclusive economies, especially if opportunities for local ownership, upskilling and development are limited. In the worst instances, this can mirror problematic forms of extractive development where the global South is largely seen as a source of raw materials and simple commodity production, with traditional cannabis farmers being transformed into day labourers on cannabis plantations.

Second of all, it can also be problematic from an environmental point of view as the inflow of foreign investment in most cases implies a transformation from traditional modes of production towards a high-input, capital-intensive model based on, *inter alia*, hybrid seeds, greenhouses, and sophisticated extraction techniques. The consequences of this industrial model of production for the environment in regions such as the Rif in Morocco have been previously discussed. Furthermore, countries in the global North have also tended to favour an import substitution approach to protect

their (largely indoor) domestic cannabis industries, foreclosing limited developmental opportunities available through (illicit and licit) trading relationships for Southern countries.

All of this means that, sustainability, both in developmental and environmental terms, is still mostly lacking within the global cannabis market. As Kenza Afsahi (2020) argues:

Changes in cannabis regulation are intended to control cultural, environmental and social justice abuses, but the cannabis market currently has relatively few economic models that promote justice, respect for the environment and equity between South and North and rich and poor. The intensification of cannabis cultivation has further deepened territorial and social inequalities at a number of levels between the traditional growing countries, which have supplied the international market with cannabis for decades, and the industrialised countries, which have switched from importing cannabis to now specialising in cannabis cultivation and adjusting their legislation accordingly.⁸³

In response, a number of countries have attempted to more actively shape the formation of their domestic cannabis markets, requiring for example that a certain percentage of cannabis is sourced from small and traditional cultivators or that foreign companies set up joint ventures or other partnerships with domestic actors. Even so, it has proven difficult to anchor these standards and environmental protections. In the case of Colombia for example, initial studies of the country’s recent shift to a regulated market for medical cannabis find that, despite the stipulation that 10 per cent of production should come from small- and medium-scale growers, the market has been dominated by corporate investors.⁸⁴ This sets up the prospect that the country’s cannabis industry will follow a similar pathway to that of other agro-commodity chains, with smaller growers being simply contracted as day labourers on plantations. In most cases, sustainable governance frameworks

for the cannabis industry – beyond those that are required through quality control standards set by the industry in the form of Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) – are still mostly underdeveloped. Moreover, many of these standards actively encourage indoor cultivation. Ongoing discussions with policymakers, traditional cannabis growers, academics and practitioners in the Caribbean region offer one potential promising pathway for developing a more sustainable model (see Box).

Other environmental issues in the cannabis industry

While carbon budgets should be a top-of-mind consideration given the urgent need to dramatically cut greenhouse gas emissions in light of global climate change, there are also a range of other environmental issues that are important to examine. The following table summarises some of the main issues that have been identified within the regulated cannabis industry in both indoor and outdoor settings, in particular in the U.S. context.

Fair Trade Cannabis in the Caribbean

The Fair Trade Cannabis Working Group was formed in 2019 as a platform of cannabis growers across six Caribbean nations to dialogue with policymakers from the CARICOM member states.⁸⁵ The Working Group highlights a number of environmental factors that can form the basis for a sustainable, legal medical cannabis industry in the region including:

- An ideal temperate climate for outdoor cultivation including adequate rainfall and sunlight;
- Use of organic production methods, taking advantage, in some countries, of the presence of volcanic soils, supplemented by, for example, natural seaweed-based fertilisers;
- The presence of indigenous cannabis strains and ability to preserve native seed varieties, thereby also protecting local genetic resources and diversity.

When combined with responsible legal regulation, these conditions can allow for the promotion of an alternative development with cannabis model that is attuned to key environmental challenges.⁸⁶ The Jamaican government has for example, through its Rural Agricultural Development Authority (RADA) initiated an AD project to provide guidance to traditional growers on GAP and organic standards in a bid to protect the environment and prevent the pollution of waterways. In St. Vincent and the Grenadines, some of the growers' networks that now form part of the Fair Trade Cannabis Working Group, were previously engaged as Forest User Groups within the Integrated Forest Management and Development programme which was geared towards sustainable watershed management, particularly in mountainous forest areas known for cannabis cultivation (see also Chapter 5).⁸⁷

As inhabitants of small island developing states, growers of the Working Group are keenly aware of the urgency to act in light of the impacts of climate change, noting the increased incidence and severity of tropical storms and hurricanes and changing precipitation patterns. They connect the development of a sustainable cannabis industry with policies that promote resilience and a sense of environmental stewardship rather than one which replicates the harmful practices of corporate controlled, industrial agriculture. This will only happen, according to them, if social equity and environmental justice, go hand in hand.

Table. Environmental impacts of the cannabis industry⁸⁸

Dimension	Potential impact	Best practices
Land use and soil health	In the absence of proper land management, cannabis cultivation can contribute to soil erosion, nutrient loss, reduction in soil organic matter, and increased acidity. This is especially the case for industrial cannabis monocultures which make use of agrochemicals.	Regular soil testing and the drafting of cultivation plans can help to avoid land and soil degradation. A shift away from cannabis monocultures and industrial farming practices towards a model based on organic agriculture, regenerative farming and agroecology can aid sustainability in the longer-term.
Water use and quality	Run-off from cannabis farming with pesticides, heavy metals, excess and elevated nutrients and other pollutants from wastewater entering waterways. Indoor cultivation can furthermore put additional pressure on municipal water systems due to the discharge of excess nutrients and industrial cleaners.	Invest in adequate water storage facilities, alternative water sources, and pre-discharge treatment methods.
Energy use	Indoor cannabis cultivation is highly energy intensive due to the use of heating, ventilation and air-conditioning systems; high intensity grow lights; and supplemental CO ₂ supplies.	Encourage outdoor cultivation as much as possible. More generally, decarbonise energy systems by phasing out all fossil-fuel based power generation.
Air quality	Volatile organic compounds in the form of terpenes are released in cannabis cultivation, processing, and extraction stages of production. These can contribute to both nuisance odours as well as harmful ground-level ozone in urban areas.	Robust air quality programmes should be designed together with cannabis licensing authorities. Outdoor cultivation in less densely populated rural areas can reduce the impact of odour pollution.
Waste management	Waste is generated from, inter alia, plant waste, single use soil or other artificial growing media in indoor sites (e.g. mineral wool), non-recyclable consumer packaging and plastics.	A number of regulations hinder the possibilities for recycling, but where possible, cannabis waste should be diverted from landfills through the use of techniques such as composting, fibre recovery and recycling, and anaerobic digestion.

‘Greenwashing’ or Responsible Investment? The Role of Voluntary Standards and the Private Sector in Cannabis Policy

In many respects, the transition to regulated cannabis markets across the world shows the difficulties in honing environment legislation within a sector previously detached from environmental policy. On the one hand, it could be argued that the current regulatory framework has overcompensated for this, subjecting small and traditional growers to an impenetrable landscape of bureaucratic rules which has, at times, actively pushed them out of the marketplace.⁸⁹ And while there may be sound reasons for requiring compliance with the stringent rules set in place by GAP and GMP standards, the rigorous testing regime for contaminants or residues within the medical cannabis industry also leads to a significant amount of waste from discarded product. On the other hand, it could also be claimed that environmental policy within the regulated cannabis marketplace is sorely lacking or counter-productive. For example, despite the vast amounts of plastic used in the packaging of cannabis product, opportunities to recycle this through store take-back schemes are precluded in countries such as the U.S. due to the possibility that traces of flower could remain inside.⁹⁰ Finally, as discussed above, many measures currently in place in the U.S., Canada and elsewhere steer the industry towards indoor cultivation which has been shown to be much more energy intensive, with a much larger carbon footprint, compared to outdoor cultivation.

Within this arena, the private sector has stepped in to fill some of these gaps, especially as environmental consciousness has risen amongst consumers and industries are under pressure to account for their environmental impact. This has led to a plethora of sustainability claims being made by industry players along with voluntary certification schemes, including eco-labelling schemes. However, as analysed by the academic Elizabeth Bennett, it is largely unclear, at least in the U.S., if these schemes truly live

up to the sustainability claims that are being made, opening them up to potential charges of ‘greenwashing’.⁹¹ While there is certainly a business case to be made for sustainability initiatives, especially with regards to cost-saving efficiency gains, one must also exercise a level of caution in substituting public policy and binding regulation for forms of corporate self-regulation and voluntary codes of conduct as experiences from other sectors show that these are unlikely to produce truly pro-poor, environmentally just outcomes.⁹²

With respect to cannabis, compliance with voluntary (or even binding) regulations has also been hampered by fragmented governance structures, as for example in the U.S. where the federal prohibition on cannabis has resulted in a ‘spaghetti bowl’ of different and, at times, conflicting industry standards. It is noteworthy that industry players in the U.S. have themselves called for the establishment of what they call a national ‘cannabis clearing house’: a ‘one-stop shop’ where cannabis businesses can track environmental parameters, share relevant information on environmental best practices and regulatory requirements, and receive assistance to enable compliance.⁹³ Ultimately, it is argued by many that a ‘federal fix’ in the form of the lifting of the federal ban is needed to fully address the environmental challenges associated with cannabis in the U.S. context.⁹⁴ This would allow the cannabis market to move forward in a coordinated, rather than fragmented and piecemeal fashion, with environmental standards implemented and enforced as part of a forward thinking strategy, rather than retro-actively. As some have noted though, it will be important that any type of federal legislation fosters a race to the top, not a race to the bottom, and does not undercut state-level standards in terms of regulations around social equity, anti-monopoly provisions, and environmental protection.⁹⁵



5. Sustainability Pathways: Embedding Environmental Justice in Drug Policy

This report has explored the environmental impacts of three ‘prohibited plants’ through a number of in-depth case-studies in different regions including:

- Coca cultivation in the Andean region and the dynamics associated with cocaine trafficking in Central America
- Opium poppy in Myanmar and Afghanistan
- Cannabis in the Rif region in Morocco and in California

In each section, both the drug and development-oriented policy responses associated with these agrarian drug economies and their role in either furthering or mitigating environmental harm have been discussed. In this Chapter, some of the analytical threads that run through each of the preceding three sections will be further teased out in order to start to piece together design elements that could inform a ‘green drug policy’ i.e. a drug policy that takes questions of environmental sustainability and environmental justice seriously.

It has not been within the scope of this report to tackle the environmental impacts of synthetic drugs. However, this is an important issue to take note of, especially as the market for old and new types of synthetic drugs is growing alongside, or even surpassing, more traditional agrarian drug economies based on illicit crop cultivation. In Myanmar for example, while opium cultivation has fluctuated over the past decades, recent years have seen an expanding production and consumption of ATS.⁹⁶ Here again however, we see how drug control policies work at cross-purposes with environmental protection, which, in the case of synthetic drugs follows on from the tightening of precursor controls (see Box). A key aim of any sustainability pathway is thus to seek to find

Precursor Control and the Environment

The production of amphetamine-type stimulants (ATS) like ecstasy (MDMA) and (meth)amphetamines are associated with negative environmental effects. Due to the illicit nature of the industry, toxic chemical waste generated with the production of synthetics is dumped illegally and unsafely, causing environmental damage and risks to public health and safety. To produce synthetic drugs, an array of production techniques are used, involving a range of different chemical precursor substances.

The production of 1 kg MDMA is estimated to result in anything between 6 kg to 10 kg of waste; for amphetamine (speed) the figure is considerably higher, with the waste per kilogram estimated to be between 20 kg and 30 kg.⁹⁷ The waste is left behind at illicit laboratories, burned or dumped on the road or in other locations, or illegally disposed of in sewage systems (causing malfunction of sewage treatment plants) and waterways or into the soil, damaging ecosystems, fauna and flora and contaminating water or food products from contaminated soil.

An important supply reduction measure to prevent the manufacture of synthetic drugs is the control of these precursor chemicals. Without the precursors, synthetic drug production is impossible. However, as noted by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), due to increasing international precursor control measures, a "pre-cursor arms race" has ensued between regulators and illicit ATS producers which "can only be expected to intensify as the system adapts and reacts to the emergence of new alternative substances".⁹⁸ As a result, the environmental damage of ATS production has only increased. Due to the control of certain precursor chemicals, crime groups looked for alternative so-called 'pre-precursors' that require setting up conversion labs to produce the needed chemical precursors, increasing the amount of laboratory and hazardous waste dumped illegally.

For instance, when the supply of the precursor BMK for (meth)amphetamines from China and Russia – two important source countries – started to tighten around 2007 and 2008, the pre-precursor APAAN was introduced.⁹⁹ The conversion of APAAN into BMK is a hazardous process, which not only can generate toxic fumes and pose a fire and explosion risk, but also requires large quantities of acid (hydrochloric, sulphuric or phosphoric), that are added to the illegal waste dumping. Using APAAN as a primary raw material also proved to be cheaper. As a result, the international control of BMK as a precursor not only reduced the costs for the illegal (meth)amphetamine producers, but also resulted in a significant increase in chemical waste.

In the early 2000's, the supply of the precursor PMK for ecstasy (MDMA) also tightened, mainly due to stricter controls introduced in China. Criminal groups looked for alternatives. One option was the use of safrole-rich oils also known as sassafras oil, a plant-based precursor. To produce the oil, wild forest trees are felled and the oil is steam-distilled from the timber, the root and stump. The main production areas are China, Laos, Cambodia and Myanmar. According to David Bradfield of the Wildlife Sanctuaries Project of Fauna and Flora International (FFI), production in the Cardamom Mountains in Cambodia is wreaking ecological damage: "The production of sassafras oil over the last 10 years has severely depleted the trees and if the illicit production isn't stamped out soon, they could become extinct in the near future".¹⁰⁰ The livelihoods of 12,000–15,000 people in the wildlife sanctuary are at risk.¹⁰¹

As the demand and supply of ATS still cannot be controlled, preventing the diversion of precursors to produce them has become one of the key methods to reduce the supply. However, precursor control suffers from the same setbacks as the fight against drugs in general: despite increasing control mechanisms, the market is not really affected. The EMCDDA calculated on the basis of the market size estimates that between 1,293 to 1,948 tonnes of ATS production waste is generated each year in the EU.¹⁰² When APAAN was put on the list of controlled precursor chemicals by the EU (2014) and the UN (2015), new pre-precursors appeared including first, glycidic derivatives of BMK, then APAA and then MAPA, continuing the "cat and mouse game" between illicit producers and law enforcement in which the increase of hazardous chemical waste as a result of precursor controls is ignored.

ways in which the interests of public health, human rights, sustainable development, and environmental protection can align.

On the Connection between Human Rights, Drugs and the Environment

Around the world, drug control efforts have been associated with an array of grievous human rights abuses and violations. In response to this, the International Guidelines on Human Rights and Drug Policy were developed by a coalition of UN Member States, WHO, UNAIDS, UNDP and leading human rights and drug policy experts.¹⁰³ Launched at the CND in 2019, they set out a framework for governments to develop human rights compliant drug policies, covering the spectrum from cultivation to consumption and touching on issues related to development, criminal justice and public health. In relation to the environment, the Guidelines make a number of recommendations, particularly pertaining to punitive measures related to drug control and eradication. Article 1.4 in particular deals with the intersection between human rights, health and the environment (see Box).

The Guidelines also specifically highlight the rights of indigenous peoples as it pertains to the control of lands, territories and natural resources. Article 4.1 states that:

Indigenous peoples have the rights to self-determination and to freely pursue their

economic, social, and cultural development. They also have the right to own, use, develop, and control the lands, territories, and resources that they have traditionally owned, occupied, or otherwise acquired. Indigenous peoples have the right to conserve their lands and protect them from harm caused by drug control measures.

This interfaces with established UN language, most notably in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) which sets out core principles in respect of the rights of indigenous peoples with respect to self-determination, autonomy, participation, consultation and consent, the use of territories and resources, and cultural integrity. The UNDRIP was also cited in the 2016 UNGASS Outcome Document which, according to IDPC, "marks a positive sign to bridge the gap between the UN drug control system and the UN human rights framework", even if much more still needs to be done.¹⁰⁴

There are also many other human rights provisions and protections for groups that are relevant for international drug policy to connect to. The United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas for example, which was adopted by the UN Human Rights Council in 2018, recognizes the rights of peasants, small-scale farmers and fishers, pastoralists, landless people, rural workers, indigenous peoples and other local communities and people working

Article 1.4. of the International Guidelines on Human Rights and Drug Policy

Human rights and environmental protection are interdependent. States should ensure a safe, clean, healthy, and sustainable environment to respect, protect, and fulfil human rights, including the rights to health and to an adequate standard of living. This applies to those who live and work in and near communities where the cultivation of illicit drug crops takes place. State obligations to protect against environmental health hazards also apply extraterritorially.

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

- Ensure that drug control measures do not cause deforestation, the degradation of natural habitats, the loss of biodiversity, or other environmental harm either within or outside their geographic borders.
- Take effective steps to prevent and redress environmental harms caused by drug control measures on illicit crop cultivation and production, including steps to limit exposure to pesticides or other chemicals used to eradicate such crops.
- Establish and enforce buffer zones prohibiting or regulating the application of pesticides and other chemicals used for drug crop eradication around sensitive sites, including human settlements, farms, and water sources.
- Prohibit the aerial spraying of pesticides, herbicides, and other chemicals as a method to prevent and eradicate illicit drug crops absent proof that such chemicals pose no risk to human life or the environment.
- Require comprehensive environmental impact assessments to be carried out with the participation of affected populations in order to assess the expected impact of drug control measures on the environment and to determine the extent to which planned activities can be modified. These studies should be completed prior to the commencement of drug control measures.
- Monitor the implementation of drug control activities. In the event of environmental and related harm arising from such activities, develop and implement adequate and effective remediation measures in consultation with affected populations.

in rural areas. These rural communities and peoples represent almost half of the world's population and are among those who suffer most from environmental degradation and climate change. As such, they should be a particular focus in relation to environmental and climate policy and the elaboration of human rights obligations. As noted by the human rights organisation, FIAN, the UNDROP advances this in the following ways:

UNDROP recognizes [rural communities'] intrinsic relationship with the natural environment by strengthening rural communities' rights. This dynamic points to the significance of their traditional knowledge and innovations as well as their sustainable management practices to cool down the planet and restore ecosystems. UNDROP increases the visibility of rights of rural communities that are already recognized in international



law as well as new rights, such as the rights to land and other natural resources (Art. 17), seeds (Art. 19), food sovereignty (Art. 15) and compensation for losses (Arts. 12, 17, and 24), among others. Women’s rights receive particular attention in UNDROP (Art. 4), which is crucial as rural women often suffer even greater hardship from climate shocks than men, as a consequence of existing gender inequalities.¹⁰⁵

Given the overlap between rural communities and agrarian drug economies, the UNDROP is particularly relevant to the development of a human-rights responsive drug policy.

The Land-Drugs-Environment Nexus

With respect to the relationship between human rights and the environment, it is worth examining the land-drugs-environment nexus in further detail. As this report has argued, agrarian drug economies have in many instances provided marginalised rural communities the possibility to retain, however precariously, land-based livelihoods in an era of globalised and liberalised agriculture. The ability to benefit from the use of this land and related resources such as forests, water, soils etc. – or to gain access to these resources

in the first place – is nearly always tenuous given the sub-altern position of these groups within societies and economies. This also has implications for environmental change as land use decisions are impacted by the ability of communities to access and control the resources upon which they depend.

This question of land is partially recognised within drug policy circles – mostly in relation to AD programmes where the question of lack of access to land is often raised as an issue to be addressed. The United Nations Guiding Principles on Alternative Development for example note that:

- Public policies should play a role in “recognising and enforcing property rights, including access to land” (General provision number 5).
- Actors should “Take into account land rights and other land management resources” in AD programmes (article *kk* in action and implementation measures).¹⁰⁶

What is sometimes not adequately appreciated however is how new forms of land titling, often promulgated under the general banner of promoting ‘land tenure security’ or

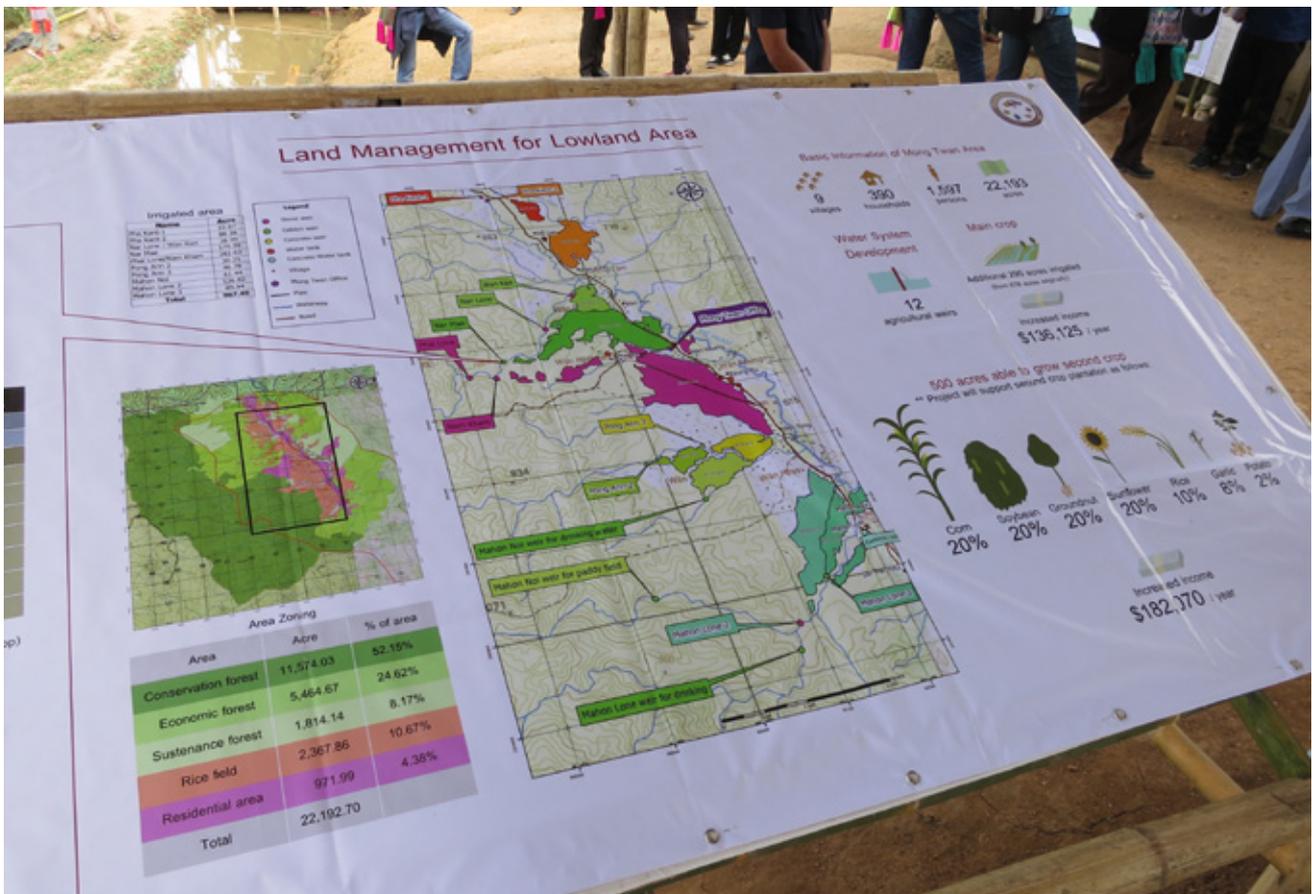
‘access to land’, can also lead to new forms of exclusion and dispossession. This is particularly so when land or tenure rights are conflated exclusively with (formal and private) property rights at the expense of collective or customary rights, or when the full range of measures to deal with (historical and contemporary) land-based injustice are not considered.

For example, in the development of Myanmar’s new land policy, many forms of informal, collective or customary land use are not recognised. Instead, under the Vacant, Fallow, and Virgin (VfV) Land Law, 47 million acres of land – around 75% of which are in the ethnic areas – have been declared to be unused and therefore amenable to be transferred to business interests. Hundreds of farmers have been criminalized in the process for seeking to assert and defend their existing use of these lands.¹⁰⁷ Formalising this process of land registration would only serve to formalise an unjust status quo.

Similarly, against the backdrop of Jamaica’s colonial history of unequal and racialised land

property relations which saw the expulsion of rural people for the creation of large sugar plantations or for bauxite mining, the persecution of ganja farmers who are deemed to be illegally squatting on State (Crown lands) needs to be questioned.¹⁰⁸ This has been taken up by ganja growers as an issue within the new regulatory structure that is being developed for the country’s regulated medical cannabis market. It has also informed the government embarking on a number of AD programmes with ganja growers, including with indigenous cultural communities such as the Rastafarians and the Maroons, to grant them access to public land for licit cannabis cultivation.

It is for this reason that rather than referring generically to ‘access to land’ or ‘land titling’ key reference documents on land such as the UN Committee on World Food Security and FAO’s Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests speak of the obligations of states to respect and protect ‘legitimate tenure rights’, including forms of informal, customary or collective tenure.¹⁰⁹ Additionally,



Land zoning plan, Doi Tung alternative development project, Myanmar, Sylvia Kay, 2015

The '5Rs': a Human Rights Based Approach to Address Land-Related Inequality¹¹⁰

The '5Rs' in the context of land and natural resource governance refers to a package of five interrelated ethical principles – Recognition, Restitution, Redistribution, Regeneration, and Representation – that ought to be at the core of a human rights approach. Elaborating briefly what each of the principles entails:

- Recognition means taking steps to protect and support rural working people who manage to remain on the land and the spaces they need, including areas under customary systems of collective ownership, use and management, such as shifting cultivation, artisanal fishing and mobile pastoralism. Access to land is important in itself and as an entry point for accessing forest and aquatic resources as well.
- Restitution means restoring access to land for both production and social reproduction, starting with the most vulnerable and distressed living in harsh conditions e.g., IDPs and refugees, and people displaced by megaprojects, big conservation projects, and natural disasters.
- Redistribution means redistributing public land and big private estates to impoverished landless and near-landless people. Land redistribution is about changing agrarian structures inherited from the past in order to address land concentration and its related effects of poverty, inequality and structural unemployment.
- Regeneration is about strengthening the ecological foundation and requirements for ensuring the biological health and survival of future generations. Regeneration has two parts. One part starts with a moratorium on any new projects that damage local ecologies and harm people, and then proceeds to identify and roll back the most ecologically damaging, degrading, contaminating, and destructive land/ocean uses (various mining and drilling; large-scale dams; toxic monoculture plantations; etc.). The other part involves encouraging and expanding ecologically beneficial uses including agroecological farming systems. This involves challenging and changing the logic of the global industrial agri-food system (i.e. chemical-based, synthetic fertilizer-dependent, using anti-biodiversity seeds and technology) which undermines rural working people in the long run and contributes further to climate change.
- Democratic representation at all levels is vital for democratic decision-making, both individual and collective. In practical terms it would mean: recognizing civil society organizations representing different kinds of rural working people and taking their views and knowledge into account in land and land-related decision making; and recognizing customary authorities and taking their views and knowledge into account in decision making processes that affect their lands and territories.

Applying all five principles to the 'land problem' is necessary to defend against a variety of economic and extra-economic processes that in combination tend to

dispossess working people and concentrate access to and control of land and related natural resources in the hands of a relative few powerful actors. In order for the 5Rs to work together rather than at cross-purposes, they must be ‘sandwiched’ together by two core measures: 1. A ‘guaranteed minimum access’ to land for all working people for production and social reproduction which is crucial for survival especially in times of crisis; and 2. A society- and system-wide ‘land size ceiling’ or the maximum size of land that an individual or corporation can own. Applying the 5R package with a land access ‘floor’ (guaranteed minimum) and ‘ceiling’ (allowable maximum) enables all working people to move forward, and not just a few.

these Guidelines recommend active measures states can take to prevent excessive land concentration by enacting (re)distributive land reforms and, where relevant, land restitution. This also links to Article 17 of the UNDROP on the right to land mentioned in the preceding section.

Fundamentally, it must be recognised that, across the world, land inequality is at the core of poverty and marginalization and that rural working people need access to an array of natural resources for their economic production and social reproduction activities in order to survive and flourish. TNI has developed a framework for the core principles that should underpin a human rights based approach to address land-related inequality known as the 5Rs (see Box). This includes an ecological regeneration plank.

Embedding Environmental Justice Principles in Transitions to Regulated Markets

In addition to analysing the environmental consequences of drug control policy and alternative development, this report has considered the prospects of integrating environmental concerns within transitions to regulated markets. In this section, a few additional points of reflection are offered with respect to these changing legal regimes.

Firstly, the very different nature and histories of these regulated markets across the world

must be recognised. The ‘social control’ model for coca leaf in Bolivia is very different to that of legal morphine production taking place in Tasmania, India, and Turkey, which in turn contrasts with the multiplicity of frameworks for cannabis regulation across the Global North and South. In the case of coca leaf cultivation in the Andean region, environmental issues are intimately tied to the assertion of indigenous rights, cultural identity and territorial sovereignty, especially against the backdrop of decades of externally driven and environmentally destructive drug control campaigns. With respect to morphine production in Tasmania meanwhile, which takes place in highly securitised and tightly controlled outdoor poppy farms, environmental interventions are likely to align more with more technical climate mitigation and adaption measures, such as those associated with a reduction in the carbon footprint.¹³¹ And when it comes to licit cannabis production, advocates and practitioners have mobilised arguments around fair trade and ethical consumerism through signalling that specific production methods are ‘good for the planet’ – an appeal that is especially targeted towards consumers in and from the global North. The point is that each type of regulated market will require a different rationale and persuasive logic for how environmental questions are to be integrated into policy frameworks.

Secondly, it is by no means a given that transitions to regulated markets – while in theory unlocking the possibility to use a

broader array of public policy tools to address environmental challenges – will necessarily lead to greater environmental protection. This has been illustrated in this report by, for example, the continuation, replication, and intensification of harmful industrial agricultural practices within licit cannabis cultivation. Polson and Bodwitch (2021) introduce a useful concept of ‘emancipatory legalization’ which is of relevance here.¹¹² They define the emancipatory dimension as a process in which regulation indicates not just a change in legal status but also one which addresses critical issues around agency, control and benefit-sharing. In this way, emancipation implies not just “the retrospective address of prior harms but the production of just futures”.¹¹³ They view technocratic forms of regulation that lead to small farmer exclusion, the erasure of accumulated knowledges, and the uprooting of relationships between people and the environment as the antithesis of this type of emancipatory legalisation.

Applying their framework to the case of California, they note that illegality generated a practice they describe as ‘prohibited commoning’ whereby cannabis

farmers operating in the black market engaged, oftentimes out of necessity, in the collective provisioning of resources. This includes the sharing of seed stocks, technological innovations, medical knowledge, communication networks, market relations and informal political power. These collective practices do not necessarily lead to better outcomes for the environment: as the authors note, “commoners can destroy environments, too”.¹¹⁴ However, they do speak to socio-ecological relationships that can emerge beyond those anchored in enforceable contracts, private property, and alienating bureaucracy – elements that underpin a classical economic approach to natural resource governance and the commodification of nature and human labour. The authors point to the ways in which some of these collective practices and commoned resources could be fostered under a new legal regime, including by encouraging the formation of farmer-owned cooperatives, appellation systems that protect unique ecological, horticultural and/or socio-historical dynamics,¹¹⁵ and the provision of public goods such as public seed banks that would protect local strains and the ‘knowledge commons’ developed around them.

Signing of a memorandum of understanding for medical cannabis production, St. Vincent and the Grenadines, Sylvia Kay, 2019



These are elements which could shape the development of a more inclusive and environmentally just cannabis market than has perhaps been the case so far (see also Chapter 4). As California has transitioned to a regulated market, not just for medical but also for adult use, this has gone hand in hand with, among other things, processes of gentrification and the production of luxury landscapes for the benefit of big ‘wine and weed’ complexes catering to high-end tourism. This raises broader questions around the distribution of environmental, economic and social burdens and benefits under a post-prohibition cannabis regime. It is not within the scope of this report to answer these questions. However, a number of organisations such as the non-profit organisation, *Health, Poverty, Action*, are engaging in this debate, exploring what the responsible legal regulation of drugs would look like.¹¹⁶ A side-event on this thematic was organised at the 65th session of the CND in March 2022, looking at some of the principles that would inform a just transition to legal regulation and the benefits this would bring in terms of public health, development, and the environment.¹¹⁷

Drug Policy as Conservation Policy

A through-line throughout this report has been that it is impossible to disassociate questions of environmental protection from issues of social justice. The two must go hand in hand if sustainable futures for people and planet are to endure. As we have seen, the history of drug policy so far has not often lived up to this aim. This brings us to the fundamental question of what does it truly mean to conceive of drug policy as conservation policy? There is no easy one-size-fits all solution but a set of principles can guide us in the right direction.

A key starting must be that conservation efforts must go beyond the outmoded (although in some cases still dominant) paradigm of the human-nature binary: the idea that humans somehow exist outside of

nature and that a strict separation between the two is therefore necessary in the name of environmental protection. That has informed the heavily critiqued ‘fortress conservation’ model whereby humans are excluded from bounded areas imbued with special designations (e.g. national parks) in the service of a worldview constructed around images of ‘unspoilt’, ‘pristine’ or ‘untouched’ nature. As many anthropologists and political ecologists have pointed out, in reality there are very few spaces in the history of the world that are unmodified by forms of social-ecological interaction. The notion therefore that we should ‘leave more room for nature’ by shutting (often racialised and ‘othered’) people out fundamentally misses the mark. It also means that despite the stated goal of environmental protection, the models of conservation that flow from this dichotomous paradigm nearly always prove to be counter-productive due to the increasing inequality, marginalisation, resentment, and conflict that is generated.

If the notion of ‘autonomous nature’ operating independently of humans is problematic, then who gets to ‘speak’ for nature also matters as this not only impacts how nature is ‘represented’ discursively; inevitably these constructs of nature are translated into policy action.¹¹⁸ Often these representations and subsequent policy actions are based on a particular mode of thinking tracing its origins back to the Enlightenment and the empirical tradition. In this form of scientific enquiry, other ways of seeing the world informed by culture, identity-based, spiritual, or religious outlooks are often subordinated, if not completely, absent. This has consequences for how conservation efforts are to be understood. For example, in his study of Karen perceptions of the forest in Kayin state in Myanmar, Steenhuisen (2020) analyses the varied criteria by which different ‘conservation actors’ make sense of a forest environment noting that “while a scientist may grade areas of the forest in Kayin state by counting IUCN [International Union for Conservation of Nature] red-listed animal and plant species, from a Karen perspective

we should consider the level of happiness of the spirits, the amount of animal species that cause peace, the abundance of trees with cultural and religious significance”.¹¹⁹

Appreciating that different people in different places will have different perceptions of nature, the environment, and conservation does not imply reifying, fetishizing, or romanticising indigenous or local practice across the board. Rather it is an appeal to take seriously the many different value-sets or ontologies that inform human-nature relationships across different places rather than super-imposing, a singular, top-down vision for how conservation is meant to play out. In fact, it is often in this process of engagement that “one becomes aware of perceptions, priorities and red-lines held by people who perceive of human-nonhuman relations from very different modes of identification”.¹²⁰ This leads to a more nuanced understanding of the two-way, dynamic relationship between people and nature, the cultural structures and institutions that mediate this relationship, and ultimately more robust models for developing sustainable and resilient interactions between human societies and the natural environment.

What does all this imply for the intersection between drug policy and conservation policy? This is worth unpacking a bit further in relation to an issue which has already been explored in this report – namely the link between DTOs and patterns of deforestation associated with cocaine flows. Jennifer A. Devine et al. (2020) look at the way DTOs have upended conservation strategies in their study of Guatemala’s Maya Biosphere Reserve: a vast region made up of a series of interconnected national parks that collectively cover two million hectares.¹²¹ They seek to explain what they call a key ‘conservation paradox’: the fact that national parks in the reserve’s west, which hold the highest protected status and where land use is restricted to conservation and tourism activities, only have experienced some of the highest deforestation rates in the world (in some cases losing up to 30% of forest cover in 15 years) while forests in the

reserve’s east, that are designated as ‘multiple use’ and are home to villages and community forestry concessions, remain much more intact.

The authors attribute this anomaly to the presence of DTOs that are drawn to the relative impenetrability of the reserve’s most protected areas to operate covert landing strips for the trafficking of cocaine. These proceeds are then laundered in the form of cattle ranches (as well as in some instances teak and oil palm plantations) to consolidate territorial control. This territorial control is in some ways even more prized than the actual cocaine trade as it allows DTOs to profit from a range of intertwined illicit activities that pass through the many unregulated crossings that exist along the Reserve’s border with Mexico that serve as smuggling corridors not only for drugs but also poached antiquities, timber and wildlife as well as for refugees and undocumented families.

While the presence of DTOs in the Reserve is far from unknown, the picture is complicated by the fact that DTOs are not the only actors operating in what can be referred to as a ‘contested conservation landscape’. They include also landless peasants (both indigenous and non-indigenous) who have established squatter settlements in a number of national parks in the Reserve to practise subsistence farming and small-scale agriculture. Despite the fact that DTOs and landless peasants hold vastly different power and economic resources, they are nevertheless brought together by Maya Biosphere policy makers under a singular frame of criminality, illegal occupation, and more broadly, a nebulous discourse of ‘ungovernability’ which fails to centre wealthy land speculators and DTOs as the main agents of environmental destruction.

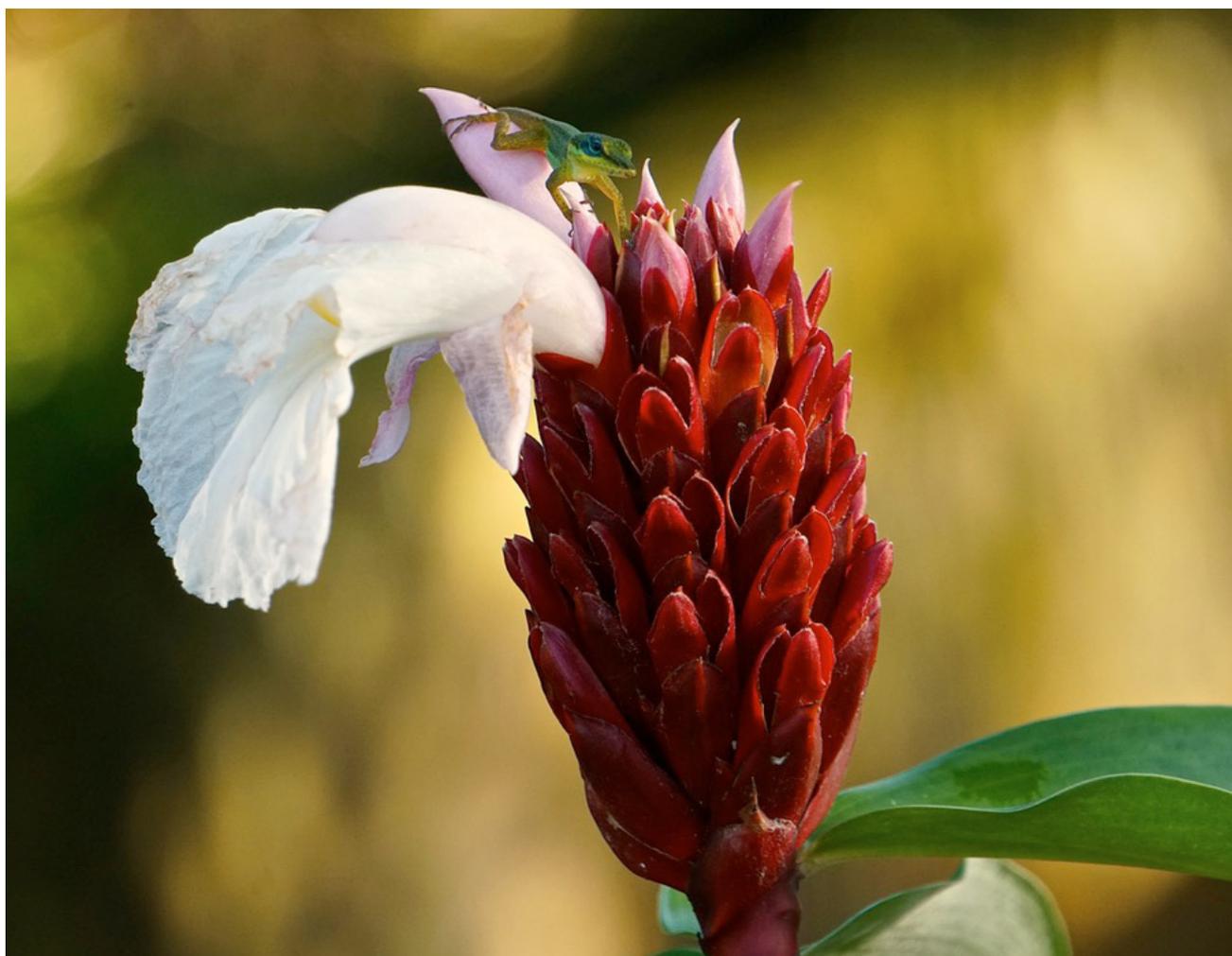
As the authors note, this essentialising frame simply does not hold. The everyday lived experiences of peasants in the Reserve, especially of indigenous Maya populations, are marked by insecurity, poverty, landlessness, malnutrition and violence. This follows on from a long history of various waves of

dispossession and agrarian conflict, including a 36 year civil war that claimed the lives of over 200,000 and led to a million people being displaced. It is perhaps therefore not surprising that these communities living in the Reserve experienced the creation of the Reserve in 1990 as another act of enclosure and land dispossession, where the force of the law is brought to bear on them in the form of the exercise of state control over resources, territories, populations; ongoing evictions; and the criminalisation of customary forest use and swidden agriculture.

This contrasts with the relative political impunity with which Guatemalan and Mexican DTOs operate within a \$100 billion illicit global drug trade – estimated to make up as much as 10% of Guatemala’s GDP every year. Among Maya Biosphere policy makers, the relationship among narco-ranchers, legal residents, land speculators, and landless peasants illegally residing in the reserve is debated and ambiguous, with peasants accused of

collaborating with DTOs by working on narco-related cattle ranches. Even if one were to put aside the tactics of violence and intimidation that are often used by cartels to seize peasant and indigenous lands, the absence of economic opportunities mean that there is often little in the way of choice but to labour as ranch hands in protected areas. More to the point, as the authors note, large-scale deforestation for narco-ranching takes place through land speculation undertaken by opportunistic people with means rather than peasant farmers.

As such, pathways to respond to the ‘conservation paradox’ of the Maya Biosphere Reserve must be rooted in frameworks that address enduring issues of landlessness, racialised poverty, agrarian conflict and inequality, and systemic violence. The authors point to the successful community forestry efforts in the Reserve’s east where deforestation rates are lower compared to, in theory, the more protected areas in the Reserve’s west as a promising strategy. In



Lizard on flowering plant in botanical gardens, St. Vincent and the Grenadines, Sylvia Kay, 2019

fact, the relative success of this model has inverted the original conservation strategy with efforts now focussed on creating a buffer to protect the remaining forests in the east from encroaching cattle ranches in the west. It also importantly shows how community forestry can operate as a 'de facto counter-narcotic strategy' by strengthening forms of land and resource rights that enable transformative grassroots politics rather than advancing an unreconstructed narrative of criminality and environmental harm.

Market-Based Environmental Management, Climate Finance, and Alternative Development: Risks and Opportunities

A relatively new development within drug policy circles has been the identification of green or climate finance mechanisms as a potential source of funding to integrate within AD programmes. A recent Expert Group Meeting (EGM) organised by the United Nations Office on Drugs and Crime; the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the Federal Ministry of Economic Cooperation and Development (BMZ) of Germany; the Ministry of Foreign Affairs of Peru; the National Commission for Development and Life without Drugs of Peru (DEVIDA); the Office of the Narcotics Control Board, the Ministry of Foreign Affairs of the Kingdom of Thailand and the Mae Fah Luang Foundation under Royal Patronage in January 2022 noted for example that:

The application of Payments for Ecosystem/ Environmental Services (PES) and the possibility to utilize carbon credit schemes were presented at the EGM as viable, diversified income-generating livelihood options.

It was stated that the private sector is adapting to the global carbon emission neutrality and the net-zero pledge and is seeking efficient ways to offset their carbon emission to meet national regulations and goals. Therefore, there is an opportunity for alternative

development programmes to encourage communities to preserve forests and gain additional income from the sales of carbon credit collected from forest protection.¹²²

The attraction of sources of green or climate finance, such as the announcement made during the United Nations Climate Change Conference of the Parties (COP26) that 100 billion USD will be made available annually to developing countries in climate finance, is understandable given the perennial funding shortages facing AD programmes worldwide. To date, only a few AD programmes have actively sought to integrate forms of green or climate finance, mostly still on a relatively small-scale and in a pilot phase. However, given the flows of funding and the prominence of environmental and climate issues within international policy-making, this is likely to increase in the coming years.

Indeed, at the CND this year a resolution on AD was adopted which:

Encourages Member States to design and implement alternative development programmes, as appropriate, in ways that also reduce negative impacts on the environment and contribute to conservation efforts and to take note of opportunities for communities affected by or at risk of illicit cultivation of narcotic plants, as appropriate, to access public and private investment, climate finance, as well as of carbon credit schemes and payments for ecosystem services, in accordance with domestic legislation;¹²³

In this context, it is important to be aware of some of the different types of schemes that can fall under green/climate finance and more broadly, what some of the critiques are of market-based environmental management strategies (see Box). This report has already touched on a number of these issues, detailing for example the problems associated with industrial tree plantations – some of which are financed through carbon credit schemes such as REDD+. Without going into too much detail, this section will briefly explore some of these issues further in relation to two

Payments for Ecosystem Services (PES): A Critical Look¹²⁴

Payments for Ecosystem Services (PES) are a particular market-based approach to environmental management and conservation. Reconceptualizing nature as a subsystem of the economy, it posits that environments and the natural world are degraded largely because they are conceived as 'externalities' within the current capitalist system. Protecting nature and the environment therefore requires pricing in these 'externalities' through forms of cost accounting, the creation of 'natural capital', and the transformation of various ecosystem functions (healthy soils, clean water, species richness, carbon sinks) into discrete, fungible, and measurable units, often amenable to trade. People and communities are to be compensated according to their ability to protect, conserve and enhance these ecosystem functions through payments and other economic incentives that are believed to guide their behaviour. PES schemes differ across the world, mobilising different sets of public and private actors and with payments more or less conditional on progress made towards conservation criteria.

The model of PES has been criticised by a number of scholars, civil society organisations and social movements on a number of fronts.¹²⁵ On a more conceptual level, the difficulties in transforming complex ecosystems into standardised and individualised metric units is often pointed out. What fundamentally counts as 'net zero' or 'net conservation' improvement? The answers are often contested and can change over time. This relates also to the allocation of responsibilities and the distribution of liabilities in PES schemes, especially for markets in PES schemes which involve tradeable property rights to ecosystem functions, sometimes on a trans-continental scale. This can generate perverse incentives: as labour, land and lives are cheaper in the global South, PES can steer investment in greening toward those places and activities where conservation can be carried out most cheaply, not necessarily where it is most needed. It can also reinforce inequalities within countries, between urban and rural areas, and critically, between those that already control 'environmental assets' (particularly land) and access to them in the form of property titles and those that do not. Fundamentally, there is also a clash of values between those that believe that environmental sustainability is best shaped by material incentives and economically 'rational' behaviour and those that stress the role of things such as culture, social reproduction, communal norms and obligations in embedding a sense of environmental stewardship within communities. In the latter case, interventions should centre on alleviating the pressures on peasants, fishers, pastoralists, indigenous peoples and forest dwellers who should be recognised and rewarded based on the ecosystem benefits they already provide.

PES schemes that have been or are in the process of being trialled in relation to AD programmes: one in Colombia and one in St. Vincent and the Grenadines. The aim is not to offer definitive conclusions on the merits and limitations of these schemes but rather to flag a number of pertinent issues that deserve further consideration.

In Colombia, reducing the environmental

harms associated with illicit coca cultivation and production is one of the general objectives of the country's 2019 – 2022 national drug control strategy, *Ruta Futuro*. The strategy recommends developing alternative sources of income that integrate conservation instruments to reduce deforestation and rehabilitate ecosystems of particular ecological significance. This includes plans for 'environmental zoning' in order to implement



PES schemes as well as updating and expanding cadastral systems and land titling programmes.¹²⁶ This partly builds on earlier initiatives such as the partnership between the Governments of Colombia, Norway, Germany and the United Kingdom which includes support for a national REDD+ programme to counter deforestation, including that arising from illicit coca cultivation. Two of the stated goals of this programme as outlined in the Joint Declaration of Intent are to create and support a land registry for at least 1 million hectares in high deforestation areas as well as to include 195,000 additional hectares under PES and environmental incentive schemes in areas of high deforestation by 2022.¹²⁷

It still largely remains to be seen what role PES schemes can play in both protecting the environment and strengthening the livelihoods of rural communities, especially of the most vulnerable and marginalised. According to Santos et al. (2021), “Accessing non-timber forest products and adding Payments for Ecosystem Services are two promising but not yet established approaches for adding value to natural forests and preventing coca-driven deforestation encouraged by a low commercial value

of the affected areas. Their further development requires value chain analyses and development plans, the improvement of institutional capabilities as well as continuous regulatory and impact assessments.”¹²⁸ In a country where land inequality is amongst the highest in the world (and the highest in Latin America) and where the ‘land question’ remains very much unresolved, it also requires a serious examination of how the land–drugs–environment nexus will unfold, particularly given the concerns noted above (see Box) that PES schemes tend to benefit wealthier land owners and those with formal property rights. The delays in rolling out Colombia’s land restitution programme, ongoing conflicts around the recognition and respect for informal and customary indigenous and community land rights, and more broadly slow progress in the implementation of an agenda for comprehensive agrarian reform all have a bearing on the relative success or failure of AD, counter-narcotic, and environmental protection policies.

The importance of access to and control over land (and related resources) as well as strengthening forms of community organisation in relationship to PES schemes

is also underlined by the experience of St. Vincent and the Grenadines (SVG). Since 1912, all land above 330m in elevation is officially designated as Crown Land – public land under the control of state authorities. It is subject to some of the strictest conservation measures in order to protect soil and slope stability and the watersheds upon which much of the island’s drinking water depends. However, upland forests are also home to rural communities who rely on the forest for hunting, charcoal production, the extraction of timber and non-timber forest products as well as the cultivation of food crops. Amongst these forest dwellers are also cannabis growers, the numbers of which have significantly increased since the dramatic down-turn in the country’s banana industry following the decision by the EU in 1997 to remove the preferential trade agreement. This has led to a range of environmental issues including increased forest fragmentation, loss of soil and siltation of watercourses.

In response to this, the government of SVG initiated the Integrated Forest Management and Development Programme in 2003. This included an Alternative Community Livelihoods Programme centred on the promotion of alternatives to cannabis cultivation as well as funding for the restoration of watersheds. According to an independent report on the programme, it “... represents an innovative approach to watershed management for St. Vincent and the islands of the Eastern Caribbean. It recognizes that the traditional approach of legislation and enforcement has largely failed to prevent increasing rate of deforestation, particularly in the face of current economic challenges”.¹²⁹

The long-term results of the programme are however rather mixed. It is unclear to what extent the programme has contributed to environmental protection – deforestation related to cannabis cultivation remains an ongoing issue, largely as a result of continued economic hardship and the inability of the programme to establish alternative livelihoods to supplant cannabis (ganja)

growing. However, according to a key project participant who served as a Community Liaison Officer, the emphasis the programme gave to engaging with and building up social organisations in the form of Forest User Groups (made up mostly of ganja growers) has been one of the enduring strengths.¹³⁰ Some of these former user groups now form part of the Fair Trade Cannabis Working Group in the Caribbean, dialoguing with policymakers and public authorities on a number of issues, including on how to integrate environmental criteria within the transition to a regulated market for medical cannabis (see also Box in Chapter 4).

Ecological Resilience and Climate Change

This report cannot end without a final word on the intersection between climate change, ecological resilience and drug policy in light of the fact that illicit crop cultivation, like all life on Earth, stands to be affected by the ongoing impact of anthropogenic climate change. In an eco-social order marked by ‘slow violence’,¹³¹ the testing or transcendence of ‘planetary boundaries’¹³² and an economic growth model built around the relentless execution of a series of ‘biophysical overrides’,¹³³ there is an urgent need to take policy action. Responses have included global agreements in the form of the 2030 Sustainable Development Agenda and the Sustainable Development Goals (SDGs), the United Nations Framework Convention on Climate Change (UNFCCC), and the Convention on Biological Diversity (CBD), to name but a few. While the SDGs have been referenced in a general way in drug related policy documents, such as the 2016 UNGASS Outcome Document, specific climate, environment or nature related policy frameworks have been rarely referenced, if ever, as noted also in Chapter 1.

There is therefore much more concerted effort that needs to take place to connect the dots between drugs and the environment. At the heart of this report has been an interrogation of the drugs-environment nexus from the

standpoint of environmental justice i.e. the fact that those most impacted, but least responsible, for large-scale environmental destruction need to be prioritised in decision-making processes that affect them. This involves asking fundamental questions around “who is entitled to what, who owes what to whom, how such rights and entitlements are to be enforced, and who gets to decide”.¹³⁴

This report has examined some of these questions with respect to the rural world, centering the role of growers of prohibited plants and their communities in discussions of the environmental impact of agrarian drug economies. As noted earlier in this Chapter with regards to the connection between drug policy, human rights and the environment, these communities face ongoing marginalisation, discrimination and criminalisation and therefore require particular attention in drug and environmental policymaking.

This marginalisation is not just the result of a prohibitionist drug regime. It is also based on a mainstream development model

which treats certain land uses and land users as economically inefficient and thereby also as ecologically inferior. Despite some positive examples, this also infuses much AD programme thinking in which a particular set of underlying assumptions drive rural development interventions geared towards the adoption of sedentary agricultural lifestyles, productivist frameworks and technologies of ‘sustainable intensification’. To this can now be added incorporation within market-based conservation schemes, the expanding non-farm economy, or increasingly also through migration to urban areas. Those who resist and don’t want to be transformed into utility maximising individuals or corralled into neoliberal conservation projects face exclusion or are otherwise sanctioned.

There is another way. A programme of ‘agrarian environmental justice’ which takes seriously questions of both production and social production and mobilises public investment and support for expanding the material basis for collective autonomy and ecological regeneration can inspire a way forward.¹³⁵ This must start from a valuation,



Coca leaf collection day. Children, young people and neighbours participate. Photographer: Diego Lagos, Drugs and Disorder project. (2021).

Organic Coca Cultivation

As discussed in Chapter 2, in addition to the damaging effects of forced eradication and aerial and ground spraying, coca monocultures also negatively impact the surrounding land and ecosystems, contributing to landslides and loss of biodiversity. Extensive plantations that make use of fertilizers and other agrochemicals to boost productivity interrupt natural cycles that renovate soil nutrients, leading to soil degradation.

Consequently, some communities in Bolivia and Colombia have opted for more sustainable, diversified forms of coca cultivation based on agroforestry systems. Commonly known as 'organic coca', this form of cultivation is characterized by the lack, or limited use, of chemicals, combined with the cultivation of native species that create a synergy between the plants and help the soil to recover. Contrary to dominant discourses, coca crops need not necessarily imply environmental harm. There are a number of examples of agroforestry systems that integrate coca along with subsistence crops such as *yuca* or corn and which help to maintain local flora and fauna.¹³⁶ Since 2007, for instance, *Ecotop Foundation* has been working with family farmers in Los Yungas, Bolivia, where sustainable production of coca was developed by introducing Successional Agroforestry Systems (SAFS) and diversified plots that help to rehabilitate degraded soils.¹³⁷ From 2010 to 2012, more than 230 families received the Organic certification by *IMO Control LA*, as part of a project financed by the European Union to develop the first organic coca tea production.¹³⁸

A study by Jacobi, Lohse and Miz (2018) shows that, although production levels were lower under organic coca production compared to conventional systems, the diversified nature of agroforestry systems generated higher income overall.¹³⁹ Similarly, while the production costs were higher in the case of organic coca, total revenue was higher, with 5.690 BOB (Bolivian Boliviano) per 0,25 hectare generated under organic coca cultivation in comparison to 2.135 BOB from the same area generated through conventional coca cultivation. Moreover, the different crops that grow alongside coca in diversified, agroecological systems mean different jobs for more people, enlarging also the scope of farmers' autonomy.

In Colombia, nearly 2,000 hectares of coca crops are dedicated for traditional use. Some indigenous communities from Lerma, a village in the department of Cauca, have been cultivating coca using ancestral techniques. Since 2017, they have been part of a research project to examine the scientific uses of coca involving the National Training Service (SENA) which purchases coca from communities producing coca in a traditional way.¹⁴⁰ As a result, they have managed to create organic fertilizer made from coca. However, legislation in Colombia still needs to be broadened in order to recognize the different potential, sustainable uses of coca.

In Bolivia, the government has implemented different strategies since 2006 to limit the environmental impacts of coca cultivation in cultivation areas, including the Comprehensive Sustainable Development Strategy with Coca (Endisc).¹⁴¹ Under Law No. 906, known as the General Law of Coca 2017, Bolivia defined authorized zones for the indigenous and ancestral/traditional production of coca to allow for domestic use and consumption, for research, and in order to control the further expansion of cultivation

areas. Based on principles of "harmony and balance with Mother Earth", the Law promotes the recovery and production of organic coca through ancestral and cultural practices. Art.19 of the Law, for example, stipulates that coca production must follow rotational crop cultivation methods with fallow plots of land being ensured to allow soils to regenerate.

According to Colombian ecologist, Dora Troyano, during a panel intervention at the JustCoca 2022 Workshop,¹⁴² a key element to encourage more sustainable forms of cultivation is through the allocation of land. While farmers without land tenure operate under a culture of colonization that responds to the production demands set by illegal armed groups, secure access to and control over land helps farmers create a strong connection with nature and the protection of natural resources.

not denigration, of modes of peasant agricultural production that often exist alongside illicit crop cultivation or which can form the basis for a just transition out of illicit cultivation where this is desired. In his work over many decades on peasant economies around the world, the rural sociologist Jan Douwe van der Ploeg, documents the series of balances and flows and processes of finetuning, adaptation, pluri-activity that define the peasant 'art of farming'.¹⁴³ One of the main 'balances' is that between people and living nature, with peasants engaged in a constant equilibrium seeking process to reproduce (and preferably also enrich, improve and diversify) natural resources to allow also for the continuation of the peasant way of life. This balance breaks down in the face of land grabbed for agrofuel plantations; or new enclosures for biosphere reserves; or the economic pressures that global commodity chains and the import of cheap, industrialised products from 'food empires' bring to bear on peasant markets.¹⁴⁴

This does not mean that there is no room for improvement and need for further knowledge exchange, investment and support to strengthen ecologically regenerative practices. Peasant movements have been calling for example for dramatically stepped-up public support for agroecological training schools and knowledge centres in light of the fact that agroecology is at the heart of the

transformation to sustainable food systems – as recognised also in the U.N.'s landmark 2009 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) report.¹⁴⁵ It is here also where agrarian movements, including also potentially organisations involving growers of illicit crops, can build bridges to the environmental and climate movements. Experiments with organic and agro-ecological coca cultivation in Bolivia and Colombia (see Box) or a fair trade cannabis model integrating core elements of environmental sustainability in the Caribbean (see Box in Chapter 4) are examples of where such bridge-work could take place.

It is only by engaging in this kind of bridge-work that new solidarities can be formed to transform ecological rupture into ecological resilience, laying the foundations for the delivery of environmental justice for people, prohibited plants, and planet.



Market in Florencia, Caqueta Province, Colombia, TNI.

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Drug policy and environmental policy have often operated at cross-purposes from one another – the result of a narrow framing of drug policy within the realm of crime and law enforcement. In an era of unprecedented environmental stress, climate change and global heating, this disconnect requires urgent remedying in order to develop an ‘environmental harm reduction’ approach to drug policy. This report outlines what the contours of such an approach could be, with a particular focus on the three main agrarian drug crops. Through a range of in-depth case studies including coca cultivation in the Andean region and cocaine trafficking in Central America, opium poppy cultivation in Myanmar and Afghanistan, and cannabis growing in Morocco and California, the report documents a range of environmental impacts associated with these ‘prohibited plants’.

The report argues that to truly deliver on the promise of a ‘green drug policy’, it is key to critically analyse the role that both drug control and (alternative) development policy have played in these environmental impacts. Such an analysis must stem from an approach centred on environmental justice: the recognition that poorer and marginalised communities, often differentiated along class, gender and racial lines, face particular exposure to environmental harms. This holds especially true for populations in the global South. This sets the basis for a number of sustainability pathways to be explored within drug policy around land and resource justice; people-based conservation strategies; the integration of environmental sustainability criteria within new, regulated markets; and connecting the dots between drug policy, environmental policy, and human rights.



The Transnational Institute (TNI) is an international research and advocacy institute committed to building a just, democratic and sustainable world. Founded in 1974 as a network of ‘activist scholars’, TNI continues to be a unique nexus between social movements, engaged scholars and policy makers.

TNI has gained an international reputation for carrying out well researched and radical critiques and anticipating and producing informed work on key issues long before they become mainstream concerns, for example, our work on food and hunger, third world debt, transnational corporations, trade, and carbon trading. As a non-sectarian institute, TNI has also consistently advocated alternatives that are both just and pragmatic, for example developing alternative approaches to international drugs policy and providing support for the practical detailed work of public water services reform.

TNI’s Drugs & Democracy programme analyses drug policies and trends in the illicit drugs market. TNI examines the underlying causes of drug production and consumption and the impacts of current drug policies on conflict, development, and democracy. The programme facilitates dialogue and advocates evidence-based policies, guided by principles of harm reduction and human rights for users and producers.

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